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Poster Sessions

IP1

Screening the pathogen box and the stasis box to identify compounds inhibiting *Madurella mycetomatis* growth *in vitro* and *in vivo*

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INTRODUCTION Mycetoma is a chronic granulomatous subcutaneous infectious disease, characterised by large tumour like swellings. It can be caused by either bacteria (actinomycetoma) or fungi (eumycetoma). The most common causative agent is the fungus *Madurella mycetomatis*. Actinomycetoma can be successfully treated with antibiotics, but for eumycetoma a combination of antifungal therapy and surgery is needed and even then a low cure rate is observed. There is a desperate need to identify novel antifungal compounds which are able to cure eumycetoma.
AIM To screen the pathogen box and stasis box to identify compounds inhibiting *Madurella mycetomatis* growth.
METHODS 400 drug-like compounds from the Pathogen Box and 400 drug-like compounds from the Stasis-box were screened for *in vitro* activity against *M. mycetomatis* hyphae at a concentration of 100 μM. For each of the growth inhibiting compounds IC50s were determined. Compounds with an IC50 < 5 μM were further evaluated *in vivo* in a *M. mycetomatis* grain model in *Galleria mellonella* larvae.
RESULTS Out of 800 compounds, 215 compounds inhibited the growth of *M. mycetomatis* at a concentration of 100 μM. 13 of these compounds had an IC50 < 5 μM. Of these compounds 12 were originating from the Pathogen Box, 1 from the stasis box. The most potent compounds were the azoles posaconazole, bitertanol and difenoconazole, followed by the two strobilurins azoxystrobin and trifloxystrobin and compounds MMV689244, MMV675968, MMV687807, MMV022478 and MMV006357. Currently we are testing these compounds *in vivo* in *G. mellonella* larvae. Compound MMV675968 prolonged survival of *M. mycetomatis* infected *G. mellonella* larvae (Log-Rank, $P = 0.005$).
CONCLUSION By screening the Pathogen Box and the Stasis Box, 13 compounds were identified which inhibited *M. mycetomatis* growth at low concentrations. At least one of the compounds was able to prolong survival of *M. mycetomatis* infected *G. mellonella* larvae.

IP2

Action of HIV and tuberculosis medication on CatSper Ca^{2+} channels in human sperm

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INTRODUCTION In humans, progesterone secreted by the oozyte serves as important chemical cue for sperm during the fertilization process. Progesterone acts via the sperm-specific, pH-sensitive CatSper Ca^{2+} (Calcium) channel that control intracellular Ca^{2+} concentration and thereby swimming behavior of sperm[3]. In human sperm, CatSper is directly activated by progesterone and prostaglandins, which stimulate a rapid Ca^{2+} increase and motility response. It has recently been demonstrated that endocrine disrupting chemicals activate CatSper channels and evoke motility response and acrosomal exocytosis in human sperm. They desensitize sperm for progesterone and prostaglandins and hence might impair human fertilization[2].

In recent publications it has been discussed if certain diseases and its' medications have an influence on human sperm and therefore might hinder the fertilization process. Sperm motility and ejaculate volume alterations in HIV-1 infected patients were described[1]. Moreover, Nevirapine was associated with better semen quality (more progressively motile spermatozoa) in comparison to other NRTIs and PIs.
AIM In this study, we tested medications that are frequently used in the treatment of people living with HIV/Aids and tuberculosis for their action on CatSper channels in human sperm.
METHODS The medication tested was Streptomycin, Pyrazinamid, Isoniazid and Rifampicin as tuberculosis medication and Nevirapin (NNRTI), Zidovudin (NRTI) and Ritonavir (PI) as anti-retroviral medication in the treatment of HIV/Aids.

We tested the action of the drug using sperm from healthy (HIV and tubercolusis negative) volunteers. Sperm were loaded with a fluorescent Ca^{2+}sensitive dye and the Ca^{2+}response of sperm were measured with with fluorescence-based assays after 10 μM of the specific substances were added. As positive controls 10 μM progesterone was added.
RESULTS We revealed that challenging sperm with the drugs did not evoke a Ca^{2+} response. In the presence of the drugs, progesterone still evoked a characteristic Ca^{2+} response. We were unable to test Rifampicin, because the drug's red color interfered with the fluorescence of the Ca^{2+} indicator.
CONCLUSION Under the conditions used here, the above mentioned tuberculosis and HIV/Aids medications do neither activate CatSper Ca^{2+} channels in human sperm nor do the drug interfere with CatSper activation by progesterone.
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Abstracts

IP3

Diagnostic performance of the Loop-Mediated Isothermal Amplification (LAMP) based illumigene® Malaria assay in a non-endemic region

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INTRODUCTION Light microscopy and antigen-based rapid diagnostic tests (RDTs) are the primary diagnostic tools for detecting malaria, although being labor-intensive and frequently challenged by lack of personnel's experience and low levels of parasite density. The latter being especially important in non-endemic settings. Novel molecular techniques aim to overcome this drawback.
AIM The objective of this study was to assess the diagnostic performance of the illumigene Malaria assay (Meridian Bioscience) compared to microscopy, RDT and real-time PCR. This loop-mediated isothermal amplification (LAMP) assay is a qualitative *in vitro* diagnostic test for the direct detection of *Plasmodium* spp. DNA in human venous whole blood samples.
METHODS The illumigene Malaria assay was assessed on a retrospective panel of stored blood samples (n = 103) from returned travelers and external quality control samples (n = 12). Additionally, the assay was prospectively assessed on 30 fresh routine samples with a request for malaria diagnosis. The illumigene assay was compared to microscopy, RDT and *Plasmodium* species specific real-time PCR.
RESULTS In the retrospective evaluation, the illumigene Malaria assay showed 100% agreement with the real-time PCR, RDT and microscopy yielding a sensitivity and specificity of 100% (95% CI: 95.1%–100% and 89.7%–100% respectively). Seven samples from patients recently treated for *Plasmodium falciparum* (*Pf*) infection that were RDT positive and microscopy negative yielded positive test results. The performance of the illumigene Malaria assay equals that of microscopy combined with RDT in the prospective panel with three false negative RDT results and one false negative microscopy result. Excellent concordance with PCR was observed. The limit of detection of the assay approached 0.5 parasites/μl for both *Pf* and *Plasmodium vivax*.
CONCLUSION In non-endemic regions where the diagnostic process for malaria infections is questioned by lack of experience and low levels of parasite densities, the illumigene Malaria assay can be of value. Due to its high sensitivity, the LAMP assay may be considered as primary diagnostic test. Our results indicate that negative screen results do not need further confirmation. However, before implementation, this approach needs to be confirmed in larger, prospective studies. A shortcoming of this assay is that no species identification nor determination of parasite density are possible.

IP4

Targeting the arginine permease 3 (*aap3*) coding sequence for rapid identification of *Leishmania* through high resolution melting (HRM) analysis

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INTRODUCTION Leishmaniases are a wide spectrum of diseases from cutaneous lesions to deadly visceral manifestations. In humans, around 20 different species of the protozoan parasite *Leishmania* are the causative agent. As the clinical outcome of the disease and the effectiveness of the treatment protocols is partly dependent on the species, accurate diagnosis associated to species identification is paramount. In addition, the correct identification of *Leishmania* species generate important data for epidemiological and ecological studies.
AIM To develop a rapid, specific and sensitive diagnostic assay for differentiation of *Leishmania* species targeting the *aap3* coding sequence.
METHODS We designed four pairs of primers flanking polymorphic sites on the *aap3* coding sequence for amplification in real-time PCR and subsequent HRM analysis. Amplicon 1 was used to group the parasites into three main groups: (I) *L. (L.) donovani, L. (L.) infantum, L. (L) tropica*; (II) *L. (L.) major, L. (L.) mexicana, L. (L.) amazonensis;* and (III) *L. (V) braziliensis, L. (V.) guyanensis, L. (V.) lainsoni, L. (V.) naiffi, L. (V.) shawi, L. (V.) panamensis*. For further distinction, three amplicons were designed to differentiate species within the groups.
RESULTS The assay was able to distinguish all the species tested. Specificity was further investigated comparing the dissociation profiles of different strains of the same species. Further, the amplification profile for *Trypanosoma cruzi*, *T. brucei*, *Crithidia fasciculata* and *Endotrypanum schaudinni* was distinct from the ones observed for *Leishmania* species. No amplification was detected for mouse, rat or human DNA.
CONCLUSION *aap3*-HRM analysis is a fast strategy for detection and discrimination of *Leishmania* species. Distinct profiles were found for phylogenetically close organisms and host DNA was negative. Further, the detection limit was about one parasite per reaction, therefore we propose an initial pre-amplification step, producing an amplicon encompassing the 4 regions to increase sensitivity.

IP5

Evaluation of the leishbox compounds on nepalese clinical isolates of *Leishmania donovani,* an industrial/academic collaboration

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INTRODUCTION Chemotherapy of visceral leishmaniasis (VL) is threatened by growing drug resistance (DR) and treatment failure. Resistance has rendered antimonials (SSG) obsolete in the Indian Sub-Continent (ISC) and miltefosine's (MIL) efficacy is decreasing. New chemotherapeutic options are needed and novel compounds are being introduced like the 'Leishbox'[a].
AIM We recently recommended embedding DR-studies in the drug development pipeline[b], among others by validating novel compounds' activity on recent clinical isolates with DR. In the present study, we explored the implementation of this recommendation.
METHODS In this academic/industrial collaboration, the Leishbox compounds were screened against one SSG-sensitive and one SSG-resistant strain of *L. donovani* recently isolated from ISC patients, using an intracellular assay of *L. donovani*-infected THP1-derived macrophages.
RESULTS Comparing the results with those originally observed with *LdBob*, an East African strain showed that significant differences were encountered.

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CONCLUSION We demonstrate the potential value of including clinical isolates (including resistant strains) in HTS progression cascade.

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IP6

Human stem cell-derived hepatocyte-like cells support Zika virus replication and provide a relevant model to assess efficacy of potential antivirals

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INTRODUCTION Zika virus (ZIKV) is an arthropod borne flavivirus mostly transmitted by *Aedes* mosquitos. A major public health concern is the link between ZIKV infection and abnormalities during fetal brain development. ZIKV viral particles have been detected in the amniotic fluid of pregnant women and in the brain tissue of fetuses with microcephaly. Recently, ZIKV mouse and non-human primate models were established. ZIKV-infected mice sustained a high viral load in the brain and spinal cord, as well as in the kidneys, spleen, liver and testes. Additionally, ZIKV RNA was detected in the liver of ZIKV-infected pregnant non-human primates as well as in the liver of the fetus. However, to the best of our knowledge, there is no evidence that ZIKV can be a causative agent of hepatitis and/or liver damage in humans.
AIMS As ZIKV is a flavivirus closely related to the dengue and yellow fever virus and ZIKV RNA is detected in the livers of mouse and non-primate models, our aim was to determine whether ZIKV can infect human pluripotent stem cell (hPSC)-derived hepatocyte-like cells (HLCs).
METHODS hPSC were differentiated towards hepatocyte-like cells. HLCs and HUH7 hepatoma cells were infected with ZIKV. ZIKV infection and replication were analysed by means of RT-qPCR, immunofluorescence imaging, cell viability assays and production of infectious virions. Additionally, the host immune response and the antiviral activity of three RNA-polymerase inhibitors were determined.
RESULTS We demonstrated that hPSC-HLCs support the complete ZIKV replication cycle, which was also seen in HUH7 cells. Among three antiviral drugs that inhibit ZIKV infection in Vero cells, only 7-deaza-2′-*C*-methyladenosine (7DMA) inhibited ZIKV replication in hPSC-HLCs, while all drugs inhibited ZIKV infection in HUH7 cells. ZIKV-infected hPSC but not HUH7 cells mounted an innate immune and NF$\kappa\beta$ response, which may explain the greater cytopathic effect seen in HUH7 cells.
CONCLUSION ZIKV productively infects hepatocytes *in vitro*. However, significant differences in innate immune response against ZIKV and antiviral drug sensitivity were observed when comparing hPSC-HLCs and HUH7 cells. This highlights the need to assess ZIKV infection and antiviral activities not only in hepatoma cells, but also in more physiologically relevant systems.

IP7

The ESBL NDP test: A tool for rationale use of antibiotics in low resource countries

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BACKGROUND Rapid and inexpensive tests for detecting Extended-Spectrum-β-Lactamase (ESBL)-Producing Enterobacteriaceae are needed, particulary in low-resource countries where infections with these bacteria constitute a major public health issue. The ESBL NDP test recently described by Nordmann, Dortet and Poirel, performed well in developed countries and it could be used for rationale use of carbapenems in severe infections caused by Enterobacteriaceae. Data on this test are scarce in developing countries.
OBJECTIVE To assess the performance, cost and feasibility of this test in positive blood cultures, in Cotonou, Benin (West Africa).
METHODS The NDP test was performed in 175 positive Bactec® broth blood culture containing Enterobacteriaceae and blindly compared with the double-disk synergy test (DDST) for the phenotypic detection of ESBL producers.
RESULTS Using DDST, the prevalence of ESBL-Producing Enterobacteriaceae was 84.5%. There was a complete agreement between the ESBL NDP test and the DDST; thus, sensitivity, specificity, negative predictive value and positive predictive value were all 100%. In average, the time to get results was 37 min for a sample and in our setting, cost of reagents per sample was US$ 7.3 with the most expensive reagents being tazobactam salt (US$ 6.6), which cost could decrease by finding another local supplier.
CONCLUSION The ESBL NDP test is rapid, relatively affordable and performed well in our setting. Its use could help to avoid inappropriate use of carbapenems.

IP8

Induced pluripotent stem cell-derived neuronal cultures as a model to study ZIKA virus infections and antivirals

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INTRODUCTION Since the Zika virus (ZIKV) has been associated with foetal abnormalities and neurological complications, relevant models are urgently needed to study the particular characteristics of the infection in neuronal cells and the inhibition thereof by antiviral molecules.
METHODS Wild-type human induced pluripotent stem cells (IPSC) were differentiated into respectively cortical neurons, motor neurons and astrocytes. Cells were infected with ZIKV strain MR766 (African) or PRVABC59 (Asian lineage; Puerto Rico 2015) and monitored for the development of a cytopathogenic effect (CPE). The activity of three antiviral molecules, i.e. T-705 (favipiravir), 7-deaza-2′-*C*-methyladenosine (7-DMA) and ribavirin, was assessed in these cultures. The viral load in culture supernatants was quantified by qRT-PCR and end-point titration.
RESULTS All three cell types proved susceptible to ZIKV infection, with full CPE observed as of day 6 post infection in cortical neurons and astrocytes and day 8 p.i. in motor neurons. The kinetics of infection in motor neurons was slower than in

the other cell types with the first signs of CPE occurring at day 6 post infection, whereas for cortical neurons and astrocytes full CPE is observed by that time. By the end of experiment the PRVABC59 strain resulted in higher viral loads ($1Log_{10}$ higher), as compared to MR766 strain. The nucleoside analogue 7-DMA (at 10 μg/ml) reduced viral loads and delayed the virus-induced CPE in all three cell types. In astrocytes the viral load was reduced to undetectable levels; in cortical and motor neurons a $2\text{-}3log_{10}$ reduction in viral titer was observed. Despite the fact that both T-705 and ribavirin inhibited ZIKV replication in Vero E6 cells, these compounds proved inactive in the stem cell-derived neuronal cultures.
CONCLUSION We demonstrate that ZIKV productively infects stem cell-derived cortical and motor neurons as well as astrocytes. Interestingly, whereas all three studied antivirals block ZIKV replication in Vero E6 cells, only 7-DMA does so in the neuronal cultures employed here. Our results demonstrate that human IPSC-derived neuronal cells represent a relevant *in vitro* model to study ZIKV neurotropism and to assess the potential efficacy of inhibitors of viral replication.

IP9

An immunomics approach detects promising candidate antigens for *Ascaris serodiagnosis* in pigs and humans

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INTRODUCTION The nematode parasite *Ascaris lumbricoides* infects over 800 million people and is considered to be an important neglected tropical disease pathogen. Ascariasis has a substantial impact on public health, but routine diagnosis still relies on the detection of eggs in stool. This technique has important limitations in terms of both application and interpretation and will lose merit as control programs continue to reduce parasite prevalence. Therefore, the development of a serological tool to detect exposure to *Ascaris* could be a game-changer in certain stages of control programs.
AIM The goal of this project is to identify immunoreactive proteins of lung stage larvae of *Ascaris* and to produce them recombinantly for evaluation as a serodiagnostic antigen for ascariasis.
METHODS Antibodies from infected pigs and humans were purified from serum and bound on an agarose column. An extract of *A. suum* lung stage L3 was passed over the column and bound antigens were eluted and analysed by mass spectrometry. Proteins were expressed in a yeast strain and purified using HPLC. The diagnostic potential of the recombinant antigen was evaluated using serum from experimentally infected pigs or naturally infected humans and the results were compared to those obtained by analysis with two other in-house ELISA tests for *Ascaris*.
RESULTS A total of 28 and 26 antigens were specifically captured by antibodies from infected pigs and humans respectively. Only 2 of the antigens were captured by antibodies from both infected pigs and humans. One of them was a 24 kDa antigen (As24) with a signal peptide, no apparent N-glycosylation sites and with high expression levels in the lung stage L3 larvae. Based on these promising features, the As24 antigen was selected for recombinant production. We have currently expressed the antigen and are in the progress of evaluating its diagnostic potential. *We wish to present the results of this evaluation during our presentation.*
CONCLUSION The immuno-proteomics approach employed in this study resulted in the selection of an immunodiagnostic antigen with the potential to serve as the basis for a new immunodiagnostic assay for the diagnosis of *Ascaris* infections in humans and pigs.

IP10

Diagnosis of *Trypanosoma cruzi* infection status in saliva of infected subjects

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INTRODUCTION Chagas disease (CD), caused by the protozoan *Trypanosoma cruzi (T. cruzi)*, is the largest parasitic burden in the Americas, affecting approximately 6 to 7 million people[1]. Conventional diagnosis requires a well-equipped laboratory with experienced personnel: the developing of new diagnostic tools, easy to use and adapted to the reality of affected populations and health systems is still a significant challenge.
AIM The main objective of this study was to measure *T. cruzi* infection status using saliva samples of infected subjects.
METHODS The study was designed as a pilot project with two parallel groups. A total of 20 *T.cruzi*-seropositive individuals were enrolled in one group. Among them, 10 received benznidazole treatment between 2005 and 2015 (all of them completed the treatment regime), and 10 of them did not receive treatment. The other group had 10 *T. cruzi*-seronegative individuals (controls). Blood and saliva were collected from all the individuals. For detection of *T. cruzi* infection, two different commercial serological tests were used in saliva and in blood.
RESULTS ELISA results showed consistency between serum and saliva samples. *T. cruzi*-seropositive subjects presented higher levels of IgG anti *T. cruzi* antibodies compared to *T. cruzi*-seronegative subjects, using serum ($P < 0.0001$) and saliva ($P < 0.05$). The salivary test showed 100% of specificity and 70% of sensitivity in detection of *T. cruzi* infection. Although this is a preliminary finding (not statistically significant), our results have also shown differences in the levels of IgG *T. cruzi*-antibodies in saliva samples between previously treated subjects and not treated patients.
CONCLUSION The detection of Chagas infection could be possible using saliva samples. Our results support the potential use of saliva to diagnose CD in infected humans. This method could provide a simple, low-cost but effective tool in the diagnosis of *T. cruzi* infection. The non-invasive nature of it makes it particularly interesting in endemic areas. Saliva could also play an important role in evaluating treatment efficacy of CD. Many questions remain, and other studies are needed for the implementation of this research to a larger population.
REFERENCE(S)
1. WHO, 2015.

Abstracts

IP11

Performance evaluation of a rapid diagnostic test for simultaneous diagnosis of malaria and screening for *gambiense* human African trypanosomiasis using archived samples

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INTRODUCTION As the prevalence of *gambiense* human African trypanosomiasis (gHAT) continues to decline, it is likely that the population screened for the disease will also decrease, thereby undermining the elimination efforts. All regions where gHAT is reported are also endemic for malaria. A rapid diagnostic test (RDT) that simultaneously tests for both diseases ("HAT/malaria combo") would much more likely be used sustainably than a simple gHAT RDT, even when the prevalence of gHAT is close to zero. In the process of testing individuals for malaria, any residual infections of gHAT would be detected and treated, thus enabling continued surveillance to sustain elimination of the disease.
AIM The objective of this study was to evaluate the diagnostic accuracy of a prototype HAT/malaria combo RDT using archived clinical samples.
METHODS The prototype was evaluated blindly by two independent readers using plasma samples from 250 gHAT cases and 250 endemic controls that were collected in Angola, Uganda and the Democratic Republic of the Congo (DRC), as well as whole blood samples from 250 *Plasmodium falciparum* positive and 250 endemic controls collected in Uganda. Performance of the test in diagnosing gHAT was compared to that of the SD BIOLINE HAT 2.0 test, and in diagnosing *P. falciparum* malaria was compared to the SD BIOLINE Malaria Ag P.f test.
RESULTS The gHAT sensitivity of the HAT/malaria combo and of the HAT 2.0 tests were 87.80% (95% CI: 83.09%-91.59%) and 86.20% (95% CI: 81.29%-90.22%), respectively. The gHAT specificity of the HAT/malaria combo and of the HAT 2.0 tests were 93.60% (95% CI: 89.81%-96.30%) and 94.00% (95% CI: 90.30%-96.60%). The malaria sensitivity of the HAT/malaria combo and of the Malaria Ag P.f tests were 97.00% (95% CI: 94.05%-98.74%) and 97.20% (95% CI: 94.32%-98.87%). The malaria specificity of the HAT/malaria combo and of the Malaria Ag P.f tests were 83.40% (95% CI: 78.20%-87.79%) and 83.80% (95% CI: 78.64%-88.14%).
CONCLUSION There was no evidence of a difference in diagnostic accuracy of either gHAT or malaria between the HAT/malaria combo and the individual tests. Prospective evaluation of the test will now be carried out in multiple sites.

IP12

Evaluation of a Loop-Mediated Isothermal Amplification (LAMP) kit as a molecular diagnostic test for congenital chagas disease

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INTRODUCTION Molecular tests are used in the diagnosis of congenital and acute Chagas disease in some countries, mainly in Europe. Their use in endemic countries is still anecdotal. Technical and economic factors have been put forward to explain the poor penetration of molecular tests to diagnose Chagas disease in low and middle-income countries (LMIC). The use of loop-mediated isothermal amplification (LAMP) methods may overcome some of these limitations. A newly developed LAMP kit designed for detection of *Trypanosoma cruzi* DNA in human blood showed a good analytical performance and easy use.
AIM To evaluate the performance of Loopamp™ *Trypanosoma cruzi* Detection Kit (*T. cruzi* LAMP) in stored clinical samples of congenital Chagas disease cases.
METHODS Stored clinical samples from 39 congenital Chagas disease cases were analysed along with samples from 48 controls. We evaluated the agreement between *T. cruzi* LAMP and qPCR using Cohen's kappa statistics. The sensitivity and specificity of the *T. cruzi* LAMP was estimated using the standard case definition as reference e.g. baby with a positive microscopy, or culture, or a positive serology after 9 months for congenital Chagas disease. The *T. cruzi* LAMP results were read by naked eye and fluorimeter. Additional samples are currently being evaluated.
RESULTS There was good agreement (Kappa index 0.9) between *T. cruzi* LAMP and qPCR, considering samples from congenital Chagas cases. The sensitivity of *T. cruzi* LAMP was 97.4% (95% CI: 86.5–99.9%) both by naked eye and fluorimeter. Specificity was 91.7% (95% CI: 80.0–97.7%) by naked eye and 93.8% (95% CI: 82.8–98.7%) by fluorimeter. The final results, including the samples currently being evaluated, will be presented.
CONCLUSION The Loopamp™ *Trypanosoma cruzi* Detection Kit could be an alternative to PCR as a diagnostic tool for congenital Chagas cases.

IP13

Serological tests for *GAMBIENSE* human African trypanosomiasis detect antibodies in cattle

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INTRODUCTION Serological tests for *gambiense* human African trypanosomiasis (gHAT) detect circulating antibodies. Only a fraction of positive individuals are subsequently confirmed as cases. The rest later become negative, suggesting transient antibody responses.

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AIM As gHAT is usually co-endemic with animal African trypanosomiasis (AAT), we hypothesize that the transient antibody response is the result of bites by tsetse flies carrying AAT-causing trypanosomes. We tested this hypothesis by evaluating rapid diagnostic tests (RDTs) on cattle in endemic and non-endemic regions.
METHODS Two RDTs, the SD BIOLINE HAT (1G RDT) made with native antigens, and a prototype RDT (p2G), made with recombinant antigens, were tested on 122 cattle in a trypanosomiasis-free region, and on 312 cattle in a region endemic for *rhodesiense* HAT and AAT. A subset of samples from the endemic region were also tested with two immune trypanolysis (TL) tests. Sensitivity was estimated by evaluating the result of the RDTs on samples found positive by both parasitology and ITS-PCR, whilst specificity was the result of the RDTs on samples that were negative by ITS-PCR and parasitology, and others from the non-endemic region.
RESULTS The specificity of the p2G RDT on cattle from the non-endemic region was 97.5% (95%CI = 93.0 - 99.2%), compared to only 57.9% (95%CI = 48.9–66.3%) for 1G RDT. The specificities of 1G RDT, p2G RDT and TL on endemic control cattle were 14.6% (9.7–21.5%), 22.6% (16.4–30.3%) and 68.3% (59.6–75.9%) respectively. The sensitivities of the tests on trypanosome positive samples were 85.1% (95% CI=79.1–89.7%), 89.1% (95%CI=83.7–93.0), and 59.3% (51.8–66.4) respectively. Among the same samples, 51.7% were positive by both TL and 1G RDT.
CONCLUSION The serological tests used in this study detect cross-reacting antibodies in cattle. The p2G RDT had a high specificity in a region that is free of tsetse and trypanosomiasis, while the 1G RDT had a lower specificity, suggesting cross-reactivity with other pathogens. Both RDTs had a low specificity in an endemic region, suggesting that they also detect antibodies against animal-infective trypanosomes. We postulate that the transient sero-positivity in people could be due to antibody responses to such trypanosomes.

IP14

In vitro and in vivo anti-malarial activity of extracts from *Terminalia mantaly* (Combretacéae)

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INTRODUCTION The emergence of resistance of malaria parasite to available drugs highlight the urgent need to develop new efficient, safe and affordable drugs. In Cameroon, medicinal plants such as *T. mantaly* are used in traditional medicine for the treatment of malaria and have been playing an important role in the fight against malaria especially in rural community. However, their efficacy are still to be validated.
AIM This work aimed to investigate the *in vitro* and *in vivo* antimalarial potency of extracts from *Terminalia mantaly*.
METHODS Extracts from stem barks, leaves and roots of *T. mantaly* were macerated in water and methanol. The susceptibility of red blood cells to the extracts was using the MTT assay. The antiplasmodial activity was performed on the W2 strain of *Plasmodium falciparum*. Prior to the curative test, acute toxicity of the promising aqueous stem bark extract was assessed in mice at a dose of 2,000 mg/kg/bw. Mice infected with *P. berghei* MRA 406 strain were treated with the promising extract at doses of 100, 200, 400 mg/kg. Their parasitemia were monitored as well as their hematological, biochemical and histological parameters.
RESULTS Extracts did not shown any cytotoxicity on erythrocytes at up to 1 mg/mL. Out of the six extracts tested, two (aqueous extracts from stem barks and leaves) presented *in vitro* antiplasmodial activity with IC_{50} of 0.809 and 2.203 μg/ml respectively. The acute toxicity assay of the aqueous extract from stem bark revealed 50% lethal dose (LD50) higher than 2000 mg/kg per body weight. The curative test showed an effective dose that reduce 50% of parasitemia (ED_{50}) of 69.50 mg/kg with no significant effect on biochemical, hematological and histological parameters.
CONCLUSION The results from this investigation support the traditional usage of *T. mantaly* and suggest that stem bark of *T. mantaly* could be potential source of compounds with anti-malaria activity. However, further investigations are needed to characterize active principles.

IP15

Loop-mediated isothermal amplification of DNA is a rapid and accurate diagnostic for canine leishmaniasis

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INTRODUCTION *Leishmania infantum* is the causative agent of zoonotic visceral leishmaniasis in the Mediterranean basin and Latin America. The parasite is transmitted in a zoonotic cycle, and dogs are both victims of the disease, and the main reservoirs. Once infected, dogs can develop canine leishmaniasis (CanL); infected humans can develop visceral (VL) and/or cutaneous leishmaniasis (CL). Molecular tests (mainly PCR) have high accuracy in the diagnosis of CanL. However, the options that are currently available are technically demanding, and the reagents require a cold chain, limiting their use in peripheral settings. In addition to this, and because most of the current PCR protocols are designed in-house, their standardisation across laboratories is challenging. The Loopamp™ *Leishmania* Detection Kit (Eiken Chemical Co.) is a simple, dry reagents-based and robust molecular test that can address these limitations of implementing molecular diagnosis of CanL in peripheral settings.
AIM To evaluate a Loopamp™ *Leishmania* Detection Kit in the diagnosis of CanL caused by *L. infantum*.
METHODS We performed a retrospective analysis of two hundred DNA samples of bone marrow and lymph node aspirates from dogs suspected of having CanL. These were tested by real-time PCR (r-tPCR) and nested-PCR (nPCR). Loopamp reactions were carried out in a Genie III fluorimeter (OptiGene), and results evaluated by both real-time fluorescence and end-point analysis by illumination with blue light. The diagnostic performance of Loopamp and nPCR was calculated using r-tPCR as reference test.
RESULTS r-tPCR classified 129 samples as positive and 71 as negative. nPCR and Loopamp, using either real-time fluorescence or illumination by blue light, showed the same diagnostic performance: sensitivity 97.67%, specificity 88.73%, positive

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predictive value 94.03%, negative predictive value 95.45%. The concordance between r-tPCR and the other molecular tests was 94.50%, K = 0.8780.
CONCLUSION The Loopamp™ *Leishmania* Detection Kit has high sensitivity and specificity for molecular diagnosis of CanL. Being a dry reagent-based test, it has long thermal stability at ambient temperature. This, and the simplicity of reading results using either blue light or the more objective real-time fluorimetry, makes this test a promising candidate for routine molecular diagnosis of CanL at peripheral facilities.

IP16

Development of a point of care diagnostic test for the neglected tropical skin disease Buruli ulcer

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INTRODUCTION Buruli ulcer (BU) is a chronic, necrotizing skin disease, presenting with a variety of clinical manifestations including ulcerative and non-ulcerative forms. The major burden of BU lies on populations in remote, rural areas of West and Central Africa. Due to the lack of an effective vaccine and incomplete understanding of transmission mechanisms of the causative agent - *Mycobacterium ulcerans* - options to control the disease are limited. Early diagnosis, a key element for BU control, is complicated by the broad differential diagnosis, combined with restricted access to re-confirmatory laboratory diagnostic services in remote areas.
AIM The aim of this project is the development of a simple and reliable rapid diagnostic test that can be implemented in rural health care settings.
METHODS We have designed low-tech antigen detection systems based on monoclonal antibodies (mAbs) raised against the *M. ulcerans* protein MUL_3720, which is a suitable target antigen due to its high expression levels and specificity profiles. We have developed a highly specific MUL_3720 sandwich ELISA aimed for usage at district hospital level. Moreover, a lateral-flow rapid diagnostic test intended for direct application at the point of care is currently being developed in a partnership between Swiss TPH, the Foundation for Innovative New Diagnostics (FIND) and Alere/Standard Diagnostics (SD).
RESULTS Systematic optimization of all assay parameters, including sample processing, identification of ideal mAb combinations and concentrations, and incorporation of signal amplification, has led to the development of a sensitive and highly specific diagnostic ELISA.
CONCLUSION Sensitivity and specificity of ELISA and RDT prototypes are currently being evaluated by testing BU lesion specimens that have first been analyzed by IS*2404* real-time PCR, which is the current gold standard for the diagnosis of BU at reference centers.

This project is funded by the UBS Optimus Foundation and the Swiss Agency for Development and Cooperation (SDC) through FIND.

IP17

Diagnosis of schistosomiasis without a microscope: a community-based survey using PCR and CCA-CAA detection on banked stool and urine samples from Dr Congo

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INTRODUCTION Schistosomiasis is known to be transmitted in the Democratic Republic of Congo (DR Congo), but accurate data describing details of the distribution is scarce. While microscopic detection of *Schistosoma* eggs in stool and urine is known for its low sensitivity in diagnosing light infections, there is also an increasing shortage of well-trained microscopists capable of identifying such infections. Alternative diagnostic tests with better sensitivity, in particular real-time PCR and circulating antigen detection, are progressively used as complementary diagnostic procedures, but not yet to replace microscopy.
AIM To study the prevalence of *Schistosoma spp* infections using a panel of non-microscopic diagnostic methods on banked stool and urine samples.
METHODS The study was performed with samples available from a previous survey on the prevalence of *Taenia solium* cysticercosis in a village community of Bas-Congo. At the moment of sample collection no microscopy was performed for schistosomiasis. Real-time PCR was used to detect *Schistosoma* DNA in 314 banked stool and urine samples, while schistosome circulating cathodic antigen (CCA) and circulating anodic antigen (CAA) were detected in urine by a point-of-care-(POC)-CCA test and a laboratory-based lateral flow test utilizing luminescent up-converting phosphor reporter particles (UCP-LF CAA), respectively.
RESULTS *Schistosoma*-specific DNA was detected in 10 (3.2%) urine samples and in 87 (27.7%) stool samples, while CCA and CAA were detected in 86 (27.4%) and 151 (48.1%) urine samples, respectively. The higher frequency of DNA-presence in stool samples compared to urine samples indicated a predominance of *S. mansoni*. This was confirmed by the POC-CCA test, known to be particularly useful for detection of *S. mansoni* infections. The high number of positives found by the UCP-LF CAA assay suggests low-intensity infections to be abundant.
CONCLUSION Stool-based PCR and urine-based POC-CCA are reliable diagnostic tools which are according to previous studies generally more sensitive for use as alternative to microscopy for screening of *S. mansoni* infections. This study indicates that both may still significantly underestimate the "true" number of schistosome positives as determined by the ultrasensitive and highly specific UCP-LF CAA assay.

Abstracts

IP18

Can a ZIKA IGM and IGG immunoblot replace the virus neutralisation test to confirm screening test results?

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INTRODUCTION Serological Zika diagnosis remains challenging because of possible cross-reactions with other pathogens and (flavi)viruses, especially dengue. Confirmation of positive/doubtful Zika IgM/IgG results with a screening test (e.g. ELISA), can be established by a virus neutralization test (VNT). This is however time consuming, labour intensive and requires a relatively large sample volume.
AIM To evaluate the use of an immunoblot (recomLine Tropical Fever IgG and IgM (Mikrogen Diagnostik) - detecting Zika, dengue and chikungunya antibodies- for confirmation of Zika ELISA results.
METHODS Twenty-five samples from patients with a confirmed Zika infection were selected for testing with recomLine Tropical Fever immunoblot. IgG immunoblot was performed on all samples, whereas IgM was only analysed in case of a recent infection. Twenty-four out of 25 patients had symptoms starting 5 to 210 days before testing. Screening for Zika virus antibodies was done by Zika Euroimmun ELISA (Euroimmun, Lübeck, Germany). All positive/undetermined results were confirmed by an in-house VNT. Additionally 5 samples from patients with acute malaria ($n = 3$), dengue ($n = 1$) and chikungunya fever ($n = 1$) were analysed with the IgM immunoblot for cross-reactivity.
RESULTS Out of 25 samples, 22 (88%) were confirmed with IgM and/or IgG immunoblot and 3 (12%) were undetermined.

Out of 20 samples tested with IgM immunoblot, agreement with IgM-detection by ELISA was 85% (17/20). Three samples were positive with ELISA but negative with immunoblot. Comparison between IgG ELISA and immunoblot revealed 88% (22/25) agreement. In 3 samples immunoblot could not distinguish between Zika and dengue. Remarkably, these also had a high dengue ELISA ratio, possibly reflecting a secondary flavivirus infection.

None of the samples from malaria, dengue and chikungunya patients tested with IgM immunoblot reacted with the Zika test lines, except for one acute malaria sample which was clearly negative with Zika VNT.
CONCLUSION The recomLine Tropical Fever IgG and IgM could be of value to confirm Zika infections more rapidly than VNT, but in some cases VNT still remains necessary.

IP19

The challenge in serodiscordant Chagas Disease': the role of two confirmatory techniques in inconclusive cases

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BACKGROUND Up to know there is no gold-standard for diagnosis of Chagas' disease (CD) in patients with inconclusive results. The qualitative method Western blot (WB), is considered an excellent tool to confirm the diagnosis of CD when other tests are discordant. The aim of this study was to confirm or discard CD in a group of individuals with discordant sera by using two different WB confirmatory techniques. The study also intended to determine the role of the screening techniques, compared to both confirmation techniques.
MATERIAL/METHODS We examined serum samples from forty-eight patients from endemic areas, Bolivia (43), Argentina (1), Ecuador (1), Chile (1), Peru (1), and El Salvador (1),with discordant serological results by two ELISA screening techniques: a recombinant enzyme immunoassay BioELISA Chagas; Biokit® S.A. (r-ELISA) and a native enzyme immunoassay Ortho® T. cruzi Elisa Test System (n-ELISA). All sera were tested by the in-house WB developed by Riera et al. using a lysate from Trypanosoma cruzi (Maracay strain) epimastigotes, and the commercial Western blot, TESA-blot (Biomérieux, RJ, Brasil) using secreted and excreted trypomastigote antigen of T. cruzi.
RESULTS Of the 48 sera tested, the in-house WB confirmed the disease in 17 (35.4%) cases (14 false negative by r-ELISA, and 3 by n-ELISA), discarded it in 30 (62.5%) cases (23 false positive by r-ELISA and 7 by n-ELISA), and obtained one indeterminate result. Regarding TESA-blot, the test confirmed the disease in 22 (45.8%) cases (15 false negative by r-ELISA, and 7 by n-ELISA), discarded it in 25 (52.1%) cases (19 false positive by r-ELISA and 6 by n-ELISA) and obtained one indeterminate result. Based on the combination of the two WB, a total of 24/48 samples (50%) could be confirmed as positive. The two confirmatory tests showed a substantial agreement ($k = 0.604$). Additionally both the in-house WB and TESA-blot, showed a moderate agreement with n-ELISA ($k = 0.56$ and $k = 0.44$, respectively) and a clear disagreement with r-ELISA ($k < 0$).
CONCLUSIONS The combination of the two WB allowed the confirmation of an overall seroprevalence of 50%. However, this methodology remains difficult to implement for routine diagnostic confirmation either because of the lack of commercial test in Europe and the technical difficulty of the in-house test on a large number of samples. This situation requires the development of improved diagnostic tools for an accurate and reliable detection of cases.

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IP20

Analysis of the specificity of a *Mycobacterium leprae* diagnostic qPCR

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INTRODUCTION *Mycobacterium leprae* is the causative agent of leprosy. While presently no reference standard for detection exists, many molecular diagnostic techniques have been developed. The RLEP qPCR utilises the RLEP repetitive element which is both specific for *M. leprae* and highly sensitive. Even though RLEP qPCR is the most sensitive diagnostic test known, the test has an inherent risk of generating false positive results as the potential presence of homologous RLEP sequences in other environmental mycobacteria cannot be ruled out.
AIM Testing specificity of RLEP qPCR for *M. leprae*.
METHODS The DNA of 19 clinical samples (slit skin smear and skin biopsies) from 18 patients, previously diagnosed with multibacillary leprosy (Brazil & Comoros), was extracted for RLEP qPCR analysis. To assess the specificity, 28 skin biopsy samples originating from Belgium (non-endemic negative controls), 31 skin biopsy samples from Benin (endemic controls) and isolates from 27 different mycobacterial species (5 closely related to *M. leprae*) were tested using RLEP qPCR. Purified DNA from *M. leprae* strain NHDP was used as positive control. RLEP qPCR was performed as described by Martinez *et al.* 2009[1]. Finally, the primer and probe sequences of the RLEP qPCR were tested for cross reactivity with other known sequences using NCBI nBLAST.
RESULTS Among the 18 leprosy confirmed patients, all presented a positive result for the RLEP qPCR, totalling a 100% sensitivity for slit skin smears and skin biopsies in multibacillary patients. Among the 28 non-endemic and 31 endemic controls, and 27 mycobacterial species, no RLEP qPCR amplification was found. Nucleotide BLASTing the RLEP qPCR primers and probes did not identify any potential cross reactivity with other sequences in NCBI's non-redundant database.
CONCLUSION These results indicate a 100% specificity of RLEP qPCR. However, due to the possible presence of homologous RLEP sequences in so far unidentified, unculturable, or understudied mycobacteria closely related to *M. leprae*, the reported specificity will always be provisional. The absence of identical primer/probe binding sites in the current NCBI public repository decreases the probability that new mycobacterial species with homologous RLEP sequences will emerge. Our results suggest that 'false' positives would more likely represent contamination issues.
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IP21

Development of a nanobody-based amperometric immunocapturing assay for sensitive and specific detection of *Toxocara canis* excretory-secretory antigen

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INTRODUCTION Human Toxocariasis (HT) is a zoonosis that, despite of its wide distribution around the world, remains poorly diagnosed. The identification of specific IgG immunoglobulins against the *Toxocara canis* Excretory-Secretory antigen (TES), a mix of glycoproteins that the parasite releases during its migration to the target organs in infected patients, is currently the only laboratory tool to detect the disease. The main drawbacks of this test are the inability to distinguish past and active infections together with lack of specificity. These factors seriously hamper the diagnosis, follow-up and control of the disease.
AIM To develop an amperometric immunocapturing diagnostic assay based on single domain immunoglobulins from camelids (nanobodies) for specific and sensitive detection of TES.
METHODS After immunization of an alpaca (*Vicugna pacos*) with TES, RNA from peripheral blood lymphocytes was used as template for cDNA amplification with oligo dT primers and library construction. Isolation and screening of TES-specific nanobodies were carried out by biopanning and the resulting nanobodies were expressed in *Escherichia coli*. Two-epitopes amperometric immunocapturing assay was designed using paramagnetic beads coated with streptavidin and bivalent nanobodies. Detection of the system was carried out with nanobodies chemically coupled to horseradish peroxidase. The reaction was measured by amperometry and the limit of detection (LOD) was compared to conventional sandwich ELISA.
RESULTS We obtained three nanobodies that specifically recognize TES with no-cross reactivity to antigens of *Ascaris lumbricoides* and *A. suum*. The LOD of the assay using PBST20 0.05% as diluent was 100 pg/ml, 10 times more sensitive than sandwich ELISA.
CONCLUSION Sensitive and specific detection of TES for discrimination of active and past infections is one of the most difficult challenges of *T. canis* diagnosis. The main advantage of our system is the use of two different nanobodies that specifically recognize two different epitopes in TES with a highly sensitive and straightforward readout. Considering that the amounts of TES available for detection in clinical samples are in the range of picograms or a few nanograms maximum, the LOD found in our experiments suggests that the test is potentially useful for the detection of clinically relevant cases of HT.

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IP22

Anti-cancer potential of Fasciola hepatica extracts

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INTRODUCTION Fascioliasis is a food borne disease caused by infection with a liver fluke termed *Fasciola (F.) hepatica*. Fascioliasis, as a neglected tropical disease, commonly affects poor people from developing countries. It has been estimated that at least 2.6 million people are infected with fascioliasis worldwide. According to the International Agency for Research on Cancer, two other liver flukes *Opistorchis viverrini* and *Clonorchis sinensis*) have been recognized as definitive causes of cancer (IARC, 2012). On the other hand even long-lasting and/or repeated *F. hepatica* infections have not been associated with cancer, so far. There are any known causative associations between this parasite and cholangiocarcinoma or liver cancer.
AIM To investigate the oncogenic role of *F. hepatica* extracts.
METHODS Chine Hamster Ovary (CHO) non-tumorigenic cells were treated with *F. hepatica* extracts and cell proliferation was assessed by using the indirect method for estimating cell number based on the mitochondrial dehydrogenase activity, which reduces sodium 2,3-bis[2-Methoxy-4-nitro-5-sulfophenyl]-2H-tetrazolium-5-carboxyanilide inner salt) with MTS cell proliferation reagent.
RESULTS Surprisingly we observed unexpected death of these cells when treated with *F. hepatica* extracts.
CONCLUSION We now hypothesize that some molecules contained in *F hepatica* extracts could have a potential as a preventive or even curative anti-cancer substance.

IP23

Could Estradiol be used as a biomarker of infection in *Schistosoma haematobium* infected patients?

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INTRODUCTION Urogenital schistosomiasis is a chronic infection caused by the human blood fluke Schistosoma haematobium. Schistosomiasis haematobia is a known risk factor for cancer leading to squamous cell carcinoma of the urinary bladder (SCC). This is a neglected tropical disease endemic in many countries of Africa and the Middle East. Schistosome eggs produce catechol-estrogens. These estrogenic molecules are metabolized to active quinones that cause alterations in DNA (leading in other contexts to breast or thyroid cancer). Our group has shown that schistosome egg associated catechol estrogens induce tumor-like phenotypes in urothelial cells, originated from parasite estrogen-host cell chromosomal DNA adducts and mutations. Also we have demonstrated that these molecules are detected as Estradiol in sera of infected patients.
AIM To investigate the role of estradiol (E2) as a biomarker of infection in S. haematobium patients.
METHODS Estradiol was tested by Electrochemoluminescence (ECLIA) in the urine of a cohort of infected patients from Guinea Bissau. We used not infected individuals from the same endemic area as controls.
RESULTS We found a significant increase in the levels of Estradiol in the urines of infected persons in comparison to not infected persons.
CONCLUSION E2 can be used as a biomarker of infection with *S. haematobium*. Schistosome eggs associated catechol estrogens are detected by Mass Spectrometry. This method is very expensive and very time consuming specially when considering schistosomiasis a disease affecting the poorest people living in the poorest countries of the world. We now propose the use of a test very feasible and very low cost used in every clinical pathology laboratories.

IP24

Optimization of the PAXgene Blood RNA system to store *Salmonella* cells for subsequent RNA analysis

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INTRODUCTION Bacterial bloodstream infections present a huge global burden. Molecular diagnostics based on the polymerase chain reaction (PCR) have been developed for the identification of bacterial DNA in blood but generally show low sensitivity and reproducibility. Targeting the highly abundant 16S ribosomal RNA (rRNA) molecules increase the sensitivity of molecular detection of bacteria in blood. However, there is no standardized protocol for field applicable blood collection for subsequent RNA analysis. The PAXgene Blood collection system (PreAnalytix) is currently used for storing up to 2.5 ml blood at -80°C for subsequent human RNA analysis, but has never been applied to bacteria.
AIM Our aim was to investigate the efficiency and biosafety of storing *Salmonella* cells in PAXgene Blood RNA tubes and to develop a *Salmonella* specific 16S rRNA reverse transcriptase real-time PCR (RT-PCR) for the detection of *Salmonella* stored in PAXgene Blood RNA tubes.
METHODS A 2.5 ml log phase culture of *Salmonella* Typhimurium SL1344 was transferred to PAXgene Blood RNA tubes and stored overnight at -80°C. PAXgene tubes were centrifuged; the cell pellets were resuspended in 1xPBS buffer and (i) inoculated on nutrient agar plates to assess viability, (ii) subjected to total RNA extraction with an *in house* adapted Trizol Max Bacterial Isolation Kit (Ambion). *Salmonella* specific 16S rRNA gene primers were optimized, and used for reverse-transcription and detection of 16S rRNA using real-time PCR with the SensiFAST™ SYBR® No-ROX One-Step Kit (Bioline) on a Lightcycler 480 instrument (Roche).

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RESULTS *Salmonella* 16S rRNA could efficiently be detected from RNA extracts obtained from *Salmonella* stored in PAXgene Blood RNA tubes, with a lower detection limit of 0.01 pg RNA. Resuspended cell pellets after storage in Paxgene Blood RNA tubes did not show growth on nutrient agar plates, indicating deactivation by the PAXgene tubes.
CONCLUSION We showed that PAXgene Blood RNA Tubes are an efficient and safe system to store *Salmonella* for subsequent extraction of RNA. In addition, our data showed that reverse transcription and real-time PCR of 16S rRNA is a sensitive method for the detection of *Salmonella* cells stored in PAXgene Blood RNA tubes.

1P25

Shotgun metagenomics as a tool for the rapid diagnosis and genotyping of Dengue

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INTRODUCTION Dengue virus (DENV) diagnosis can be performed by serological tests, isolation of the virus or by molecular methods. Especially, *q*RT-PCR and nested RT-PCR are widely used to detect DENV during the acute phase of illness. For genotyping, Sanger sequencing is often used; however, it is time-consuming and unsuitable for initial diagnosis. Therefore, new methodologies are required to improve rapid detection and genotyping of DENV and other viruses directly from clinical material.
AIM We applied shotgun metagenomics combined with sequence classification methods to identify and type DENV directly from plasma samples.
METHODS From five DENV-2 RT-PCR positive patients' samples from Venezuela (2015), viral RNA was isolated using the QIAmp® Viral RNA kit (Qiagen). cDNA libraries were prepared with TruSeq RNA v2 library prep kit (Illumina) and sequenced on a MiSeq instrument (Illumina) using MiSeq Reagent Kit v2 (300-cycles, paired-end). First, the data was analysed with Taxonomer (IDbyDNA), an ultrafast web-tool for comprehensive metagenomics data investigation. Subsequently, the raw reads were mapped against a human genome (hg18) and *de novo* assembled using CLC Genomics Workbench v9.5.4. Next, a BLAST analysis of the longest contig was performed. The phylogenetic analysis was performed in MEGA v7.0 using the maximum likelihood method, based on the general time reversible model, with 1,000 bootstrap replications.
RESULTS The mean total number of reads for the samples was 3,145,628. Taxonomer could correctly identify DENV- 2 in all samples. About 85.23% of the reads were mapped against the human genome, while the proportion of reads that matched DENV were 4.02%. After *de novo* assembly, sequences with an average length of 10,700 bp and an average coverage of 1651.15 reads were obtained. Using BLAST, the closest strains identified were DENV 2 strains (99% identity) isolated in Venezuela between 2005–2007.
CONCLUSION Dengue identification and genotyping was possible directly from the patients' plasma. The whole workflow was performed in three days, which is approximately twice as fast as what is needed for classical genotyping through standard isolation and identification. This approach also enables the detection and discrimination of other viruses causing similar clinical presentations, namely chikungunya and Zika.

1P26

Usefulness of *TOXOCARA CANIS* larval low molecular weight excretory-secretory products for diagnosis of human toxocariasis

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INTRODUCTION Toxocariasis is a zoonosis caused by *Toxocara* migrating larvae inside the human body. Serology, using the excretory-secretory products released by *Toxocara canis* larvae (TES), is the best laboratory diagnostic option for human toxocariasis. Several approaches have been suggested in order to improve the efficacy of the serodiagnosis, for example the use of purified native TES to avoid crossreactivity and the use of IgG subclasses as well as antibody avidity to increase specificity.
AIM To investigate the usefulness of *T. canis* larval low molecular weight excretory-secretory products for diagnosis of human toxocariasis.
METHODS Infective larvae were hatched from embryonated eggs and maintained *in vitro* in RPMI 1640 in an atmosphere of 5% CO_2 at 37°C. Culture medium was collected weekly, supplemented with proteinase inhibitors and concentrated using 3000 Da membrane. The RPMI medium was exchanged to PBS using PD10 column. Purification of low molecular weight fraction (<50KDa) of TES was performed using size exclusion chromatography. The obtained native fraction of TES was used to standardize indirect ELISAs for specific detection of IgG or Ig4 and in IgG avidity studies.
RESULTS The relative sensitivity and specificity of the IgG ELISA in human serum compared with a commercial kit (Bordier Affinity) were 93.9% and 96.7%, respectively. In the case of the IgG4 ELISA, serum samples from patients with clinical, hematological and serological evidence of toxocariasis and from non-*Toxocara* infection patients were tested. Sensitivity was 86.7% and specificity 97.7%. No cross reactivity was detected in both ELISAs using samples of patients with ascaridiasis, trichuriasis, estrongyloidiasis or fascioliasis. The study showed that 69.0% of positive sera collected from patients reporting <6 months infection had low IgG avidity values, sugesting recent toxocariasis, whereas 23.5% of positive sera taken from patients >6 months infection showed low indices of IgG avidity, $P = 0.009$.
CONCLUSION The low molecular weight fraction of TES was useful for diagnosis of human toxocariasis avoiding crossreactivity. The combination of the developed tests can improve *Toxocara* serodiagnosis. When the tests are positive and epidemiological history and clinical/laboratory symptoms are consistent with *Toxocara* infection, there is a higher likelihood that the case is a true positive.

Abstracts

IP27

MRDT (Malaria Rapid Diagnostic Test): *P. vivax* pLDH cross react with *Denguevirus (DENV)*?

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INTRODUCTION In many countries of touristic interest (e.g. Thailand and other South East Asia countries) malaria cases are decreasing while Dengue and other arbovirosis prevalence is rising. This global trend makes the clinical assessment and diagnosis of tropical fevers more difficult than in the past.
AIM We describe four cases of False Positive Result (FPR) MRDT to *P. vivax* occurred in patient affected with *DENV* acute infection.
METHODS Four patients with fever coming back from South East Asia attended for malaria diagnosis in E.R.(Emergency Room) of L.Sacco and S.Matteo Hospitals
RESULTS All the thin films and thick smears were negative for malaria while all MRDTs (Core Diagnostics- UK) resulted positive for P.vivax specific band (pLDH *P.vivax*) and negative for Pan Malaria band (pan pLDH). The patients were subsequently investigated for DENV by serology (specific IgM and IgG Elisa Novalisa ™) and all but one for molecular biology methods for the identification of viral nucleic acid of DENV and for DNA of Plasmodium (RT PCR FastTrack-USA).. All four patients tested were positive for IgM and IgG immunoglobulins specific for DENV. In detail the first three patients tested result positive for IgM then immediately become positive for IgG in the following days. The patient number 4 was immediately positive for IgM and IgG and remained positive to the next control took place 15 days later. All the three patients investigated for RNA DENV and Plasmodia DNA resulted positive for RNA DENV and negative for Plasmodia DNA.
CONCLUSION In a little gap of time in two reference labs for Tropical Diseases Diagnosis occurred the same false positive result with the same kind of MRDT and in all the cases we got in patients which were big evidences they were been suffering acute dengue infection. Although four single reports are not too much to state to a definitive conclusion we consider very useful and interesting further studies on the possible cross reaction between specific *P. vivax* pLDH and DENV.

IP28

Neutrophil activation and enhanced release of granule products in HIV-TB immune reconstitution inflammatory syndrome

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INTRODUCTION Tuberculosis Immune Reconstitution Inflammatory Syndrome (TB-IRIS) remains incompletely understood.
AIM Neutrophils are implicated in tuberculosis pathology but detailed investigations in TB-IRIS are lacking.
METHODS Unbiased nCounter gene expression analysis was performed in TB-IRIS patients (n = 17) versus antiretroviral-treated HIV/TB co-infected controls without IRIS (n = 17) in Kampala, Uganda. Flow cytometry was performed in TB-IRIS patients (n = 18) and controls (n = 11) in Cape Town, South Africa to determine expression of neutrophil surface activation markers, intracellular cytokines and Human Neutrophil Peptides (HNP). Plasma neutrophil Elastase and HNP1-3 were quantified using ELISA. Lymph node immunohistochemistry was performed on three TB-IRIS cases.
RESULTS There was significant increase in gene expression of S100A9 (P = 0.002), NLRP12 (P = 0.018), COX-1 (P = 0.025) and IL-10 (P = 0.045) two weeks after ART initiation in Ugandan TB-IRIS patients versus controls. IRIS patients in both cohorts demonstrated increases in blood neutrophil count, plasma HNP and elastase concentrations from ART initiation to week two. CD62L (L-selectin) expression increased over 4 weeks in South African controls while IRIS patients demonstrated the opposite. Intense staining for the neutrophil marker CD15 and IL-10 was seen in necrotic areas of TB-IRIS patients' lymph nodes.
CONCLUSION Neutrophils in TB-IRIS are activated, recruited to sites of disease and release granule contents, contributing to pathology.

Abstracts

IP29

Influence of age, IPTp-SP, malaria infection and anaemia on naturally acquired antibodies levels to DBL5 and ID1-ID2A and the antibodies' dynamic during postpartum in a rural setting of Burkina Faso

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INTRODUCTION Although the deleterious effects of malaria in pregnancy to both the mother and the child are well documented, the mechanisms involved are still relatively unknown. This applies also to the increased susceptibility to malaria infection during the postpartum. To improve our knowledges on this topic, it is relevant to investigate on what immunological events underlie women susceptibility and/or recovery of immune-competence during postpartum.
AIM The current study aimed to (1) determine factors influencing levels of antibody (Ab) to DBL5 and ID1-ID2a antigens (Ag) at delivery, (2) and to evaluate these Ab dynamics during postpartum.
METHODS Ab levels were measured by ELISA using plasma samples collected from primiparous and nulliparous. Primiparous women were followed up during 3 months after delivery and their immunological profile compared to nulliparous. A univariate analysis of the effect of age, IPTp-SP, malaria status and anaemia during pregnancy was performed as a function of antibodies levels to DBL5 and ID1-ID2a at delivery.
RESULTS Of the 33 primiparous 17 (51.52%) experienced at least one malaria episode during pregnancy. Even if malaria infection significantly influenced Ab levels to DBL5, at delivery, no boosting effect was induced by malaria during postpartum. In contrast, naturally acquired Ab levels at delivery to DBL5 and ID1-ID2a Ag were not influenced by the number of doses ($\leq$ or $>$ 2) of IPTp-SP received. The same trends were also observed with age, and anaemia. However, a continuous decrease of Ab levels to placental-specific Ag after delivery.
CONCLUSION Among factors analysed, only malaria infection influenced Ab levels to DBL5 Ag at delivery. Overall, Ab levels to DBL5 and ID1-ID2a at delivery underwent a decrease after delivery towards Abs measured in nulliparous.

IP30

Low levels of soluble CD40 ligand in asymptomatic leishmania donovani co-infected HIV patients

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INTRODUCTION The production of IL-10 and IFN-y is dependent on costimulatory molecules such as CD40 /CD40L. Its serum soluble derivate sCD40L was shown in a human *L. infantum* model to improve control of parasite and was associated with clinical resolution of visceral leishmaniasis (VL). They observed that many individuals living in high risk endemic settings in Brazil – with unknown infection status - had high levels of sCD40L, suggesting it may contribute to protection.
AIM To assess whether an early difference in serum sCD40L levels can be observed during asymptomatic *L. donovani* infection in HIV patients in North-West Ethiopia, who are at increased risk of progression to VL.
METHODS We conducted a case-control study comparing cases of asymptomatic Leishmania infection with non-infected controls, matched on CD4 count, months on ART and ART regime. Asymptomatic infection was defined as positivity for any of the *Leishmania* markers: Direct Agglutination Test (DAT), rK39-Rapid diagnostic test (RDT), and urine antigen (KAtex) test. Serum samples were tested for sCD40L on the Luminex 200 (Bio-Rad). Robust mixed-effects logistic regression model was used, corrected for sex, body mass index category and presence of opportunistic infections (OIs).
RESULTS A total of 96 HIV patients were included with a median age of 39.5 years (Min-Max: 21-61y), of which 85.4% male. This included 48 asymptomatically infected patients with *L. donovani* and 48 matched non-infected individuals. The median CD4 count was 386 cells/μL (IQR: 278–490), 92% were on ART. The median sCD40L value was 1370 pg/ml with values ranging from 0 to 5225 in cases and from 372 to 10000 in controls. Every 500 unit increase in serum sCD40L concentrations decreased the odds of being infected with 0.88 times ($P = 0.014$).
CONCLUSION In general, lower levels of sCD40L were observed in asymptomatic infected individuals, suggesting an immunosuppressive mechanism of the parasite on the CD40 signalling pathway, independent of their HIV infection. These results match with the stated protective role of sCD40L and indicate the importance in early immune responses. Low and high sCD40L levels merit further evaluation as early disease markers for resistance to and evolution to active VL on HIV patients, respectively.

IP31

Distribution of Duffy blood group (*FY*) phenotypes among *Plasmodium vivax*-infected patients in Nouakchott, Mauritania

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INTRODUCTION The distribution of Duffy blood group polymorphisms is important in areas where *Plasmodium vivax* predominates because this red blood cell surface antigen is thought to act as a key receptor for this parasite.
AIM To determine Duffy polymorphism among malaria-positive and malaria-negative febrile patients of different ethnic origins living in Nouakchott.
METHODS Duffy phenotype was determined using indirect anti-globulin assay. Fingerprick blood sample from each patient was examined for *Plasmodium* parasites using rapid diagnostic test and microscopy.

RESULTS Malaria prevalence rate was 32.5% (42/129), including 69% (29/42) *P. vivax*, 21.4% (9/42) *P. falciparum,* and 9.5% (4/42) mixed *P. falciparum-P. vivax* infection. The most common Duffy phenotype was Fy(a-,b-) (Duffy negative) with a frequency of 67%, followed by the phenotype Fy(a+, b-) with a frequency of 24%. The Duffy-negative individuals were comprised of 56.9% white Moors, 36% black Moors and 6.9% black Africans. Fy(a+, b+) phenotype was not found among black Moors and black Africans. Of the *P. vivax*-infected patients, 12 white Moors and 4 black Moors were Duffy negative. No *P. vivax*-infected patient was found among black African ethnic groups.
CONCLUSION The present study highlights the presence of *P. vivax* infection among Duffy-negative individuals. Further studies are necessary to compare the observed Duffy phenotypes with Duffy genotypes in the study population.

IP32

Killer-cell immunoglobulin-like receptor genotyping by multiplex PCR-SSP in a Venezuelan population infected with cutaneous leishmanisis

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INTRODUCTION Natural killer (NK) cells are central to the innate immune system and they represent the first line of defence against bacteria, parasites, viruses and malignant cells. NK cells are bone marrow-derived lymphocytes that share a common progenitor with T cells, do not express antigen-specific cell surface receptors and comprise 10–15% of cells circulating lymphocytes and are also found in tissues including the liver, peritoneal cavity and placenta. They can mediate spontaneous killing of infected or transformed target cells and produce immunoregulatory cytokines and chemokines that stimulate the adaptive immune response. NK cells are regulated in part by inhibitory receptors that recognize MHC class I molecules on normal cells. In humans, inhibitory receptors that recognize classical MHC class I molecules (HLA-A, HLA-B, and HLA-C) belong to the KIR genes. KIRs are a family of ~15 closely linked genes located on chromosome 19q13.4, which encode both inhibitory and activating receptors that are expressed by NK cells. In this research we will focus on the effects of variation within the highly polymorphic HLA loci and KIR gene complex on outcome to specific cutaneous leishmaniasis infections.
AIM This is an on-going research project and we expect to obtain interesting results by the end of July providing KIR gene profiles and identifying the presence or absence of the KIR genes 2DL1, 2DL2, 2DL3, 2DL4, 2DL5, 2DS1, 2DS2, 2DS3, 2DS4, 2DS5, 3DL1, 3DL2, 3DL3, 3DS1, 2DP1, 3DP1, as well as the common variants of 2DL5, 2DS4 and 3DP1 from the selected population and to correlate them with the clinical diagnosis.
METHODS The presence/absence of the KIR genes will be analysed by multiplex PCR-SSP methodology using primers in multiplex combinations that will be resolved by gel electrophoresis following the methodology developed by Martin M.P. and Carrington M.[1]
RESULTS Waiting for results.
CONCLUSION Waiting for results.
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IP33

Platelet-activating factor mediates endotoxin tolerance by regulating indoleamine 2,3-dioxygenase-dependent expression of the suppressor of cytokine signaling 3

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INTRODUCTION Indoleamine 2, 3-dioxygenase (IDO) mediates immune tolerance, and suppressor of cytokine signaling 3 (SOCS3) negatively regulates the JAK/STAT signal transduction pathway. We previously determined platelet-activating factor (PAF) protects mice against lipopolysaccharide (LPS)-induced endotoxic shock, but its detailed mechanism of action was unknown.
AIM To illuminated PAF-mediated endotoxic tolerance mechanism, we performed this study.
METHODS We performed survival experiment in $IDO^{+/+}$ and $IDO^{-/-}$ mice using LPS-induced endotoxemia model, and checked organ injury (neutrophil infiltration and ALT). Using ELISA and Western blot. experiments, we defined the PAF-mediated endotoxin tolerance mechanism.
RESULTS We found that PAF-mediated endotoxin tolerance is dependent on IDO *in vivo and in vitro*, using $IDO^{-/-}$ mice. PAF-mediated endotoxin tolerance was not observed in $IDO^{-/-}$ mice. JAK/STAT signaling which is crucial for SOCS expression was also impaired in the absence of IDO. In IDO- and STAT-dependent manner, PAF induces the reduction of pro-inflammatory cytokine, IL-12 and elicits dramatic production of anti-inflammatory cytokine, IL-10 compared with the LPS-treated control, *in vivo* and *in vitro* experiments. PAF-mediated mouse survival attenuation was also regulated in IDO- and STAT-dependent manner. LPS-mediated neutrophil infiltration into lung and interaction between neutrophil-like cell, THP-1 and endotherial cell, HUVEC, were attenuated by PAF.
CONCLUSION PAF-mediated endotoxin tolerance is initiated via IDO- and JAK/STAT-dependent expression of SOCS3. Our study has revealed a novel tolerogenic mechanism of IDO and an important association between IDO and SOCS3 with respect to endotoxin tolerance.

Abstracts

IP34

Decrease of serological markers of Th2 activity in a context of decreasing intestinal helminth prevalence: Chaco Region, Plurinational State of Bolivia

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INTRODUCTION In the Chaco Region, Plurinational State of Bolivia, recent surveys documented a dramatic decrease in soil-transmitted helminth (STH) prevalence with respect to the 1970s and 1980s. STH prevalence dropped from 1987 to 2013: hookworm from up to 50% to 0.4–1.3%, *Ascaris lumbricoides* from up to 19% to 0.9–1.5%, *Trichuris trichiura* from 19% to 0%. No significant change in intestinal protozoan infections has occurred. Nematode infections are associated with an upregulation of the T-helper (Th)2-cells response, producing increased levels of circulating IgE and Th-2 cytokines. Immunological rearrangements are expected as a consequence of decreased prevalence.
AIM To evaluate changes in serological markers of Th1- Th17-Th2-cells activity over a 25-year period from 1987 to 2012, in rural areas of the Chaco Region, Plurinational State of Bolivia.
METHODS We analysed 160 sera, collected in two different surveys in 1987 ($n = 65$) and 2012 ($n = 95$) from individuals living in two rural communities of the Bolivian Chaco. Sera were evaluated by ELISA/Luminex technology to test the concentration of IgE, glycoprotein CD30 soluble form (sCD30), IL-2, IL-4, IL-10, IL12-p70, IL-17, interferon (IFN)-γ and IL-23. Statistical analysis was performed (Student t-test or Mann-Whitney test, when appropriate) in order to establish significant differences among the samples between the two periods of time. $P < 0.05$ was considered statistically significant.
RESULTS Comparing the distributions of results between sera collected at the two time points, there was a statistically significant decrease in IgE, sCD30, IL-4 ($P < 0.0001$) and IL-10 ($P = 0.019$), a significant increase in IL-17, IFN-γ,and IL-23 ($P < 0.0001$), and non-significant changes for IL-2 ($P = 0.379$) and IL-12p70 ($P = 0.050$). In particular, levels of indicators for Th2 activity, such as IgE and sCD30, decreased during this time lapse; conversely, IFN-γ, IL-17 and IL-23 levels were significantly increased.
CONCLUSION Our data show a decrease in serological Th2 markers (IgE, sCD30 and IL-4) and an increase in Th1/Th17 markers (IFN-γ, IL-17 and IL-23). The result is consistent with the epidemiological trend of STH prevalence reduction, reported in this geographical area during the same period of time.

IP35

Parasitic exosomes as biomarkers for diagnosis in infectious diseases

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INTRODUCTION Diseases such as amebiasis, malaria, trypanosomiasis, leishmaniasis, among others, are produced by parasites affecting the health of millions of people every year in the world, these parasites induce amoebic dysentery, irritations, cysts, loss of cognitive abilities, even death. These types of parasite infections are frequent in underdeveloped countries as consequence of the climatic, economic and social conditions suitable for the prevalence of these type of pathogens. The warm and humid weather as well as annual cycle of rain have permitted the multiplication of the vectors; however, the lack of diagnostic has allowed the dissemination and persistence of this type of illness. So the use of extracellular vesicles as exosomes in these type of illness could be an handful tool in the prediction, diagnostic and tracing, due to their principle role in cellular communication and exchange of genetic material,

Thus, the release of these vesicles from these eukaryotic pathogens is a process that can be produce in every stage of their life cycle that can be recognized by the hosting cell for the activation of the immune system.

Exosomes have been the focus of numerous studies because of their involvement in intercellular communications, especially between immune and tumor cells. Most types of eukaryotic cells and genomes of parasites like apicomplexan, plasmodium spp, and toxoplasma and Cryptosporidium species among others secrete them. In the classical pathway, exosomes are formed through the invagination of endocytic compartments generating multivesicular bodies (MVBs), and are released into the extracellular space after their fusion with the plasma membrane (Bobrie et al., 2011; And Thery, 2013). Despite the abundant knowledge gained through in vitro studies using purified exosomes in vitro or various biological fluids, it is more difficult to produce exosomes in vivo.

Isolated exosomes play a crucial role in host-pathogen interactions. The vesicles secreted by infected cells contain substantial amounts of pathogenic molecules, which are sufficient to induce modifications in neighboring, uninfected cells or act as hosts of antigens for the immune system. As a result, studies have given biological importance to exosomes secreted directly by pathogens (Hassani et al., 2011; Hassani et al., 2014; Silverman and Reiner, 2011a).
AIM The identification of markers for diagnosis, prognosis and prediction in parasitic diseases is particularly relevant and is one of the most promising approaches in screening and / or diagnostic programs and to monitoring the efficacy of treatment. Ideally, exosomes can be isolated from all body fluids and in recent years, remarkable efforts have been made to develop protocols capable of isolating a high yield of pure exosomes.
METHODS Purification of Leishmania exosomes was performed by culturing the parasite in Schneider 'Drosophila GIBCO medium at 28 C ° according to standard methods. The stationary phase parasites were washed twice with PBS, resuspended in Schneider 'Drosophila medium. At the end the sample was centrifuged at 3,000 RPM to remove the parasites, than at 10,000 RPM to remove residues, finally was filtered through 0.45 μm followed by 0.20 μm syringe filters. The

exosomes were then pelleted by 1 hour centrifugation at 100,000 g and resuspended in exosome buffer (1x PBS). For further purification, the exosomes were plated in a linear gradient of sucrose (0 to 2 M sucrose) and deuterium (D2O) and precipitated again for 1 hour at 100,000 g. A final centrifugation was performed to wash them with PBS 1x for 1 hour at 100,000 g and finally were preserved at 4 degrees for further determination of protein content and its observation by TEM, SEM and AFM.
RESULTS In the present investigation, it was verified the presence of nanovesicles in parasite cultures of *Leishmania mexicana* y *amazonensis*, these vesicles were observed by electronic microscopy like SEM and TEM, where the samples of pure exosomes were fixated with glutaraldehyde and sodium cacodylate in 1:1 concentrations. The size of these type of vesicles were between 80 to 150 nm, and its morphology was characterized by its double membrane, at the same time the multivesicular bodies regards of the production of exosomes were observed in the integument of the parasites.
CONCLUSION The secretion of EVs by different parasites is just beginning to be characterized, the investigation on secretory vesicles and their implication in intracellular and extracellular signaling will treat if these vesicles are good targets for new disease control strategies, which could be implemented as new Diagnosis and treatment and vaccines.
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IP36

Recent uptake of intermittent preventive treatment during pregnancy with sulfadoxine-pyrimethamine is associated with selection of *Pfdhfr* mutations in Bobo-Dioulasso, Burkina Faso

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INTRODUCTION The impact of sulfadoxine-pyrimethamine (SP) used as intermittent preventive treatment during pregnancy (IPTp-SP) on mutant parasites selection has never been documented in Burkina Faso.
AIM This study sought to explore the relationship between IPTp-SP and the presence of mutant parasites in Bobo-Dioulasso, the second largest city of Burkina Faso.
METHODS From September to December 2010, dried blood spots (DBS) were collected during antenatal care visits and at delivery from 109 pregnant women with microscopically confirmed falciparum malaria infection. DBS were analyzed by PCR-restriction fragment length polymorphism (PCR-RFLP) for the polymorphisms at codons 51, 59, 108, and 164 of the *Pfdhfr* gene and codons 437 and 540 in the *Pfdhps* gene.
RESULTS Both the *Pfdhfr* and *Pfdhps* genes were successfully genotyped in 92.7% (101/109) of the samples. The prevalence of *Pfdhfr* mutations N51I, C59R and S108N was 71.3, 42.6 and 64.4%, respectively. Overall, 80.2% (81/101) of samples carried the *Pfdhps* A437G mutation. None of the samples carried the *Pfdhfr* I164L and the *Pfdhps* K540E mutations. The prevalence of the triple *Pfdhfr* N51I+C59R+S108N mutation was 25.7% (26/101). The use of IPTp-SP was associated with a three-fold increased odds of *Pfdhfr* C59R mutation (crude OR=3.29; 95% CI (1.44–7.50). Pregnant women with *recent* uptake of IPTp-SP were at higher odds of both the *Pfdhfr* C59R mutation (adjusted OR=4.26; 95% CI (1.64–11.07)) and the *Pfdhfr* intermediate-to-high resistance, i.e., ≥2 *Pfdhfr* mutations (adjusted OR=3.45; 95% CI (1.18–10.07)).
CONCLUSION The data indicate that despite the possibility that SP contributes to the selection of resistant parasites it may still be efficacious when used as IPTp in Bobo-Dioulasso. Nevertheless, further studies aiming at assessing the *in vivo* efficacy of SP in pregnancy are warranted.

IP37

Variable-number-tandem-repeat typing for *Madurella mycetomatis* isolates

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INTRODUCTION The neglected tropical disease mycetoma is a chronic granulomatous infectious disease of mainly the foot. It can be caused by more than 56 different micro-organisms but the most common causative agent is the fungus *Madurella mycetomatis*. Previous molecular typing studies included the amplification of restriction fragment (AFLP) and random amplification of polymorphic DNA (RAPD) were developed, but were either not discriminative or not easy to perform in resource limited laboratories. Variable-Number-Tandem-Repeat (VNTR) can overcome these difficulties.
AIM To develop an easy-to-use VNTR typing technique for *M. mycetomatis* and determine if there is an association between VNTR genotypes and size of lesion or origin of isolates.
METHODS To identify tandem-repeat-containing loci, *M. mycetmatis* MM55 genome was loaded into online tandem repeats finder software. Selection criteria were a repeat size of >17 bp, a perfect (100%) sequence identify of the repeats and an entropy of repeat sequences of >1.70 within the total entropy range of 0–2. To amplify the tandem repeats, primers were designed on the flanking regions. To further determine the tandem repeats in M. mycetomatis, DNA from 81 strains isolated from patients in Sudan, Peru and Mali were amplified by PCR and the number of repeats was determined by determining the size of the amplicons by gel-electrophoresis.
RESULTS Six repeats meeting all criteria were identified. Typing 81 isolates with these 6 repeats resulted in fourteen different VNTR genotypes. These fourteen genotype groups were divided into two clusters with seven and five subdivisions respectively. Our results showed no correlation between the VNTR genotypes and the geographical location of the isolates. We also observed no clear correlation between the genotypes and size of lesions.

Abstracts

Strikingly, *M. mycetomatis* isolates from Mali and India are clustered together with the Sudanese isolates.
CONCLUSION VNTR typing confirms the heterogeneity of *M. mycetomatis* strains and allows discrimination of isolates based on genetics. This VNTR study may be used to study the epidemiology of *M. mycetomatis*.

IP38

Trypanosoma cruzi analysis by Next Generation Sequencing reveals an important genetic expansion

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INTRODUCTION Actually the publication of some different *T. cruzi* genomes has been an important advance for the understanding of this parasite. To date, there are available public genomes from Dm28c, JrCl4 and Sylvio X-10 (TcI), Esmeraldo (TcII), Tula, CL Brener Esmeraldo-like and non-Esmeraldo-like (TcVI), and B7 (TcBat) strains, but not from TcIII, TcIV and TcV strains however their important differential behavior on *in vitro* and *in vivo* experiments.
AIM Sequence and annotate two new *T. cruzi* genomes of interest, a strain belonging to DTU V and Y strain belonging to DTU II, finally compare them to all *T. cruzi* genomes sequenced to date looking for specie specific genetic profiles and differential genetic composition.
METHODS We have sequenced Y strain Trypomastigotes by illumina MiSeq (reads 2x250 pb) and Bug2148 Trypomastigotes by PacBio technologies (reads ~15 kb), both genomes were assembled with suitable algorithms, annotated based on blastp results and compared to all available genomes from *T. cruzi* to date using different bioinformatics tools.
RESULTS About 900 and 10,000 contigs were obtained for Bug2148 and Y respectively, with more than 100X of read depth coverage mean. Bug2148, the first strain sequenced belonging to DTU V and related to have hybrid origin reveal a dramatic expansion for the main surface proteins (MASP, Mucin, Tran-sialidase, gp63, etc). Alignment to contig-level confirms a high genome core conservation, but important differences between DTU's and strains for the most abundant proteins.
CONCLUSION DTUs II, V and VI are the predominant causes of Chagas disease in the South American cone, however the adoption of NGS technologies for its understanding remains poorly explored. In the case of Bug2148, is the first strain sequenced belonging DTU V and it could represents a positive contribution for coming projects and genomic analysis. Moreover, the analysis of the second strain belonging to DTU II confirms the previous results indicating an unusual ploidy level arrangement for this strain and their possible roles on differential pathogenicity behavior.

IP39

High prevalence of *Pfdhfr* and *Pfdhps* genes mutations in pregnant women in Bobo-Dioulasso, Burkina Faso

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INTRODUCTION Drug resistance is one of the major concerns in the control of malaria. Data show that *Plasmodium falciparum* resistance to sulfadoxine-pyrimethamine (SP), used as intermittent preventive treatment during pregnancy (IPTp-SP), is increasing in West Africa. However, in Burkina Faso, there is a lack of data on the *Pfdhfr* and *Pfdhps* genes mutations, as molecular markers of SP resistance, in pregnant women.
AIM The study aims to determine the prevalence of *Pfdhfr* and *Pfdhps* mutations in pregnant women in Bobo-Dioulasso, five years after the IPTp-SP implementation in Burkina Faso.
METHODS From September to December 2010, dried blood spots (DBS) were collected during antenatal care visits from 105 pregnant women with microscopic confirmation of falciparum malaria infection. DBS were analysed by PCR-restriction fragment length polymorphism (PCR-RFLP) for the alleles 51, 59, 108, 164 in the *Pfdhfr* gene and 437, 540 in the *Pfdhps* gene.
RESULTS Both *Pfdhfr* and *Pfdhps* gene were successfully genotyped in 92.4% (97/105) of the samples. Overall, 97.9% (95/97) of the samples carried at least one mutation either at *Pfdhfr* gene or *Pfdhps* gene. The proportions of *Pfdhfr* triple mutation (Ile51 + Arg59 + Asn108) and quadruple mutation (triple Pfdhfr mutation + Pfdhps A437G mutation) were 24.7% (24/97) and 19.6% (19/97), respectively. None of the samples had the *Pfdhfr* I164L and the *Pfdhps* K540E mutations. The prevalence of the triple and quadruple mutation was higher among pregnant women who took the IPTp-SP ($P > 0.05$).
CONCLUSION There is a need for continuous monitoring of SP resistance markers and to assess the in vivo efficacy of SP in pregnant women in Burkina Faso.

IP40

Analysis of the Ubiquitin-conjugating (E2) gene, over-expressed in metacyclic promastigotes of Leishmania infantum extracted from Phlebotomus perniciosus

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INTRODUCTION Leishmaniasis, a disease caused by protozoa of the genus *Leishmania*, affects about two million people worldwide. The main clinical forms are cutaneous, mucocutaneous and visceral (VL). In Europe, zoonotic VL is caused by *L. infantum* and is transmitted through the bite of sand flies of the genus *Phlebotomus*.

The ubiquitin-conjugating enzyme E2 (LinJ.33.2910) is one of the genes over-expressed at the infective stage within the insect vector and may be related with the infection ability of the parasite. It is involved in protein degradation via the proteasome.
AIMS Study of the expression and the subcellular localization of the Ubiquitin-conjugating E2 enzyme of *L. infantum*.

Abstracts

METHODS Sequence alignments with orthologues from models organisms was performed with *ClustalW* and *BlastP*. The ubiquitin-conjugating E2 gene has been cloned in the pQE-30 vector and expression was carried out in *Escherichia coli* strain M15 [pREP4]. The protein has been purified using Ni^{2+} affinity chromatography and a polyclonal antibody has been obtained. Expression of the proteins has been measured throughout the growth curve of promastigotes in axenic culture, including procyclics and metacyclics isolated with peanut lectin promastigotes, and in axenic amastigotes by means of Western Blot. The cell localization of the enzyme has been also studied by indirect immunofluorescence (IFA).
RESULTS The ubiquitin-conjugating gene shows a homology of 92% with *Leishmania major* and 82% with *L. braziliensis* whereas with the related genus *Trypanosoma* (*T. cruzi)* the homology drops to 68%. The enzyme is similar to the A chain of the human orthologous. Western blot has revealed similar expression of the protein throughout the different stages of growth in axenic culture.

The E2 protein is expressed constitutively during the development of the parasite in axenic culture and is located at the nucleus and discrete units within the cytoplasm.
CONCLUSION The E2 gene is up-regulated in metacyclic promastigotes within the sand fly vector *P. perniciosus* but not in axenic culture. According to IFA, the E2 enzyme is compartmentalized.

IP41

Genome-wide analysis of gene expression in a *knock-in* cell line of *Leishmania infantum* over-expressing the elongation factor 2 gene

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INTRODUCTION *Leishmania infantum* (Kinetoplastida: Trypanosomatidae) is the etiological agent of zoonotic visceral leishmaniasis in the mediterranean basin, where dogs are the main reservoir. In these parasites, protein-coding genes are organized in long polycistronic clusters (PGCs) in which gene functions are generally unrelated. The polycistronic transcripts are processed by *trans*-splicing of a 39 nucleotide-long mini-exon and capping at the 5′-end, and polyadenylation at the 3′-end. A protein complex including the eukaryotic translation initiation factor complex eIF4F (eIF4E plus eIF4F) bound to the cap, the poly-A-binding protein in place and other proteins nearby stabilize the mRNA molecule for translation. The translation elongation factor 2 (EF2) is essential for protein synthesis and is encoded by three identical tandem arrayed genes (LinJ.36.0190, LinJ.36.0200 and LinJ.36.0210) in the case of *L. infantum*. The genome of this parasite contains a different gene encoding an EF2-like protein (LinJ.25.2160). The euclidean pairwise distance between the amino acid sequence of the EF2 and the EF2-like protein is 0.69.
AIM Get insight into the functions of EF2 by gene expression profiling of a *knock-in* promastigote line of *L. infantum*.
METHODS *L. infantum* promastigotes were transfected in order to generate cell lines containing the construct pTEX-GFP and pTEX-GFP-EF2. Relative gene expression was compared at a genome-wide scale by using DNA microarray hybridization analysis with cDNA samples. Three replicates of the experiment were performed and genes showing significant increase or decrease of two-fold were selected.
RESULTS Up-regulation of the elongation factor 2 gene in a *knock-in* line of *Leishmania infantum* promastigotes induces over-expression of the genes encoding a cyclosome subunit, a cell division protein, a tyrosine phosphatase and the phosphatidyl inositol 3-kinase (PI3K) and down-regulation of the genes encoding the ribosomal proteins S20 and L18A and a DNA topoisomerase I B, among others.
CONCLUSIONS Over-expression of EF2 induces changes in genes involved in anaphase, cell division and signal transduction in *L. infantum* promastigotes.

IP42

Molecular subtyping of *Blastocystis* from symptomatic patients and healthy individuals from the southwestern Iran

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INTRODUCTION *Blastocystis*, the most common unicellular eukaryote colonized in the large intestine of both humans and non-human hosts has worldwide distribution. The parasite frequently reported in both healthy individuals and symptomatic patients. The parasite has been linked to the pathogenesis of Irritable Bowel Syndrome (IBS), previously.
AIM The current study aimed to evaluate the *Blastocystis* subtypes based on the SSU−rDNA gene in IBS patients compared to healthy individuals in Ahvaz, southwest Iran.
METHODS Two hundred eighty-two stool samples were collected from 152 patients with GI symptoms (67 males and 85 females), and 130 healthy volunteers (102 males and 28 females) during the years 2015–2016. The collected feces were examined using direct saline smear, Lugol's iodine staining, and inoculated in Jones' medium for *Blastocystis* detection. DNA extracted from all samples, and then PCR was performed by SSU rDNA gene.
RESULTS *Blastocystis* was identified in 18 (6.4%) samples, including two (1.3%) of the IBS patients and 16 (12.3%) of the controls group by microscopy. Stool culture was positive in 15 with IBS, 1 without IBS, and 40 control samples. The expected 600 bp fragments of the SSU-rDNA gene were identified in 15 (27.3%) cases and 40 (72.7%) controls. Subtypes 1, 2, and 3 were identified from the 54 successfully sequenced samples. Subtype3 was the most common ST with the frequency of 46.3%, followed by ST2, 37% and ST1, 16.7% in case and control groups. The highest frequency of *Blastocystis* STs (27.8%) was identified in the age group of 31–40 and the lowest was found in the age groups of under 10 years and over 81 years.
CONCLUSION The obtained data showed that *Blastocystis* was more common in healthy individuals compared to IBS patients. Therefore, our findings highlight the contrast between *Blastocystis* infection and gastrointestinal disorders. furthermore, these results support the hypothesis that *Blastocystis* could be a gastrointestinal health marker.

Abstracts

1P43

Expression analysis of Iron Super Oxide Dismutases (FeSOD A/ B) genes in sensitive and resistant field isolates of *L. tropica* to meglumine antimoniate using Real-Time RT-PCR

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INTRODUCTION Kinetoplastids family, including *Leishmania* species for survival in the host macrophages must be defense against the free radicals. Iron-Superoxide dismutase (Fe-SOD) is an antioxidant enzyme contributing to radical super oxidase dismutation to prevent cellular oxidative damage.
AIM In this comparative study, we analysed the expression level of Iron superoxide dismutase mitochondrial (SOD A) and glycosomal (SOD B) in 26 meglumine antimoniate (Glucantime®) healing (sensitive) and non-healing (resistant) *Leishmania tropica* field isolates (*Leishmania tropica* isolates from responsive and unresponsive patients).
METHODS Sensitive and resistant *L. tropica* parasites were isolated from anthroponotic cutaneous leishmaniasis (ACL) patients. After RNA extraction and cDNA synthesis, Real-Time RT-PCR approach was utilized to investigate the relative expression level of resistant and sensitive field isolates with respect to the standard isolate.
RESULTS Real time RT-PCR revealed a significant down regulation of SOD A (2.81 Fold) in resistant isolates, whereas SOD B was upregulated (4.01 fold) in resistant isolates compared to sensitive ones ($P < 0.05$).
CONCLUSION Our primary results suggest that alteration in the level of superoxide dismutases expression in resistant parasites could potentially contribute to detoxify reactive radicals and thus protects cell from antimony-induced oxidative stress. Moreover, since SOD B was up regulated in all resistant *L. tropica* isolates, it could be considered as potential biomarkers for monitoring of clinical resistant isolates.

1P44

Pharmacogenetic profile of P450 2B6, 2C8 and 3A4 genetic variants and the clinical association with malaria recurrent infections in DR Congo

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BACKGROUND Artemisinin combination therapies (ACTs) are the recommended first-line treatment for uncomplicated *P. falciparum* infections. However, human genetic variations in the human Cytochrome P450 (CYP) genes can result in different levels of drug metabolism potentially leading to poor treatment outcomes and risk of recurrent infections. The aim was to assess the frequency of CYP2B6, CYP2A6, CYP2C8 and CYP3A4 allelic variants and their impact on treatment and re-treatment responses in clinical settings in DR Congo.
METHODS Samples from 220 patients collected in 2013–2014 were analysed from children aged 12–60 months in clinical settings in Kinshasa, DR Congo. Patients with confirmed malaria episodes were treated using artesunate amodiaquine (ASAQ) in the first phase and randomised to receive either artemether-lumefantrine (AL) or ASAQ as a rescue treatment with Quinine-clindamycine (QnC) as a control. A post-PCR ligation detection reaction-fluorescent microsphere assay was used to detect the variants in the CYP2B6, CYP2A6, and CYP3A4 genes. Polymorphisms in CYP2C8 were detected by polymerase chain reaction followed by RFLP.
RESULTS The SNPs frequencies for CYP2B6 64C>T, CYP2B6 777/785 C>A/A>G, CYP2B6 1459 C>T, CYP2C8 805A>T, CYP 2C8 416 G>A, CYP2C8 792 A>G, CYP3A4 20230 G>A and CYP3A4 15389 C>T were 5.1%, 72.1%, 2.9%, 29.9%, 30.4%, 4%, 15.4% and 45.0%, respectively. Univariate analysis demonstrated that in ASAQ treated arm ($n = 84$), CYP2C8 416 G>A was significantly associated with the risk of malaria recurrence [OR=4.8, 95% CI (1.1–21.2, $P = 0.04$)]. There was no significant association between CYP3A4 20230 G>A and the risk of recurrence in patients randomised for AL ($n = 95$), [(OR=1.89, 95%,CI (0.52–6.76), $P = 0.33$)]. Similarly, no association between the CYP2B6, CYP2C8 and CYP3A4 variants and risk of malaria recurrences in QnC arm.
CONCLUSION The study suggests a potential association between CYP2C8 variants and recurrent malaria infections after ASAQ treatment. The results demonstrate the influence of pharmacogenetic status in malaria recurrences after treatment and re-treatment with same or rescue ACT therapy.

1P45

Molecular epidemiology of hepatitis D virus in Togo

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INTRODUCTION Hepatitis B virus (HBV) and hepatitis D virus (HDV) infections are major public health problems in sub-Saharan Africa. Whereas it is known that HBV infection is endemic in Togo, there is little data about HDV prevalence.
AIM To assess HDV seroprevalence and determine the HDV and HBV genotypes distribution among HBsAg positive individuals in Togo.
METHODS A retrospective cross-sectional study involved serum samples from 188 HBsAg positive outpatients recruited at one humanitarian medical center in Togo. ELISA and RT-PCR were used to detect anti-HDV antibodies and HDV-RNA respectively. Sequencing followed by phylogenetic analyses and HBV

genotype-specific PCR were used to characterize HDV and HBV genotypes respectively.
RESULTS Out of 119 HBsAg positive serum samples, 10 (8.4%) and 17 (14.3%) were tested positive for HDV-RNA and anti-HDV antibodies respectively. Furthermore, among the HDV seropositive patients, 70.6% of males and 25.3% of females had a positive HDV-RNA ($P < 0.05$). No significant associations were observed with regard to HDV seroprevalence and available risk factors. Phylogenetic analyses demonstrated a predominance of HDV genotype 1 and HBV genotype E among the HDV-RNA/HBsAg positive patients.
CONCLUSION There was a high HDV infection prevalence in HBsAg carriers in Togo with predominance of genotype 1. These data underline the need to reinforce HBV vaccination in newborns and in blood donors without HBV markers, together with screening for HDV in HBV-infected individuals.

IP46

Molecular characterization of *Trypanosoma cruzi* in 4 Chagas disease patients infected by different routes of transmission

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INTRODUCTION *Trypanosoma cruzi*, the etiological agent of Chagas disease (CD) is characterized by a tremendous genetic diversity. Different typing methods have made it possible to classified the parasite into six genetic groups (discrete typing units, DTUs), named TcI to Tc VI.

Beyond the vectorial transmission, limited to endemic areas, other routes of transmission are blood transfusion, organ transplantation, and congenital transmission. In Spain, screening for CD in all blood and organ donors coming from endemic areas has been mandatory since 2005. However, in relation to mother to child transmission, not all the communities have established official prevention programmes.

The aim of this study was to determine the *T. cruzi* genotype of 4 patients with different immune status and infected by different routes of transmission.
MATERIAL/METHODS Samples from 4 patients with CD were investigated: 2 congenital transmission cases from Bolivian *T. cruzi* seropositive mothers, 1 HIV co-infected patient from Bolivia, and 1 recipient who received platelet transfusion from a Brazilian donor. DNA was obtained from a clinical sample (1 congenital case), and culture (3 other cases). DNA from reference control strains were simultaneously processed. Molecular characterization was performed combining PCRs of the intergenic region of the mini-exon gene, the 24Sa and 18S regions of rDNA and A10 repetitive sequence.
RESULTS Genotyping characterization was successfully carried out in all samples. Tc V DTU was identified in 3 patients: both congenital cases, and HIV co-infected patient. On the other hand, Tc II was detected in the platelet transfusion receptor. The size of amplified products in base pairs (bp) from characterization PCRs are summarized in table 1.

Table 1. Size of amplified products (bp) from characterization PCRs.

CD case	Mini-exon gene	rDNA			A10	DTU
		24s		18s		
		D71-D72	D71-D76	V1-V2		
Congenital_1	300 bp	110 and 120 bp	140 bp and 125 bp	165 bp	210 bp	Tc V
Congenital_2	300 bp	110 and 120 bp	140 bp and 125 bp	165 bp	210 bp	Tc V
HIV co-infected	300 bp	110 and 120 bp	140 bp and 125 bp	165 bp	210 bp	Tc V
Platelet transfusion receptor	300 bp	125 bp	140 bp	165 bp	225 bp	Tc II

CONCLUSION
- Molecular characterization can be successfully performed in clinical samples with high parasite load.
- Tc V was identified in all cases with a common Bolivian origin as source of infection.
- In contrast, TcII DTU was characterized in the recipient who received platelet transfusion from a Brazilian donor.
- DTUs distribution in migrant population seems to be similar to that observed in the patients' countries of origin.

IP47

Exploring the genetic basis for human Trypanotolerance in African populations

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INTRODUCTION The classical progression human African Trypanosomiasis (HAT) is from the early haemo-lymphatic stage into the late meningo-encephalitic stage that is invariably fatal unless treated. However, individuals that tolerate the infections and even self-cure without intervention were reported, pointing to possible genetic differences leading to the observed phenotypes.
AIM To identify the loci and respective SNPs associated with HAT susceptibility.
METHODS We have carried out a candidate gene association study (CGAS) to identify single nucleotide polymorphisms (SNPs) that favour trypanotolerance. We investigated SNPs in *CFH, IL10, IL1B, IL8, IL4, IL12B, HLA-G, TNFA, IL6, IFNG, IL4R, HPR, IL12RB1, MIF*, and *APOL1* with trypanotolerance. These were commercially genotyped and the resultant data analysed by PLINK v1.9 to determine the level of individual and genotype missingness, Hardy-Weinberg equilibrium, estimate allele frequencies, and linkage disequilibrium. Fisher's exact test was used to determine the associations of indivudual SNPs with HAT. Bonferroni correction was undertaken to control for multiple testing. Testing for population stratification and admixture was carried out using PCA implemented with SNPRelate (Release 3.3).
RESULTS Prior to Bonferroni correction, several SNPs exhibited associations with HAT but after that, SNPs at 5 loci remained significantly associated. In Malawi, the G minor allele rs1736936 of HLA-G was associated with decreased risk of developing HAT ($P = 0.000044$ and BONF=0.003 after Bonferroni correction, OR=0.38 CI95 = 0.24–0.6), while the G minor allele rs1610696 associated with increased risk ($P = 0.00046$, OR=3.4, CI95 = 1.65–7.15). In Cameroon the minor T allele rs8062041 of HPR was protective ($P = 0.0002395$, BONF=0.0163, OR=0.36, CI95 = 0.20–0.63), while in Guinea the IL6 rs1818879 allele A was associated with reduced risk of progressing from latent infection to active disease

Abstracts

(P = 0.0027, BONF = 0.0409, OR = 0.52, CI95 = 0.34–0.8). Also in Guinea, APOL1 G2 allele (DEL) was associated with a higher risk (P = 0.0006, BONF = 0.0089, OR = 2.55, CI95 = 1.43–4.55), while APOL1 G1 polymorphism associated with a lower risk of developing HAT (P = 0.0005, BONF=0.0071, OR = 0.46 and CI95 = 0.3–0.71).
CONCLUSION Different SNPs at different loci are involved in human trypanotolerance. However, the variants associated with risk of HAT vary between populations, pointing to possible involvement of other host, parasite or even environmental factors.

IP48

Complexity of infection and parasite relatedness of *Plasmodium falciparum* parasites populations in patients administered artemether-lumefantrine (AL) in Kenya

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INTRODUCTION Molecular barcode of twenty-four unlinked single nucleotide polymorphisms (SNPs have been used to characterize *Plasmodium falciparum* parasite. Complexity of infection (COI) which is the average number of infections within a human host is then generated and is a parameter associated with malaria clinical outcome and transmission. Currently, analyses of data from this molecular barcode in Kenyan parasites is has not been done. This renders anti-malarial drugs ineffective due to presence of multiple unknown strains in circulation that would have otherwise been helpful in malaria elimination.
AIM This study sought to identify and track specific *Plasmodium falciparum* parasites in patients administered artemether-lumefantrine (AL) in different malaria endemic regions in Kenya.
METHODS DNA from 71 blood samples collected from the various malaria high (n = 40) and low (n = 31 transmission zones in Kenya in the year 2014 were isolated and quantified. Target amplification and high resolution melting for SNP discrimination was then carried out. The parasites were genotyped using a molecular barcode of 24 SNPs distributed across *P. falciparum* genome which have a high minor allele frequency (average MAF > 35%). Clustering was done in comparison with Asian, South American and African isolates. However, clustering of Kenyan parasites in relation to clinical outcome is yet to be done.
RESULTS Highest COI value was 2 reported in 8% of all parasites which represented presence of poly-genomic infections while the rest had COI of 1 representing isolate with mono-genomic infections based on the 24 SNPs barcode. Poly-genomic infections showed evidence of high genetic diversity and malaria transmission among Kenyan parasites. All isolates from Asia, South America and Africa clustered geographically. More specific, clustering of Kenyan parasites showed presence of distinct (similar-genotype) parasite profile. Eight samples (11%) with posterior probability value of < 0.95 were eliminated from subsequent network analysis.
CONCLUSION These findings are important in evaluating reduced response to anti-malarial therapy which its findings pose a threat of artemisinin resistance emergence thus hampering malaria control and elimination efforts.

IP49

Role of mTOR in invasion, proliferation and egress of *Toxoplasma Gondii* Tachyzoites

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INTRODUCTION The protozoan *Toxoplasma gondii* is an intracellular parasite that infects humans and a broad variety of animals. In immuncompromised individuals it causes a severe disease and death. *T. gondii* is able to invade all the cells in the organism through dynamic mechanisms such as gliding motility, conoid extrusion and secretion from different organelles. How this lytic cycle is regulated is unknown but it can involve a role for protein kinases like mTOR.
AIM To determine the role of mTOR in invasion, proliferation and egress of *Toxoplasma gondii* tachyzoites.
METHODS An in silico analysis was made in order to determine the isoforms of TOR present in *Toxoplasma gondii* genome by using BLAST, domain analysis, multiple alignments and modeling. RT-PCR was carried out in order to know the expression of TgTOR. The effect of inhibitors of mTOR were examined in the processes of invasion, proliferation and egress of *Toxoplasma gondii* in cell culture.
RESULTS *Toxoplasma gondii* has an isoform of TOR which retains the HEAT, FAT, FRB, FATC, PIKK domains conserved in TOR proteins in all species. By RT-PCR we observed the fragments corresponding to the catalytic and FRB domains of TgTOR. Also we noted that the presence of specific inhibitors of mTOR blocked the invasion, proliferation and egress of T. gondii in cell culture.
CONCLUSION *Toxoplasma gondii* tachyzoites expressed an isoform of TOR (TgTOR) and it apparently is essential in the pathology of this protozoan parasite.

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IP50

First genome of *Salmonella* concord, a highly resistant and virulent *salmonella* serotype in the Horn of Africa

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INTRODUCTION The *Salmonella* genus is highly divers, with some serovars causing gastroenteritis, such as *Salmonella* Typhimurium, while others like *Salmonella* Typhi are more invasive. *Salmonella* Concord is of particular interest as it can cause gastroenteritis as well as invasive infections. Intriguingly, this serovar is geographically linked to the Horn of Africa. It was brought under the attention due to a high prevalence amongst Ethiopian adoptees[1]. In addition to its invasive phenotype, *Salmonella* Concord shows high antimicrobial

resistance[2]. Unfortunately, no reference sequence is available allowing an in-depth genomic analysis.
AIM The objective is (i) to draft the first *Salmonella* Concord reference genome and (ii) to identify genomic signatures underlying its antimicrobial resistance and invasiveness.
METHODS Two isolates were obtained from stool samples from Ethiopian adoptees who presented at the travel clinic of ITM Belgium in 2008 and 2012. Antibiotic susceptibility profiles were determined using conventional methods. Isolates were whole-genome sequenced using PacBio and Illumina platforms. Assemblies were constructed using a HGAP/Quiver/Circlator pipeline, and Pilon. Finished genomes were queried for antimicrobial resistance and virulence genes. Genetic signatures linked to human invasiveness, were identified by comparing the *Salmonella* Concord gene content with those from reference isolates of serovars Typhimurium and Typhi. The degree of pseudogene formation is associated with increased invasiveness towards one host, and was predicted by calculating delta-bit scores. Gene ontology (GO) enrichment was used for functional grouping.
RESULTS Two reference genomes were obtained comprising five contigs, carrying one similar IncHI2A resistance plasmid each. Both isolates were multidrug resistant, ESBL producing (*CTX-M-15*) and tetracycline resistant (*tetD*). One isolate was in addition resistant to azithromycin (*mphA*), showed quinolone resistance (*qnrB*) and harboured an extra IncA/C2 resistance plasmid. The isolates had respectively 235 and 236 pseudogenes compared to *Salmonella* Typhimurium, significantly enriched for virulence-associated processes.
CONCLUSION We provide the first reference genomes of *Salmonella* Concord, and used these for an in-depth genomic analysis. The studied isolates acquired several antibiotic resistance genes present on mobile elements and genomic signatures linked to increased invasiveness.
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IP51

Antifolate resistance mutations in *Plasmodium falciparum* isolates from the Central Africa Republic

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INTRODUCTION The triple N51I/C59R/S108N mutant alleles in the dihydrofolate reductase *(dhfr)* gene and the double A437G/K540E mutant alleles in the dihydropteroate synthase (*dhps)* gene alone or in combination are frequently associated with treatment failure with Sulfadoxine/Pyrimethamine. We report frequency distributions of mutant alleles of these genes in *P. falciparum* isolates in Central African Republic.
METHODS Between October 2009 and January 2010 individual blood samples with *P. falciparum* infection were collected on Whatman™ absorbent filter paper in five cities across the Central African Republic: Bangui which is located in the South, Berberati and Bouar in the East and Bria and Bangassou in the West. The blood samples were dried and then stored at -20 °C for analysis at Institut Pasteur of Bangui. *P. falciparum* DNA was extracted from the filter paper (Chelex method) and amplified by nested polymerase chain reaction (nested-PCR) for *dhfr* and *dhps* genes to identify the presence of N51I, C59R, S108N, A437G, K540E mutant alleles.
RESULTS A total number of 259 blood samples was collected for analysis. Overall, mutant alleles N51I, C59R, and S108N for *dhfr* gene were found in 65.5%, 64.0% and 81.5%, respectively. The *dhfr* gene mutant alleles were very commonly found in Bangui with 91.8% for N51I, 84.0% for C59R and 93.7% for S108N, but also in Berberati with 86.3% for N51I, 79.1%% for C59R and 97.8% for S108N. The frequency of A437G and K540E mutant alleles was less common, with 14.0% and 4.1%, respectively. The triple *dhfr* variant (51I, 59R, and 108N) was found more frequently in Bangui with a proportion of 70.1% and in Berberati with a proportion of 58.5%, while the double A437G/K540E mutant in the *dhps* gene was only found in two individuals from Bangui. Blood samples from these individuals also yielded the triple *dhfr* mutant N51I/C59R/S108N.
CONCLUSION There was a very high frequency of N51I, C59R, and S108N mutant alleles and the triple mutants N51I/C59R/S108N in *dhfr* genes while the A437G and K540E mutant alleles and the double mutants A437G/K540E in *dhps* genes were uncommon. However, the finding of the quintuple mutant (N51I/C59R/S108N and A437G/K540E), even if less frequent, but predicting Sulfadoxine/Pyrimethamine treatment failure is alarming.

IP52

Evaluation of the pharmacokinetic-pharmacodynamic relationship of praziquantel in the schistosoma mansoni mouse model: possible clinical implications

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INTRODUCTION After more than 40 years of use, Praziquantel (PZQ) still remains the drug of choice for the treatment of intestinal and urogenital schistosomiasis. Its anti-parasitic activity resides essentially in the (*R*)-enantiomer. Hitherto neither the molecular target nor the pharmacokinetic-pharmacodynamic relationship have been elucidated.
AIM Here we investigated the efficacy and pharmacokinetics of PZQ in the *Schistosoma mansoni* mouse model to determine the key factors that drive its efficacy.
METHODS Dose-response studies with racemic PZQ with or without addition of an irreversible pan-cytochrome P450 (CYP) inhibitor, 1-aminobenzotriazole (ABT), were performed. In addition, efficacy of PZQ in the presence of the CYP inducer, dexamethasone (DEX), was determined. Plasma samples were obtained by tail vein bleeding at 4 time points. The (*R*)-PZQ levels were determined using a LC-MS/MS method. Non-

compartmental pharmacokinetic analysis was performed using PKsolver. In addition, *in vitro* experiments in a host-mimicking environment were conducted.
RESULTS The use of ABT increased (*R*)-PZQ plasma exposures in the systemic circulation by ~10–20 fold but were not predictive of efficacy. The use of DEX decreased plasma exposures of (*R*)-PZQ in the systemic circulation by ~10 fold without reducing efficacy. We extrapolated the (*R*)-PZQ concentrations in mouse portal vein / mesenteric veins from the systemic exposures and found that a free exposure of (*R*)-PZQ of ~ 20 μM*h in the portal vein was needed to obtain a worm burden reduction >60%. This was corroborated by *in vitro* experiments where an exposure to free (*R*)-PZQ of ~ 25 μM for 1 h was required to effectively reduce the viability of *S. mansoni* adult worms.
CONCLUSION The high (*R*)-PZQ concentrations available before the hepatic first pass metabolism drive the efficacy against *S. mansoni* adult worms residing in the mesenteric veins. It is then possible that the current dosing regimen of 40 mg/kg may provide suboptimal concentrations in low-weight patients such as children, due to smaller total amounts of drug administered, and consequently results in lower cure rates as already shown in some clinical studies. Therefore, we propose that the selection of paediatric doses for PZQ should not be based on a standard PK approach but rather on efficacy.

IP53

Moderate and severe LFT elevations in controlled human P. falciparum malaria infection model: recent experience, literature review and mechanistic hypotheses

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Controlled Human Malaria Infection (CHMI) in healthy subjects is a critical model in vaccine research and in profiling new chemical entities (NCEs). Documented laboratory changes induced by CHMI include mild benign liver function tests (LFT) elevations (<2.5xULN). In recent evaluations of antimalarial NCEs with the *Plasmodium falciparum* (*Pf*) induced blood stage malaria (IBSM) model, we have observed cases of transient asymptomatic moderate/severe LFT elevations (2.6-10xULN).

Among more than 190 healthy subjects tested in our *Pf* IBSM studies with NCEs and approved antimalarials, 8 participants showed ALT/AST elevations of up to 10 x ULN. These cases were reported in four distinct studies with three NCEs that were not identified as hepatotoxic in the initial Phase 1 studies. A liver safety review of 16 *Pf* IBSM studies (14 completed and 2 ongoing with 5 approved antimalarials and 7 NCEs) and 44 published sporozoite challenge studies was performed. For sporozoite CHMIs, moderate/severe LFT elevations were also reported in a mosquito-bite study with a NCE (pafuramidine) in 6/19 subjects (4 active/2 placebo). Most of these subjects (including placebo) received paracetamol with a highest cumulative dose of 17.5 g. ALT elevations were generally higher than AST. For IBSM studies, only one subject showed bilirubin > 2xULN (potential Hy's law reported as serious adverse event).

Review of these cases by Drug-Induced Liver Injury Experts suggest that these changes are likely to be multifactorial in origin with combined interaction of 3 possible causative factors: 1-Inflammatory state induced by CHMI, 2-paracetamol, 3-NCE and additional risk factors (undiagnosed condition such as liver steatosis or alcohol consumption). Because these laboratory findings are not uncommon, specific safety provisions for the conduct of CHMI studies with NCEs during drug development are proposed. The recommendations for IBSM studies include preclinical hepatotoxicity profiling of the NCE, strengthened eligibility criteria, use of a positive control and symptomatic treatment with NSAIDs (ibuprofen) as a substitute to paracetamol.

IP54

Cellulose filtration of blood from malaria patients for improving ex vivo growth of *Plasmodium Falciparum* parasites

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INTRODUCTION Establishing in vitro *Plasmodium falciparum* culture lines from patient parasite isolates can offer deeper understanding of geographic variations of drug sensitivity and mechanisms of malaria pathogenesis and immunity. Cellulose column filtration of blood is an inexpensive, rapid and effective method for the removal of host factors, such as leucocytes and platelets, significantly improving the purification of parasite DNA in a blood sample.
METHODS In this study, the effect of cellulose column filtration of venous blood on the initial in vitro growth of *P. falciparum* parasite isolates from Tanzanian children admitted to hospital was tested. The parasites were allowed to expand in culture without subcultivation until 5 days after admission or the appearance of dead parasites and parasitaemia was determined daily. To investigate whether the filtration had an effect on clonality, *P. falciparum* merozoites surface protein 2 genotyping was performed using nested PCR on extracted genomic DNA, and the *var* gene transcript levels were investigated, using quantitative PCR on extracted RNA, at admission and 4 days of culture.
RESULTS The cellulose-filtered parasites grew to higher parasitaemia faster than non-filtered parasites seemingly due to a higher development ratio of ring stage parasites progressing into the late stages. Cellulose filtration had no apparent effect on clonality or *var* gene expression; however, evident differences were observed after only 4 days of culture in both the number of clones and transcript levels of *var* genes compared to the time of admission.
CONCLUSIONS Cellulose column filtration of parasitized blood is a cheap, applicable method for improving cultivation of *P. falciparum* field isolates for ex vivo based assays; however, when assessing phenotype and genotype of cultured parasites, in general, assumed to represent the in vivo infection, caution is advised.

Abstracts

1P55

The establishment of an Enterovirus 71 (EV71) infection model with robust lethal neuro-pathogenicity in adult mice

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INTRODUCTION Although infection models for enterovirus 71 (EV71) in mice have been reported, the age of mice used, neonatal or juvenile (≤ 2 weeks old), limits their relevance. Indeed, the blood-brain barrier in young mice is immature and poorly developed. This constitutes either a bias for the study of viral neuro-pathogenesis and it affects all studies of *in vivo* antiviral activity.
AIM To establish robust EV71 infection model in adult mice in order to assess the potential protective effect of antiviral molecules.
METHODS Adult immunodeficient (SCID) mice (≥ 6 weeks old) were infected with EV71 clinical isolate (#812) and a mouse-adapted variant obtained by passaging three times the #812 strain in neonates by intracranial injection. Viral RNA was isolated from mice tissues and was quantified by means of RT-qPCR. EV71 antigen was detected by immunohistochemistry in formaldehyde-fixed mice tissues.
RESULTS We found that in SCID mice, EV71-#812 strain developed a slowly-progressing infection whereas the mouse-adapted variant (#812MA) could rapidly cause neurologic disease at 4 days post infection. EV71 induced neurological disease in SCID mice was characterized by hind limb paralysis and apparent balancing and coordination problems. EV71 viral antigens in the CNS were particularly observed in neurons of the cerebellum and motor neurons of the spinal cord, a pattern that has also been reported in humans that succumbed from EV71 infections. The study of the sequences of EV71 #812 and #812MA revealed a single amino acid substitution (V135I) located in the "puff loop" of the capsid protein VP2. Interestingly, when we infected murine neuroblastoma (Neuro-2a) cells with either EV71 strain, only the EV71 #812MA strain was able to efficiently induce cytopathic effect (CPE). Moreover, by the third passage of the EV71 #812 strain on Neuro-2a cells, a CPE inducing phenotype was acquired together with the amino acid substitution VP2_V135I.
CONCLUSION We herein demonstrated the essential role of substitution VP2_V135I for mouse neuro-adaptation *in vivo* and *in vitro*. The effect of VP2_V135I mutation on viral entry and tissue tropism *in vivo* is currently being studied. Moreover, we established an EV71 infection model with robust lethal neuro-pathogenicity in adult mice to study antiviral activity in a physiologically relevant context.

1P56

Steroid hormones in murine schistosomiasis mansoni

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INTRODUCTION Schistosomiasis is a neglected tropical disease, endemic in 76 countries, that afflicts more than 240 million people. The impact of schistosomiasis on infertility may be underestimated according to recent literature. Extracts of *Schistosoma (S.) haematobium* include estrogen-like metabolites termed catechol-estrogens that down regulate estrogen receptors alpha and beta in estrogen responsive cells. In addition, schistosome derived catechol-estrogens induce genotoxicity that result in estrogen-DNA adducts and cause hormonal imbalance. We now hypothesize the induction of infertility in individuals infected with S. mansoni also through an hormonal imbalance.
AIM The aim of this study was to study a panel of steroid hormones in mice infected with *S. mansoni*.
METHODS By electrochemoluminescence (ECLIA) we tested Estradiol (E2), Testosterone, Progesterone, Prolactin, Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH) in the sera of animals infected with *S. mansoni* in comparison with controls.
RESULTS We found a decrease in the levels of E2 (3385 ± 1238.9 vs. 499.1 ± 489.9; $P < 0.05$), Testosterone (0.974 ± 0.5 vs. 0.087 ± 0.01; $P < 0.05$) and Progesterone (96.7 ± 48.8 vs. 11.0 ± 14.6; $P < 0.05$) in infected females in comparison with controls.
CONCLUSION To our knowledge this is the first study addressing the role of steroid hormones in *S. mansoni* infection. These results emphasize the possible role of hormonal imbalance in the pathogenesis of this infection and that schistosomiasis has an important metabolic effect that may affect the fertility of the infected host.

1P57

Expression of angiogenic and inflammation markers in murine schistosomiasis mansoni

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INTRODUCTION Schistosomiasis is a neglected tropical disease, endemic in 76 countries, that afflicts more than 240 million people. Symmers' portal fibrosis (also called periportal fibrosis) is a characteristic hepatic disease described in schistosomiasis. Although estimates are not available, Schistosomiasis must still be considered to be the most frequent cause of liver fibrosis worldwide. Angiogenesis, the formation of new blood vessels from pre-existing ones, is recognized as a key event in a basic change occurring during repair by granulation tissue. This process seems to precede fibrosis formation in most types of chronic liver disease.
AIM Since a growing amount of evidence points to angiogenesis playing a key role in the development of fibrosis, the aim of the current work was to study angiogenesis in the livers of mice infected with *S. mansoni*.
METHODS By immunohistochemical staining using Von Willebrand (CD31) as an endothelial marker in the livers of normal control mice and *S. mansoni infected mice*. We also

evaluated the expression of TNF-alpha and IL-6 as inflammation markers.
RESULTS We found an increase in angiogenesis analysed by the number of new vessels in the livers of infected animals. We also found an increase in IL6 expression in these tissues in comparison to controls.
CONCLUSION We will show and discuss such findings as evidence of the importance of vascular proliferation in the process of liver fibrosis. Thus, blocking of angiogenesis may represent the appropriate therapeutic target for the treatment of schistosomal liver fibrosis.

IP58

Rabies antibody response after boostering 10 years or more after pre-exposure prophylaxis

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INTRODUCTION Rabies can be prevented by pre-exposure prophylaxis (PrEP). PrEP consists of three intradermal or intramuscular immunizations at Day 0, 7 and 21–28. Booster immunization is recommended for high-risk groups. We are interested in rabies antibody titers immediately after boostering, when PrEP was administered more than 10 years ago. By administering one booster vaccine, we mimic the effect of a post-exposure treatment.
AIM To assess the long-term boostability after a completed intradermal or intramuscular pre-exposure rabies immunization scheme after more than 10 years.
METHODS This two-arm pilot study included participants that received intramuscular or intradermal immunization schemes. All volunteers (10/arm) had a completed PrEP 10 years or longer ago and had never received a rabies booster or anti-rabies immunoglobulin. Rabies virus neutralizing antibodies were determined, prior to intramuscular booster vaccination, and on Days 3, 7 and 14, through Rapid Focus Fluorescent Inhibition Test (RFFIT).
RESULTS WHO considers a minimum titer of 0.5 IU/mL as protective. In the 'intramuscular' arm, the median age was 49.5 (43–57) years and the median time interval between initial PrEP and booster was 22.50 (14–24) years. Prior to booster immunization, 90% of the participants were still protected (Geometric Mean Titer (GMT) 3.86 IU/mL; see Table). First increase of antibodies was seen on Day 7, with 100% seroconversion on Day 14 (GMT 43.28 IU/mL).
CONCLUSION This pilot study provides additional evidence that rabies antibodies are still present even when PrEP was administered more than 10 (up to 24) years ago. Moreover, one single intramuscular booster immunization will result in an accelerated antibody response. This suggests that two booster doses (as part of post exposure treatment) will lead to an even higher and faster antibody increase. The complete results of the 'intradermal' arm are still pending; preliminary first results are similar to those of the 'intramuscular' arm.

Table: Rabies antibody response – characteristics per time point for 'intramuscular' study arm.

Time point	*n*	Seroprotection (%)	GMT (IU/ml) (95% CI) in seroconverted	Range of titers (IU/ml) in seroconverted
Day0	10	90	3.86 (2.03–7.34)	1.50–14.91
Day3	10	90	3.88 (2.06–7.30)	1.57–19.02
Day7	10	90	9.50 (5.87–15.37)	4.26–25.29
Day14	10	100	43.28 (10.72–177.38)	0.61–741.03

IP59

Pneumococcal vaccine immunogenicity following allogeneic hematopoietic stem cell transplantation

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INTRODUCTION Infection with *Streptococcus pneumoniae* is a life-threatening complication in patients after hematopoietic stem cell transplantation (HSCT). Vaccination is an important strategy to prevent invasive pneumococcal disease (IPD). The currently available vaccines against IPD are the 13-valent conjugate vaccine (PCV13) and the 23-valent polysaccharide vaccine (PPSV23). We recently encountered two severe cases of HSCT recipients who developed IPD despite adequate revaccinations. These cases prompted us to re-evaluate the level of (long-term) immunogenicity of pneumococcal vaccinations in this patient group. In addition, we investigated whether better guidance is needed regarding the measurement of the post-vaccination antibody responses and which scientific data underlie various immunization schedules.
AIM We aimed to define the optimal time-period between HSCT and pneumococcal revaccination and to assess the need for antibody measurements, both based on our own data and on the existing literature. To that end, we performed a systematic review on pneumococcal immunization post HSCT.
METHODS In this study, patients who received post HSCT immunizations between January 2009 and January 2017 at the Academic Medical Center (AMC) of the University of Amsterdam, the Netherlands, were included. The current immunization schedule of the AMC advises to start revaccination from 1 year after HSCT.
RESULTS Of 103 patients included (mean age 50.0 years), antibody concentration measurements were performed in only 40.8%. The immunogenic response rate to PCV13 was 84.6%. However, an inferior response (61.5%) was seen to the PPSV23 serotypes that are not covered by PCV13. A very low protection (15.0%) was found against serotype 12F, while for the other serotypes the response was varying between 55.0%-85.0%. Despite adequate antimicrobial prophylaxis during the first year post HSCT, IPD was found in 2.9% of the patients with a median time of 6 months after transplantation.
CONCLUSION HSCT recipients are vulnerable to IPD, even after full vaccination. The optimal time-interval between HSCT and the start of routine vaccinations is controversial; however, because of the clinical impact of early IPD, we advise to start 3–6 months post HSCT. Furthermore, we recommend to include guidance on standard pneumococcal antibody concentration measurements in international guidelines.

Abstracts

1P60

The new Cuban pneumococcal vaccine pipeline: clinical evaluation status and future considerations

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INTRODUCTION A new conjugate heptavalent pneumococcal vaccine (PCV7-T) is under development. The implementation of pneumococcal vaccination has been designed assuming the need to maximize both direct and indirect effects.
AIM To present the current results of clinical research of PCV7-T and the introduction strategy planned in Cuba for 2018.
METHODS The pipeline of clinical evaluation is described. The results of three randomized control trials are synthetized to demonstrated the safety and immunogenicity including: 1) adults (n = 40), 2) preschool children 4–5y/o (n = 15) and infants 7–11 months (n = 30) and 3) preschool children 1–5y/o (n = 1135). For vaccine introduction, a novel approach is suggested addressing preschool children as first line of target groups to generate herd immunity in infants and to impact on transmission at community level.
RESULTS No serious adverse events were reported in none group of age. Following a single-dose vaccination in 4–5-year-old children induced statistically significant ($P \leq 0.05$) increase of IgG GMC and OPA for individual seven serotypes included in PCV7-T. In infants vaccinated at 7, 8 and 11 months (2p+1) we did not find difference in percentages of seroprotection using Synflorix® as control vaccine. The booster capacity was also demonstrated in this target group. New insights since a protective efficacy clinical trial including 1135 preschool children and using PREVNAR® as control vaccine, showing that more than 90% of children have IgG titers ≥0.35 for 6 of 7 vaccine serotypes, and more than 77% have protective titers for serotype 5.
CONCLUSION The Cuban pneumococcal vaccine candidate is safe and immunogenic. The clinical evaluation strategy support the making-decision to introduce it in the National Vaccination Programme. The scientific contribution of the Cuban strategy could support the shift of paradigm from the individual protection to population effect based on a rigorous body of scientific evidence.

Trial registration: Currents controlled trials RPCEC00000133, RPCEC00000173 and RPCEC00000182

Funding Finlay Vaccine Institute, Havana, Cuba.

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1P61

Measuring the burden of nasopharyngeal colonization In Cuban children: Prevalence and expected changes after pneumococcal vaccine introduction

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INTRODUCTION Country data on the burden of NP colonization and pneumococcal serotype circulation is limited. However, this information is essential to measure the health impact of the vaccination. The impact evaluation on carriages is included as part of the evaluation strategy of the Cuban new pneumococcal vaccine candidate (PCV7-T).
AIM To explore the burden of NP colonization in child population and the changes associated with pneumococcal vaccination (one year after) in preschool children included in a randomized control trial.
METHODS Two cross-sectional and one follow up studies were conducted including children 2–18 months (n = 998) and 1–5 y/o (n = 1135) in Cienfuegos municipality between 2013 and 2016. To explore changes on NP colonization associated with vaccination 552/1135 children, randomly selected, were following up 1 year after single dose. Nasopharyngeal swabs were collected according to established protocols. Data analysis comparing prevalence NP colonization global and by serotype pre and post vaccination is included.
RESULTS The overall prevalence of NP colonization in children 2–18 months old was 21.6% and in children between 1–5 years old day-care attendance it rises to 31.01%. In both studies, the most common serotypes isolated correspond to those included in the Cuban vaccine candidate: 23F, 6B, 19F and 14. In the follow up survey in children included in clinical trial was found a vaccine type NP carriage reduction of 62% (from 55% to 21%), while the proportion of non-vaccine serotypes increased from 22% to 35%, mainly for serotype 6A. Serotype 14, 23F and 18C were not find post vaccination and 19F colonization was reduced significantly ($P \leq 0.05$). Serotype 1 and 5 were not isolated. The most frequent non-Cuban vaccine serotypes were 6A, 19A, 23A y 15B.
CONCLUSION The introduction of pneumococcal vaccination in Cuba could impacts the NP colonization at population level and consequently, might reduce the burden of pneumococcal disease in child population.

Abstracts

Trial registration: Current controlled trials RPCEC00000133, RPCEC00000173 and RPCEC00000182

Funding Finlay Vaccine Institute, Havana, Cuba.

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IP62

Suspected cases of adverse event following immunization (AEFI) in pregnant women vaccinated after the last yellow fever mass immunization campaign in Kinshasa/Lemba

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BACKGROUND During the last outbreak of yellow fever in DRC, WHO recommend the use of fractional doses of vaccine for immunization except for pregnant women and children of less than 2 years old which received the complete doses. However, there is no available information in DRC on inocuity of this vaccine in pregnant women and the possible upcoming of adverse events in post immunization period.
AIM To value the importance of AEFI in pregnant women vaccinated during the last mass yellow fever immunization campaign in LEMBA/KINSHASA
METHOD We conducted a cross sectional survey based on adverse event sin post immunizations period surveillance data from August 16 to October 25, 2016 in the Health Zone of Lemba in Kinshasa. The present survey included suspected AEFI cases among which, pregnant women
RESULTS A total of 194 pregnant women were enrolled in this study with a mean of 29 years. Frequency of pregnant women with complaints was 20, 1%. On a total of 53 AEFI, the most observed complaints were physical asthenia (17%), pain in injection site (15.1%) and pruritus (15.1%) while abdominal pain (13.2%) and abortion (1.9%) were the most severe as the grave MAPI reported.
CONCLUSION This survey allowed the determination of pregnant women AEFI rate after a mass immunization campaign. It proves that the rate of AEFI in pregnant woman is increased after a yellow fever immunization campaign.

IP63

Inhibition of Peruvian Amazon *P. Falciparum* isolates by antibodies against N-terminal and central MSP10 domains

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INTRODUCTION Merozoite Surface Protein 10 (MSP10), which has two EGF-like domains, is among the most immunodominant *P. falciparum* proteins recognized infected individuals in all endemic regions. MSP10 is not polymorphic, suggesting that it may have potential of a vaccine target.
AIM To test the hypothesis that non-EGF regions of MSP10 might be targets of protective immunity, monoclonal antibodies (mAb) against N-terminal and central regions of MSP10 were used in growth inhibition assays (GIA), using *P. falciparum* isolates from the Peruvian Amazon.
METHODS Two mAbs against the N-terminal region of MSP10, (anti MSP10-1 and anti MSP10-4), and one against the central region (anti MSP10-2), were characterized by Western blot, IFA, confocal microscopy, quantitative ELISA and GIA. Polyclonal antibodies (pAb) against full-length MSP10 protein was used as control. Three *P. falciparum* isolates from the Peruvian Amazon and the standard *P. falciparum* strain 3D7 were used in GIAs.
RESULTS mAbs directed against the N-terminal region and the central region were shown to be specific for MSP10 by Western blot, IFA and ELISA. Growth inhibition of the 3D7 strain ranged from 1–20%, 35–42% and 30 to 85% using mAb anti MSP10-1 and mAb anti MSP10-2 at [10–100 μg/mL] and pAb anti-MSP10 at [1–10 mg/mL] respectively. mAb anti MSP10-1 inhibited *P. falciparum* isolates from the Peruvian Amazon up to 40% at [100 μg/mL] in GIAs. mAb anti MSP10-2 inhibited *P. falciparum* isolates from the Peruvian Amazon up to 22% at [100 μg/mL] and from 11–80% at [0.1–10 mg/mL] with pAb. GIAs using anti MSP10-4 are in progress.
CONCLUSION mAbs against the N-terminal region of MSP10 inhibited the *in vitro* growth of *P.falciparum* isolates from the Peruvian Amazon more than antibodies against MSP10 central region. These results provide evidence that MSP10 should be pursued as a vaccine candidate against the asexual blood states of the parasite.

IP64

Is early measles vaccination associated with stronger survival benefits than later measles vaccination?

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INTRODUCTION A recent WHO review concluded that there is evidence of beneficial non-specific effects of the measles vaccine (MV), the vaccine reducing mortality by more than can be

explained by preventing measles infections. Previous studies have suggested that early MV is more beneficial than late MV.
AIM We tested whether early MV before 9 months of age is associated with lower mortality than MV given after 9 months of age.
METHODS Bandim Health Project follows children under 5 years of age through a Health and Demographic Surveillance System with biannual visits to randomly selected villages in rural Guinea-Bissau. The present study included children from 6 to 36 months of age, who had their vaccination card inspected between January 1st 1999 and May 15th 2006. We examined their mortality until the next time their vaccination card could be inspected or for a maximum of 6 months. Mortality rates were compared in Cox proportional-hazards models with age as underlying time, providing mortality rate ratios (MRR) for measles-vaccinated versus measles-unvaccinated children overall and by age at vaccination.
RESULTS Among the 14,815 children (31,730 observations of 6-months follow-up periods), 70% had received MV and 30% had not. Having received MV was associated with better survival compared with being measles unvaccinated: MRR: 0.76 (95% CI: 0.63–0.91). Children vaccinated before 9 months of age had a MRR of 0.68 (0.53–0.87), MV administered between 9 and 11 months was associated with a MRR of 0.77 (0.62–0.96) and for MV administered after 12 months the MRR was 0.86 (0.67–1.11). The beneficial effect of age at vaccination was stronger and significant for girls but not for boys. Censoring deaths caused by measles infection did not alter the conclusions.
CONCLUSION MV is associated with lower child mortality. MV before 9 months of age was associated with a larger survival advantage for girls.

1P65

Wing sexual dimorphism in species and subspecies of tsetse flies

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INTRODUCTION Unlike in several insects of medical and veterinary importance, male and female tsetse flies are both involved in disease transmission. However, their epidemiological importance, as far as transmission of African trypanosomosis is concerned, differ. Identification of sexual dimorphic characters will facilitate differentiation of both sexes and eventually, enhance clearer understanding of their epidemiological roles.
AIM Employing the geometric morphometric technique, a study was conducted to investigate sexual dimorphism in wing shape and size in some tsetse fly species and subspecies: *Glossina morsitans submorsitans, G. tachinoides, G. palpalis gambiense,* and *G. p. palpalis*.
METHODS Using the CLIC package, 11 landmark coordinates were collected from the right wings of 343 (139 male and 204 female) tsetse flies, transformed and then subjected to the Generalised Proscrutes superimposition. To investigate for shape variation between sexes in each species/subspecies, partial warp scores and their principal components (relative warps) were generated from superimposed coordinates. Discriminant analyses were performed on, and Mahalanobis distance calculated from, relative warps. Differences in centroid sizes of male and female wings were assessed by the Mann-Whitney U test. Contribution of size to shape was quantified by regressing the first discriminant factor of the shape variable on size, and reclassification scores were estimated.
RESULTS Mahalanobis distance at 1000 permutation rounds and graphical depictions of discriminant analyses based on first and second discriminant factors indicated the existence of sexual shape dimorphism among the species/subspecies studied. Centroid sizes of female wings were larger than and significantly different from those of their male counterparts. Allometry did not contribute to sexual shape variation. Reclassification scores to reassign the sexes were satisfactory being highest in *G. m. submorsitans* and least in *G. p. gambiense*.
CONCLUSION Results from the study suggest that wing shape is sex-specific in tsetse flies and that its phenotypic expression is independent of size. This demonstrates possible evolutionary pattern of wing shape in tsetse flies probably driven by sexual selection.

1P66

Preparation of colloidal gold immunochromatigraphic test to detect dog exposure to *Phlebotomus Perniciosus* in endemic settings of canine Leishmaniasis

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INTRODUCTION Canine leishmaniasis (CanL) is a zoonotic disease, caused by *L. infantum* and transmitted by the bite of a female sand fly. In the Mediterranean area, sand flies of the species *P. perniciosus* are considered to be the principle vector of *L. infantum*. When an infectious sand fly bites a host, sand fly saliva is injected into the host skin where it elicits a humoral immune response. By using salivary proteins in antibody-detection assays, host exposure to *P. perniciosus* can be determined. Previously, rSP03B salivary protein was proposed as a universal exposure marker for *P. perniciosus* across regions where CanL is endemic. In this study, a prototype of an immunochromatographic test (ICT) with rSP03B as antigen is being presented. The use of an ICT to detect host exposure to *P. perniciosus* is a new tool that will facilitate and speed up the screening process of sera samples in large-scale epidemiological studies, hence more sera samples can be tested and a rapid indication of vector presence is given. Since the ICT is easily operated, no specific experience is required.
AIM Preparation of an ICT with rSP03B that can be used in large-scale epidemiological studies.
METHODS A colloidal gold ICT was prepared in collaboration with Coris BioConcept, Gembloux. The test is a lateral-flow device intended to rapidly screen canine sera samples for antibodies against *P. perniciosus* saliva. The salivary protein rSP03B is used as antigen in the ICT. Sera samples from dogs experimentally exposed to 200 females and field dogs that were sampled multiple times during two transmission seasons were used to evaluate the test. Pre-immune sera and sera from field dogs sampled off-season were used as negative controls. All sera samples were previously screened for anti-rSP03B antibodies using ELISA.
RESULTS Preparation of the ICT is in progress and is expected to be completed in June 2017. The results will be presented during the congress.
CONCLUSION To conclude, we present an ICT prototype that detects dog exposure against *P. perniciosus*. In the future, this test can be employed to fast and easily screen sera samples during large-scale epidemiological studies.

Abstracts

2P1

A molecular survey on babesia and thileria species parazitizing tick of camels in bordline of Iran-Pakistan

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INTRODUCTION *Babesia* is a malaria-like parasite that infects red blood cells. *Theileria* is also a parasite that is closely related to Plasmodium. *Both Babesia* and *Theileria* species (order: Piroplasmida) are tick-borne intracellular parasites that infect a variety of vertebrate hosts. These parasites cause serious health issues in infected vertebrates. Ticks act as main vectors of these parasites.
AIM To determine molecular survey on Babesia and Theileria species parasitizing ticks of camels in borderline of Iran-Pakistan.
METHODS A total of 143 tick specimens were collected from camels from Chabahar County, located in south east part of Iran and bordered with Pakistan and Oman Sea. Specimens were identified based on morphological analysis. The detection of Babesia spp/Theileria spp. within tick samples was carried out by Polymerase Chain Reaction (PCR) amplification accompanied by DNA sequencing.
RESULTS Identification of the tick species was carried out using valid morphological keys. All of 143 collected ticks were identified as one species: Hyalomma dromedarii. Molecular analysis of Babesia/Theileria revealed the infection of 7/15 (46%) tested samples. All of the identified parasites belonged to Theileria ovis.
CONCLUSION We suggest that *Theileria ovis* is circulating in the studied area.

2P2

Identification and genetic characterization of tick-borne zoonotic Anaplasma species in dogs in Lusaka, Zambia

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INTRODUCTION Man and dogs have a close relationship which predisposes man to zoonotic pathogens carried by dogs. Whilst rabies is the most publicized zoonotic disease associated with dogs, there are a number of tick-borne pathogens for which the dog plays a significant role in transmission to humans. Within the genus *Anaplasma*, *Anaplasma platys* and *Anaplasma phagocytophilum* are known zoonotic pathogens, infecting both dogs and humans.
AIM The purpose of this study was to screen domestic dogs for the presence of zoonotic Anaplasma species (*Anaplasma phagocytophilum* and *A. platys*).
METHODS Molecular detection of Anaplasma DNA in canine blood was performed through conventional polymerase chain reaction (PCR) targeting the 16S rDNA. Positive samples were sequenced and phylogenetically characterized for species identification and classification.
RESULTS Out of a total of 301 dogs sampled, 27 (9%) were found to be infected with zoonotic Anaplasma species. Genetic characterization based on the 16S rDNA indicated that these *Anaplasma* species were closely related to *A. platys* and *A. phagocytophilum – like* species, which were identified in dogs in South Africa.
CONCLUSION This is first report of *A. platys* and *A. phagocytophilum* in domestic dogs in Zambia highlighting the circulation of zoonotic *Anaplasma* species in domestic dogs. Therefore it is important to raise awareness in owners and recommend proper veterinary care for the animals so that they do not serve as a source of infection to humans. It is also important to conduct further studies of other tick-borne zoonotic pathogens in order to have a clear understanding of the extent of the potential role of dogs in zoonotic disease transmission.

2P3

The tsetse fly (*Glossina*) challenge at wildlife/people/livestock interface of Akagera National Park, Rwanda

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INTRODUCTION The tsetse flies (*Glossina*) are the only biological vectors of the trypanosomes affecting humans and livestock. The Akagera National Park (ANP) and its surroundings remain the lone home to tsetse flies in Rwanda. The wild game-livestock-human interface plays an important role in the epidemiology of trypanosomes, and wild animals are the reservoirs of the disease. The study was carried out in Eastern province of Rwanda; at the Game/People/Livestock Interface of the Akagera National Park.
AIM The aim was to determine (a) the tsetse fly diversity, (b) trypanosomes infection rates and (c) identify the pathogenic trypanosome species in field-captured tsetse flies at the Game/People/Livestock Interface of the Akagera National Park.
METHODS Tsetse flies were collected from three districts surrounding the park between May and July 2015. Tsetse flies were trapped from different locations and live flies were counted, sex-determined and dissected so as to find the trypanosomes in their predilection sites in the tsetse fly. The mouthparts, salivary glands and mid-guts were microscopically examined for the presence and identification of trypanosomes according to the distinct differential morphology.
RESULTS A total of 257 live flies were dissected (179 *Glossina pallidipes* and 78 *Glossina morsitans*). The study revealed an overall infection rate of 12.8% of which 4.6% is for the mouthparts, 0.7% for salivary glands and 7.3% for the mid-gut. Of the 33 infection cases, T*rypanosoma congolense* accounted for 57.5%, *Trypanosoma brucei* for 6%, *Trypanosoma vivax* for 21.2% and the mixed infections of *T.congolense* and *T. vivax* accounting for 15.1%. Only *G. pallidipes* and *G. morsitans* were found at the interface and are potential vectors of the trypanosomes. *G. pallidipes* appears to be the most important vector due to its high density.
CONCLUSION The study confirmed the presence of trypanosome infected tsetse flies and livestock infective trypanosomes. However, a more accurate DNA based diagnosis is required to identify the blood meal sources and definitely

differentiate the species and the sub-species or detect the new species so as to characterize even the human infective trypanosomes as we found the *T. brucei*-like species.

2P4

Important foodborne bacteria and their antimicrobial resistances in Ecuadorian poultry

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INTRODUCTION Foodborne bacteria and their antimicrobial resistances are a major health concern in the world. In many tropical countries, this issue has been partially addressed because the lack of funds, public policies and technical limitations. In Ecuador, poultry meat is the main source of animal protein for human consumption

AIM We aimed to study the prevalence and antimicrobial resistance of *E. coli* ESBL, *Salmonella* and *Campylobacter* from poultry industry in Ecuador.

METHODS 388 broiler flocks coming from 120 farms were sampled during one year. Isolation of *E. coli* ESBL, *Salmonella* and *Campylobacter* were carried out with specific protocols. Isolates were further typed with molecular techniques and antimicrobial resistant profiles were accessed by phenotypic and genotypic methods.

RESULTS *E. coli* ESBL, *Salmonella* and *Campylobacter* were present in 92%, 16% and 64% of broiler flocks respectively. For *Salmonella* and *Campylobacter*, S. *Infantis* (84%) and *C. coli* (81%) were mostly isolated. *E. coli* ESBL harboured genes of the families $bla_{\text{CTX-M}}$ (90.6%), bla_{SHV} (10%), bla_{TEM} (42%) and bla_{CMY} (22%). The gene *mcr-1* responsible for resistance to colistin was found in 3 isolates. Resistance genes *kpc* and *mcr-2* were not found. All bacteria showed high resistant phenotypes against most tested antibiotics. Genetic typing showed that isolates from different farms were closely related.

CONCLUSION This study shows the importance that these pathogens could have in the food chain in Ecuador. Reports in the region show different rates of *S. Infantis* and *C. coli* in broiler farms which could be attributed to differences in environmental conditions and specific risk factors for flock contamination. High resistance rates of the 3 bacteria could be linked to the common usage of antibiotics in poultry production. Bacterial genetic types common to different farms indicate the possibility of cross contamination between farms. This evidence suggests that a stricter biosecurity should be put in place to control these microorganisms in the primary sector. Our data shows that Ecuadorian poultry production is an important hotspot of antimicrobial resistances. This novel study in Ecuador gives insights on the epidemiology of these bacteria that will be used by policy makers and researches in the future[1,2].

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2P5

Gastro-intestinal parasites infections in mountain gorillas (*Gorilla beringei beringei*) of Rwanda Volcanoes National Park: one health implications

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INTRODUCTION Mountain gorillas (*Gorilla beringei beringei*) are endangered worldwide and are the best tourists' attractions of Rwanda. Gorillas of Volcanoes National Park have close contact mostly with tourists, researchers, park workers and the community around the park. Foraging areas outside the park are crossed by village pathways or are in areas where villagers obtain firewood. In addition to poor health services and information, the local communities lack hygienic amenities including clean water and pit latrines.

AIM The study was conducted in the Volcanoes National Park of Rwanda, which is home to mountain gorillas, between March-June 2015. The study assessed the prevalence of the gastro-intestinal parasites affecting the gorillas and identified parasites that can be of public health importance.

METHODS 24 faecal samples were randomly collected from two gorilla families at different intervals. The faecal samples were examined for parasites using flotation and sedimentation methods.

RESULTS Of the 24 fecal samples examined, the study revealed 5 nematodes, 1 cestode and 4 protozoa. The nematodes eggs found include Trichostrongyle-type (11/24), *Strongylus spp* (6/24), *Ascaris spp* (3/24), *Hyostrongylus* (2/24) and *Probstmayria spp*. (1/24). The cestode parasite recovered is *Anoplocephala gorillae* (5/24). The protozoa include *Iodamoeba buetschlii* cysts and trophozoites (7/24), *Entamoeba coli* cysts and trophozoites (4/24), *Entamoeba histolytica* trophozoite (3/24) and *Giardia* sp. cyst (1/24).

CONCLUSION Some of the parasites could not be identified. *E. hystolytica* and *Giardia* are of zoonotic nature and could therefore be shared with humans. Most of the nematode types found are also found in humans, it is possible that these parasites were from daily human-gorilla interactions by zoonotic, reservoir or paratenic ways. However, there is a need to make the systematic coproculture to definitely identify some parasites and determine the transmission mode in order to confirm whether or not these are multi-host pathogens that can be shared. A similar research in the surrounding human community and livestock in close contact with gorillas would identify the potential one health actions to be taken.

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2P6
A one health approach to *Taenia Solium* control in sub-Saharan Africa

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INTRODUCTION *Taenia solium* taeniosis/cysticercosis (TSTC) is ranked the most important foodborne parasitic disease globally. Despite an internationally agreed 'Road Map' for elimination, control has yet to be trialled in sub-Saharan Africa. Intervention tools exist for both human taeniosis and porcine cysticercosis but are not accessible in sub-Saharan Africa. Studies from South-west Tanzania recorded ten years ago a human taeniosis, human cysticercosis (Ab-ELISA), and porcine cysticercosis (Ag-ELISA) prevalence of 5.2%, 45.3% and 30.0%, respectively.
AIM Demonstrate the impact of two international funded projects in Tanzania aiming at reducing the prevalence of TSTC in humans and pigs.
METHODS A Danida-funded project (2010–2016) focussed on improving livelihood of smallholder pig producers by providing education, pig pen models and pig feed and anthelmintic treatment. A Bill and Melinda Gates funded project (2012–2016) assessed the effect of praziquantel Mass Drug Administration (provided by Ministry of Health against schistosomiasis) on human taeniosis and porcine cysticercosis. Both projects were carried out in Mbeya Region, South-west Tanzania.
RESULTS General knowledge regarding TSTC increased among trained farmers and professionals, prevalence of human taeniosis and porcine cysticercosis declined, farmers livelihood improved and research capacity was extensively built. At national level, a policy brief was produced and TSTC was adopted as a national health priority. Internationally, TSTC in Tanzania was recognised and included in the list of countries targeting disease elimination. A computer based education tool "The Vicious Worm" was developed in English and Swahili, providing evidence-based efficient health education on a programmatic level.
CONCLUSION TSTC is highly endemic in Tanzania and now recognised as a national health priority. Using a combination of human and pig treatment with education targeting health and pig management was able to reduce the prevalence of TSTC in the area. However, a sustainable control strategy will require a cross-sectoral approach, availability of drugs/vaccine for humans and pigs, health and pig management education, a point-of-care test for detecting taeniosis and cysticercosis and political commitment. With the available knowledge, a proof-of-concept is ready to be trialled in sub-Saharan Africa, paving the road for a sustainable and cost-effective One Health model for control and elimination of *T. solium*.

2P7
Minyoo Matata – The Vicious Worm – A *Taenia Solium* taeniosis/cysticercosis health education tool – in Swahili

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INTRODUCTION *Taenia solium* is a zoonotic parasite that contributes to substantial public health and economic consequences across the globe. The parasite causes disease among some of the poorest communities where lack of knowledge is common. In 2014 "The Vicious Worm" a computer based health education tool was developed with the hope to have evidence-based health education included as a specific control tool in any control strategy. In East Africa Swahili is the most commonly spoken language. To use and increase the impact of the health education tool "The Vicious Worm" also in communities where English is not always spoken the need of a translated version of the tool was recognised.
AIM The aim of this project was to develop a new version of "The Vicious Worm", in Swahili.
METHODS "The Vicious Worm" is an open access computer based health education tool for *T. solium* taeniosis/cysticercosis. The program provides information on transmission, diagnosis, treatment, risk factors, prevention and control of *T. solium* taeniosis/cysticercosis and targets different stakeholders across different sectors and disciplines. The educational materials included in "The Vicious Worm" are illustrated short stories, videos, scientific texts and policy and information sheets. The information is displayed using an interactive map showing a village, town and city addressing three levels of stakeholders. For this project the educational material of the English version was systematically translated, formatted and implemented in the new version.
RESULTS The beta version of the "Minyoo Matata" – "The Vicious Worm" – A *Taenia solium* taeniosis/cysticercosis health education tool – in Swahili is now available and can be downloaded for free through the homepage theviciousworm.sites.ku.dk. The tool can also be downloaded as an Android app and used on Android tablets and smart phones. We welcome everyone to test it and participate in its evaluation.
CONCLUSION As lack of knowledge is among the major risks for the spread of the parasite, evidence-based health education should be included in any control programme. With the new version of "The Vicious Worm", local communities and both medical and veterinary practitioners will have an effective tool for obtaining and disseminating information on the vicious worm, *T. solium*.

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2P8

Experience of a Peruvian University using the "One Health (UnaSalud)" concept

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INTRODUCTION Globally there is an increase in emerging infectious diseases with zoonotic origin. There is a need for collaboration between professionals working on different health sectors: human, animal and environmental health. This collaboration when implemented locally, nationally and globally refers to the "One Health" concept.
AIM The objective of this communication is to present the collaborative experience (training and research) between last-year students from the Faculty of Veterinary Medicine and Animal Science (FAVEZ) and professionals at the Institute of Tropical Medicine Alexander von Humboldt (IMT-AvH) both ascribed to the Peruvian University Cayetano Heredia (UPCH). This review aimed at evaluate the quantity of dissertation thesis and scientific projects that have been registered by the collaborative teams during the period of 2006 to 2016.
METHODS A literature search of dissertation theses and research projects of veterinary students who participated in the collaborative program was performed. Information was collected from two sources: theses and projects registered at the Directorate of Research, Science and Technology, part of the UPCH Vice-rectorate of Research (VRINVE) and the UPCH library website. We verified the collected information at the National Directory of Researchers and Innovators (DINA), a Peruvian scientific platform. Scientific publications of the undergraduated participants of this collaboration were searched in Scielo, PUBMED and Google Scholar.
RESULTS A total of 193 veterinary students have taken part in this training program, and have produced a total of 8 dissertation theses and 8 research projects as collaboration between veterinarians and scientific advisors from the ITMAvH. A total of three publications authored by the training students was released.
CONCLUSION Even though efforts have been directed towards the use of the One Health concept in Peru and around the world, the number of investigations performed at this Academic Institution are limited.

2P9

Systemic insecticide treatment of the canine reservoir of Trypanosoma cruzi induces high levels of lethality in Triatoma infestans, a principal vector of Chagas disease

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INTRODUCTION Despite large-scale reductions in Chagas disease prevalence across Central and South America, *Trypanosoma cruzi* infection remains a considerable public health problem in the Gran Chaco region where vector-borne transmission persists. In these communities, peridomestic animals are major blood-meal sources for triatomines, and dogs play an important role in maintaining bug populations, potentially compromising the long-term sustainability of current control efforts.
AIM This study evaluated the systemic activity of three commercial oral endectocides (Bravecto®, fluralaner; NexGard®, afoxolaner; and Comfortis®, spinosad) in canine feed-through assays against *Triatoma infestans*, the principle vector of Chagas disease in the Southern Cone countries.
METHODS Twelve healthy, outbred dogs were recruited from the national zoonoses control program in Santa Cruz, Bolivia, and randomized to three groups, containing one control and three treated dogs per drug. Following treatment, starved colony reared *T. infestans* 2nd and 3rd stage nymphs were exposed to dogs for 30 minutes at 2, 7, 21, 34 and 51 days post-treatment. Mortality and morbidity were recorded in non-exposed, exposed (blood-fed) and fully- and semi-engorged exposed bugs.
RESULTS Eighty-five per cent (768/907) of *T. infestans* successfully blood-fed during bioassays, with significantly more bugs becoming fully-engorged when exposed to Bravecto® dogs ($P < 0.001$). Bravecto® or NexGard® treatment induced 100% triatomine mortality in fully- or semi-engorged bugs within 5 days of feeding at every time point. The lethality effect for Comfortis® was much lower (50–70%) and declined almost entirely after 51 days. Instead Comfortis® resulted in substantial morbidity; a third of bugs fully recovered after 120 hours but were unable to feed even 30 days later. A single oral dose of Bravecto® or NexGard® was safe and well tolerated, producing complete triatomine mortality on treated dogs over 7.3 weeks. While both drugs were highly efficacious, more bugs exposed to Bravecto® were immediately knocked-down and took complete blood-meals.
CONCLUSIONS Bravecto® represents an ideal systemic insecticide to develop into an operationally-feasible, community-level method of reducing triatomine infestation and controlling *T. cruzi* transmission in the Gran Chaco region.
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2P10

Gaps in the control of zoonoses In Nepal

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INTRODUCTION Nepal has not fairly reported the zoonoses burden in South East Asia. Zoonoses come in attention to the stake holders in few circumstances like if there is outbreak of high pathogenic avian influenza in poultry or there is community exposure to rabid animal or there exist donor based vertical program.
AIM The aim of the study was to prioritize zoonoses and understand the gaps in knowledge and policy for control of Zoonoses in Nepal.
METHODS Stake holders of Zoonoses like policy maker, clinical practioner, academician, public health personnel from animal health and human health were interviewed using a

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standardized questionnaire used by Public Health Foundation of India/Roadmap to Combat Zoonoses in India (PHFI/RCZI). The questionnaire was a modified adaptation of the methodology developed by the Child Health and Nutrition Research Initiative (CHNRI) for a systematic research prioritization exercise to identify the knowledge gaps in zoonoses and to generate research options based upon Instruments of Health Research (IHR): basic epidemiological research, health policy and systems research, research to improve existing interventions, and research to develop newer interventions.
RESULTS The priority zoonotic diseases for stakeholders working predominantly in animal health were rabies, avian flu then brucellosis whereas working predominantly in human health were cysticercosis, viral encephalitis then water borne disease like leptospirosis and rickettsial fever. Majority of them pointed the lack of one health curricula during academic training in university could be one of the reason for differences in this priority list between the two groups. Gaps in need of epidemiological and developing newer interventional research was highlighted by academician and clinical practioner whereas gaps in need of research on health policy and system and improving existing health policies were highlighted by the programmer and policy maker.
CONCLUSION Implementation of one health as academic curricula might be instrumental to bring consistency in specific knowledge and policy gaps among animal and human health stakeholders for the control of Zoonoses in low income country like Nepal.

2P11

One Health to enhance the health status of nomadic pastoralists and their livestock

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INTRODUCTION Between 2015–2016, Comitato Collaborazione Medica (CCM) carried out an Operational Research (OR) - financed by the Swiss Development Cooperation - to test the feasibility, efficacy and efficiency of the One Health (OH) approach in Filtu district (Somali Regional State of Ethiopia).
AIM To design an effective strategy in response to high levels of mortality and morbidity, the OR conducted an in-depth ethnography of the needs, perceptions and behaviours of pastoralist communities in relation to health, diseases and human-animal interactions. Special attention was given to the socio-cultural, structural and economic hindrances preventing the access to care, and to the adaptation and resilience strategies enacted by the pastoralists facing environmental changes and socio-political dynamics.
METHODS The research applied a transdisciplinary approach (medicine, veterinary, social and environmental sciences, applied geography and meteorology) and directly engaged local communities and authorities. The OR team was coordinated by a social anthropologist, allowing the integration of plural scientific contributions with pastoralists' knowledge and experience and the promotion of an interactive dialogue among research staff, local authorities and household members.
RESULTS The main result of the transdisciplinary and collaborative approach is the participatory identification of strategies of intervention to enhance the health of pastoralist communities and their livestock in Filtu district. In particular, they address three main hindrances: the inadequacy of the human and animal health care systems, as well as the lack of communication and cooperation between the related professionals and authorities; the social and economic barriers to access existing facilities; the poor knowledge either among pastoralists or local health workers, about the risks of zoonotic diseases transmission.
CONCLUSION The OR combined a plurality of perspectives and experiences, resulting in an 'augmented' One Health approach that allowed identifying multivariate solutions. These have been discussed, acknowledged and endorsed by the pastoralist communities, enhancing the responsibility, ownership and accountability of all concerned bodies to promote the efficacy and suitability of future actions.

2P12

Prevention of emerging zoonoses in Central Africa: an overview from a veterinary perspective

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INTRODUCTION During the last five years significant attention has been given to emerging zoonoses, particularly in geographical areas with high risk for outbreak of infectious diseases. More specifically zoonotic diseases with high threats have been targeted for elimination. The remaining diseases could be regarded as neglected tropical zoonoses with serious public health impact, particularly parasitic zoonotic diseases.
AIM The main objective of this study was to gather data available on the emerging zoonoses and the options for the control of these diseases in Central Africa including the Congo Basin (Cameroon, Central African Republic, Congo, Gabon, Democratic Republic of Congo, Equatorial Guinea), one of five areas in the world considered to be at high risk for emerging infectious diseases.
METHODS Scoping review of scientific literature was conducted as described by Wiethoelter *et al*. (2015) using the main databases in the field of life science and biomedical research.
RESULTS We have identified more than 40 potential zoonotic diseases. Most of the countries in the area of focus are implementing global health security agenda programs supported by the international agencies. Ongoing activities utilizing a "One Health" approach involve wildlife, environmental health, public health, and veterinary services. This global health program is based mostly, in each country, on capacity building for surveillance, early detection of new threats and response to the emergence of infectious diseases in the region. Although prevention using vaccination has been described to be one of the most cost effective of all healthcare interventions in history, for more than 80 percent of zoonotic diseases identified in the region there is no vaccine available to immunize animals considered to be origins of emerging diseases in humans.
CONCLUSION Obviously, the effect of capacity building for surveillance, early detection of threats and response to the emergence of zoonotic diseases is only a partial solution and will not achieve the long term goal of eliminating the zoonoses in Central Africa. In light of this limitation, more research is needed on veterinary vaccines for the prevention of diseases at the wildlife-livestock interface.

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2P13

Knowledge and preventive practices of toxocariosis in schoolchildren and their parents trained on the disease in 2006. District of San Juan De Lurigancho. Lima-Perú, 2010

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INTRODUCTION In the year 2006, the research proyect called "Seroprevalence of toxocariosis in schoolchildren in San Juan de Lurigancho district, located at Lima – Peru" made several health awareness campaigns about a general description of toxocariosis. This health promotion campaign was performed to the schoolchildren enrolled in the project and to their respective parents. This educational program used the same methodology as the different health and education entities used normally.
AIM We aimed to evaluate the knowledge and the practices associated to the exposure of toxocariosis in this population.
METHODS Semi-structured surveys were carried out by the participants of the toxocariasis project made at 2006. We looked up to gather the schoolchildren that were still enrolled at the three educational institutions involved in the previous study. Together with this, we also selected a control group of students and parents who did not participate in this research.
RESULTS A total of 341 survey tests were collected, 106 (93.8%) schoolchildren and 71 (62.8%) parents that took part on the project of the 2006; and the control group composed of 105 schoolchildren and 59 parents. The results showed no difference between the knowledge and the practices between the population that received the health awareness campaign and the control group. All the evaluated population recognizes the existence of reservoirs and sources for the transmission of parasites (more than 73%); nevertheless, few are aware on how they are transmitted (less than 32% of schoolchildren and 60% of the parents). Only 47.2% of the schoolchildren and the 63.4% of the parents that received the health awareness campaign, affirm to have heard or read about this parasitic disease.
CONCLUSION The methodology used in this health awareness campaign did not promote the permanent knowledge and preventive practices associated to the exposure of *Toxocara canis*.

2P14

Seroprevalence of toxoplasmosis in pregnant and infants in Lubumbashi, Democratic Republic of Congo

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BACKGROUND Toxoplasmosis is a zoonotic disease caused by Toxoplasma gondii. It is transmitted to humans from vegetables and fruit contaminated with cat feces. Often asymptomatic in the pregnant women, it can result in the fetus, severe neurological effects, and infant, eye injuries, neurological and death. If care is not early in pregnancy, the risk of MTCT is ≈30%. Seroconversion, only diagnostic means, in Africa is estimated at 60%. In tropical countries of Africa, high prevalence, up to 80% in humid regions. While cats are among the highest Pets Lubumbashi, no data exist on the extent of the disease in the population; accordingly, there is no integrated public health measure to ANC activities.
AIM This study was initiated to determine the seroprevalence of toxoplasmosis in pregnant women in Lubumbashi.
METHODS It was a cross-sectionnal study. The antibody titration (IgG and IgM), as screening, was performed in blood samples taken from pregnant at ANC (2nd and 3rd trimester) at *Cliniques Universitaires de Lubumbashi*. Samples were also collected, for diagnosis, in infants with symptoms suggestive of toxoplasmosis. When the test was positive in children, a sample was taken from the mother to search for the same antibodies. Avidity test was performed to confirm seroconversion.
RESULTS In total 117 pregnant, 5 infants underwent titration of antibodies against Toxoplasma. The seroprevalence of toxoplasmosis was 23.9% (95% CI: 16.5 to 32.7%). All children with neurological signs consistent with toxoplasmosis had a positive test; their mothers also had a positive test.
CONCLUSION Toxoplasmosis is a common zoonosis in pregnant but is not systematically sought during prenatal visits despite his serious fetal and neonatal unknown consequences for health personnel and women. Ensure, at home, the management of feces of cats and integrate screening and early treatment of toxoplasmosis with ANC activities are public health measures to reduce the impact of disease on human health.
KEYWORDS Toxoplasmosis, maternal-fetal transmission.

2P15

Rabies outbreak in village livestock and lack of post exposure vaccine seeking behavior in South Oromia pastoralist, Ethiopia

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In 2016, rabid wild fox enters the Pastoralist village in Goro Dola district of Oromia region in south Ethiopia and bites domestic dog. The victim dog turned rabid after four months and bites livestock, and rabies outbreak was occurred in family livestock. Consequently; a bull, lactating cow, calf, two donkeys and heifer were died. This is first confirmed case report from southern Oromia Pastoralists. Occurrence of rabies cases across the district was also reported by veterinary and health officers. Loss of livestock due to outbreak frustrated family, as the result of livestock loss and fear of human rabies. Low awareness of family about importance of post exposure vaccine was observed. On the other hand, the global rabies conference of 2016 vision of zero human deaths from dog-mediated rabies by 2030 is unlikely achievable in pastoralist community like in Goro Dola district with current attitude toward use of post exposure vaccine. We recommend integrated intervention strategy and coordinated control program including animal health, human health and wildlife authority.

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2P16

Evaluating milk handling processes in smallholder dairy farms in Rombo district, Tanzania

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INTRODUCTION In sub Saharan Africa, smallholder farmers are producing unclean milk mainly due to poor animal husbandry and hygienic practices. This problem may be contributed by shedding of inborn microorganisms existing in the blood of milking cows, presence of udder infections and contamination during and after milking[1]. Therefore, good animal husbandry and milk hygiene standards as a public health requirement is imperative[2].
AIM This cross-sectional study was carried out to evaluate the keeping quality of raw milk and practices of farmers affecting the occurrence of mastitis and zoonotic pathogens in smallholder dairy farms in Rombo district, Tanzania.
METHODS We surveyed 40 farming households using a questionnaire. In total, 81 milking cows were ear tagged. The single comparative intradermal tuberculin test (SCITT) was used to detect TB reactors. California Mastitis Test (CMT) was carried out to detect subclinical and clinical mastitis. Subsequently, samples of milk, each 50 ml were aseptically drawn from all quarters of the udder and a blood sample was drawn from jugular vein of each appraised cow for investigation of brucellosis in the laboratory.
RESULTS Survey showed poor hygienic practices by the majority of farmers. All tested cows were TB non-reactors and all 324 milk samples and 81 blood samples tested negative for brucellosis. More than 14% of the quarters had subclinical mastitis and 0.3% clinical mastitis was diagnosed. There was no statistical significant difference on the prevalence of mastitis between different quarters ($P > 0.05$) whereas, the difference was highly significant between villages ($P < 0.05$). Poor milking hygiene and lack of formal training were influencing the prevalence of mastitis quarters ($P < 0.05$). Besides, there was no statistical significant association ($P > 0.05$) between dirty houses and prevalence of mastitis quarters.
CONCLUSION Improvement in animal husbandry practices and training of farmers to increase their awareness on management of animals and hygienic production and commercialization of milk must be focused. Also, placement of milk collection centres will influence the appropriate milking and milk handling practices.
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Use of One Health approach for anthrax outbreak response in Northern Tanzania. A case study of Selela Ward in Monduli District, November 2016

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INTRODUCTION Anthrax is a disease caused by a bacterium *Bacillus anthracis* and it is fatal in both animals and humans. We confirmed anthrax outbreak in wildlife samples following rumours of the existence of the outbreak in wildlife, livestock and humans from Selela Ward. Due to this outbreak, a multi-sectoral response team was deployed to the affected areas.
AIMS The aims of response were: to determine the magnitude of outbreak in the interface areas of Selela Ward, to assess the One Health local response capacity, to safely dispose of the wildlife carcasses in the affected area and to set up outbreak control and preventive measures by using a One Health approach.
MATERIALS AND METHODS Methods used were: Active search of suspected human cases, Physical count and safe disposal of wildlife carcasses, Use of GPS Software for mapping of locations where human and animal cases emerged, and Conducting meetings with local experts and leaders so as to review the situation and local response initiatives of the outbreak. We used Giemsa staining and real - time polymerase chain reaction (qPCR) techniques to test specimen for *B. anthracis*. We analyzed data by Stata Software and maps were created using Quantum GIS software
RESULTS A total of 21 humans were suspected with a majority of cases ($n = 13$; 61.9%) being from Selela Ward. A total of 131 wildlife, 10 cattle, 26 goats, and 3 sheep died following this outbreak with a high mortality of wildebeests ($n = 109$; 83.2%). The laboratory results indicated that, three blood smears from wildebeests tested positive by Giemsa staining and another two specimen were confirmed by qPCR. Five human's blood samples tested negative for anthrax
CONCLUSION We confirmed anthrax outbreak in wildlife from Selela Ward using both Giemsa stain and qPCR techniques. Since clinical forms of anthrax were also observed in humans and livestock, this shows that wildlife plays a significant role as reservoir for anthrax which is easily transmitted to humans and livestock. The prompt response by using a One Health approach managed to contain the outbreak. This implies that outbreaks of emerging infectious zoonotic diseases can easily be contained when there is a multi-sectoral approach.

Abstracts

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Epidemiology of human brucellosis in Durood city, lorestan province, Iran

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Introduction: Brucellosis is a zoonotic infection caused by the bacterial genus *Brucella*. The bacteria are transmitted from animals to humans by ingestion through infected food products, direct contact with an infected animal, or inhalation of aerosols. The disease is an old one that has been known by various names, including Mediterranean fever, Malta fever, gastric remittent fever, and undulant fever. Humans are accidental hosts, but brucellosis continues to be a major public health concern worldwide and is the most common zoonotic infection.

Materials and methods: A cross-sectional study was carried out in Durood city, Lorstan province, to determine the seroprevalence and risk factors associated with human brucellosis (2014). A questionnaire was used to collect data on socio-demographic characteristics and human brucellosis related risk factors.

Results: A total of 235 patients were involved in the study. Blood samples from the patients were collected and screened for Brucella using Serum Agglutination Test. Human Brucella seroprevalence was (n = 235). The prevalence was highest among males (50.6%,) and the residence in rural areas (76.2%).

Conclusions Brucellosis is highly prevalent in Durood district, and therefore, an important public health problem. The transmission risk was aggravated by consumption of unpasteurized milk products, residing in rural settings. There is a need to initiate screening, treat infected humans, and educate the public about risk factors and appropriate preventive measures of brucellosis.

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Erysipelothrix rhusiopathiae infection in pigs, pork and among raw pork handlers in Kamuli District, Eastern Uganda

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Introduction *Erysipelothrix rhusiopathiae* is a zoonotic ubiquitous gram-positive bacterium, which causes erysipelas in swine, mammals, birds and erysipeloid in humans. Individuals occupationally involved in contact with animals, animal products or animal wastes are at greatest risk.

Aim From August 2015–May 2016, multidisciplinary risk assessment was conducted to determine the prevalence and factors associated with *E. rhusiopathaie* infection along the pig value chain in Kamuli District, Eastern Uganda.

Methods A cross-sectional community based study was conducted that employed both quantitative and qualitative methods for data collection between August 2015 and March 2016. The study was conducted in Namwendwa, Bugulumbya and Kitayunjwa sub counties in Kamuli District. Sera from 426 live pigs was collected, 100 fresh pork samples from selected abattoirs and butcheries from three subcounties that make up part of Kamuli district. A total of 302 participants (butchers, abattoir workers and cooks/housewives) were enrolled consecutively for quantitative data collection. Whole blood was collected from 302 raw pork handlers (butchers, abattoir workers and cooks), for microbiology cultures and serology. Six focus group discussions were conducted with 26 butchers/abattoir workers and cooks. Three key informant interviews were conducted with a health assistant, veterinary officer and a nursing officer.

Results Overall, 308/460 (67% CI: 62.2–71.4) of the pig sera carried antibodies against *E.rhusiopathiae*. Forty-five percent 45/100, (45% CI: 35.0–55.3) of the fresh pork samples were contaminated with *E.rhusiopathiae* The prevalence of *E.rhusiopathiae* infection among raw pork handlers was 9.9% (95% CI: 7.35–12.52). Working in the abattoir and butchery increased the risk of the infection at (aOR= 26.13 95% CI: 5.29–129.10) and (aOR= 8.37 95% CI: 1.79–39.10) respectively. Alcohol consumption was associated with *E.rhusiopathiae* infection (aOR= 4.02 95% CI: 1.07–15.03) among butchers and abattoir workers. Qualitative study reported that the main source of entry of *E.rhusiopathiae* infection to the raw pork handlers were; poor hygiene and provision of veterinary services to the pigs.

Conclusion The overall prevalence of *E. rhusiopathiae* infection was high. Alcohol consumption, working in the abattoir and being of male sex increased the risk of acquiring the infection. This is the first report of *E. rhusiopathiae* in pigs Uganda and among humans in East Africa.

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Evaluation of post-mortem detection techniques for bovine cysticercosis in Belgium

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Introduction A 3-year study on post-mortem detection techniques for bovine cysticercosis (cc) was conducted in Belgium. Cc is responsible for important economic losses in the meat sector. Diagnosis of cc is solely based on routine meat inspection (MI) at the slaughter line. The yearly taeniosis incidence (human tapeworm infections) is estimated at 11000 cases.

Methods Three post-mortem detection techniques (MI, MI with additional incisions in the heart and monoclonal antibody-based antigen-detection (Ag-ELISA)) were compared. Serum samples and predilection sites (PS) (heart, tongue, masseter muscles, diaphragm and oesophagus) of 101 carcasses found positive for cc at MI and 614 carcasses negative for MI were collected in three slaughterhouses. Complete dissection of PS in 0.5 cm thick slices was considered a reference test. Using the obtained results, a model was developed to estimate the current situation in Belgium and the effect of using an improved diagnostic technique on the meat sector and public health.

Results According to official MI results, the observed prevalence of cc is 0.28%. Our results show that out of 614 MI-negative animals, 4 new cases (0.6%) of cc were found by making additional incisions in the heart, rendering this detection technique unprofitable. However, by completely dissecting PS of the same 614 animals, 144 (23.5%) carcasses were found to

contain cysticerci. Ag-ELISA identified another 40 positive carcasses out of the remaining 470 (8.5%) carcasses (negative on MI and PS). Extrapolation of these results shows that out of 500,000 cattle slaughtered yearly, on average 200,684 (40.1%) contain cysticerci, while only 1429 infected carcasses are detected at MI. Implementation of the Ag-ELISA is likely to lead to a 40% reduction in the number of viable cysticerci passing the slaughterhouse undetected.
CONCLUSION On a longer term, implementing Ag-ELISA as a detection test in slaughterhouses, would lead to an overall decrease in infections in bovines and humans.

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Participatory-based surveillance and detection of viral zoonotic pathogens in the Democratic Republic of Congo

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INTRODUCTION In the past decade, 72% of the pathogens involved in zoonotic emerging infectious diseases originated from wildlife. Surveillance of viral pathogens at the Human-wildlife interface is thus crucial. We report here results of viral pathogens detection from hunted wild animals sampled by community members.
AIM To characterize viruses circulating at the Human-Wildlife interface in order to propose mitigation strategies to minimize the risk of zoonotic infections.
METHODS From December 2010 to September 2012, field teams from the USAID Emerging Pandemic Threats (EPT) PREDICT project recruited, sensitized and trained hunters from villages in 3 Health Zones of the Sankuru District, DRC, on prevention of zoonotic infections, safe hunting and butchering practices, and the collection of Dried Blood Spots (DBS) on filter paper from hunted animals. DBS samples were collected under the supervision of trained field investigators and shipped to the PREDICT laboratory at INRB in Kinshasa. Samples were then tested for zoonotic viruses by family-level conventional PCR. Amplicons for presumptive positive samples were submitted for Sanger Sequencing and sequences were analysed to characterize viruses.
RESULTS A total of 253 village volunteers participated to the surveillance activities. Out of the 2,500 envelops with filter papers that were distributed, 1,824 (72.96%) were recovered. Of them, 1,042 DBS were of good quality. Animals sampled included non-human primates (NHPs), bats, rodents, insectivores, pangolins, ungulates and others. Known and unknown viruses were detected from 285 samples, including Bocavirus, Poxvirus, Simian Foamy virus, Herpes virus, Polyoma virus and Adenovirus.
CONCLUSION Community members participated actively in this surveillance activity and collected DBS of good quality that permitted the detection of known and new viral pathogens of zoonotic potential. This kind of participatory surveillance can be implemented nationwide for better prevention and control measures.

2P22

Pattern spatio-temporal of buruli ulcer in the rural health area of Kimpese, Central Kongo Province, In the Democratic Republic of the Congo from 2009–2015

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INTRODUCTION Buruli ulcer is an infectious disease caused by mycobacterium ulcerans, an environmental mycobacterium whose reservoir and mode of contamination in humans remain unknown. It is still endemic in the rural health zone of Kimpese, where the strategies for the control of this disease are absolutely medical-centered, not taking into account the eco-epidemiological factors including lack of knowledge and taking into account, determines the perpetuation.
OBJECTIVES Describe the spatial distribution.
Identify and analyze the factors explaining the heterogeneity of the distribution.
METHODS Over seven years at the health area level, this study analyzed the epidemiological surveillance data sets collected in an Excel database. The spatialization was done using the QGIS software (2.8.5). Statistical analyzes for the identification of risk clusters by SatScan V9.1.1. The links between the number of cases and the environmental characteristics were modeled by the generalized linear model using software/
RESULTS 480 suspected cases were reported by health facilities during our study period. The spatial distribution shows that all health areas are affected by the disease. The cluster analysis identified three high-risk health areas (Mukimbungu, Kilueka and Lovo). The most affected of all is Mukimbungu (RR = 5.51; *P*-value < 1e-17). Savanna-type vegetation (odds ratio 2.66) and altitude (odds radio 2.76) significantly influence the heterogeneity of the cases.
CONCLUSION The Kimpese Rural Health Zone is a high relative risk for Buruli Ulcer. There are three high-risk health areas and one is the site of high contamination. Savannah and altitude are not enough to explain its endemicity. Future research will be necessary for spatialization at the level of villages and / or neighborhoods, in order to know other factors of heterogeneity and perpetuation; Improving control approaches. To this end, eco-epidemiology will have a major role to play.

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Seroprevalence of toxoplasmosis among premarital women in Banguntapan, Bantul, Indonesia

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INTRODUCTION Toxoplasmosis is an infectious disease caused by protozoa Apicomplexa *Toxoplasma gondii*. The human becomes infected with *Toxoplasma gondii* mainly by consuming undercooked meat containing tissue cyst or by incidental

ingestion of food and water contaminated with oocyst from the feces of infected cats. Toxoplasmosis is particularly dangerous for pregnant women. Therefore, screening of toxoplasmosis in premarital women before pregnant is needed.
AIM The present study aimed to determine the seroprevalence of anti-*Toxoplasma* IgM and IgG antibodies among premarital women in Banguntapan, Bantul.
METHODS A cross-sectional study was conducted among premarital women attending marriage registration office in Banguntapan, Bantul, Indonesia. Data and 3 ml blood samples were collected from 79 women in the periode from April-June 2016. The presence of IgM and IgG antibodies anti-Toxoplasma was determined by indirect ELISA.
RESULTS A total of 79 women were included. Mean age was 24.7 years old. The seroprevalence of IgM and IgG were 40.5% (32/47) and 46.8% (37/79), respectively.
CONCLUSION There is a high prevalence of *Toxoplasma gondii* infection in premarital women in Banguntapan, Bantul. Serological testing for Toxoplasmosis is necessary in order to avoid infection before pregnant.

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Hemato-biochemical analysis of natural PPR outbreaks in Black Bengal goats showed marked anemia, leukocytosis and electrolyte imbalance

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INTRODUCTION *Peste des Petits Ruminants* (PPR) in Black Bengal goats is a major limitation in the development of sustained goat industry in Bangladesh. At present, it is one of main contagious viral disease of goat with an average flock mortality and morbidity of 75% and 59%, respectively and case fatality rate of 74%[1]. Veterinarians often claim to reduce the mortality of natural PPR outbreaks with the help of supportive fluids and electrolyte therapy. The information on hematological and biochemical parameters of PPR infected goats, which often alter due to associated tissue damages, are necessary to formulate the appropriate supportive therapy.
AIM The present study determined the hematological and biochemical parameters of Black Bengal goats naturally infected with PPR virus (PPRV).
METHODS Blood and sera samples from 13 clinically PPR affected which was confirmed by RT-PCR and 5 healthy Black Bengal goats were collected and analyzed by routine hematological and biochemical examination. In addition, selected serum enzymes and electrolytes were analyzed in automated analyzer using commercial kits.
RESULTS Hematological analysis of PRR affected goats showed severe anemia characterized by significant decrease in the values of hemoglobin, total erythrocyte counts (TEC) and packed cell volume (PCV). In contrary, PPR affected goats showed marked leukocytosis together with increased absolute lymphocytes and neutrophils counts than the healthy goats. Biochemical analysis revealed significant decrease in total protein and albumin level and increased creatine kinase (CK), aspartate transaminase (AST) and alanine transaminase (ALT) that mirrored the gross and histopathological changes in the PPR affected goats. Significant increase in the values of sodium and chloride ions were found in the sera of PPR infected goats.
CONCLUSION Taken together, hemato-biochemical analysis provides important evidences for the veterinarians that anti-diarrheic therapy in the form of oral or intravenous application of isotonic aqua solution together with other supportive drugs should be prescribed for the treatment of natural PPR outbreaks.
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2P25

Serological evidence and risk factor of spotted fever group and typhus group rickettsiae exposure in humans from Madagascar

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INTRODUCTION Rickettsiae are obligate intracellular bacteria responsible for many febrile syndromes and emerging infectious diseases around the world, including many tropical countries. Recent studies reported detection of *Rickettsia sp.* in ticks[1,2] and fleas[3] from Madagascar, and humans seropositive to antibodies against these pathogens[1,3]. But very few are known about the epidemiology of these infections and any human case of rickettsial infection was reported in the island.
AIM The current study was conducted in order to assess exposition of malagasy population to spotted fever group (SFGR) and typhus group Rickettsiae (TGR) at national scale and to determine the socio-economic and environmental drivers that influence their exposition to these pathogens.
METHODS A cross-sectional study was conducted in 28 sites, with urban and rural area for each site. About 30 persons were randomly selected in each area, from November 2011 to April 2012, and then from October 2012 to May 2013. A standard questionnaire was administered to consent participant, followed by blood sample collection. Two group-specific ELISA were used to look for anti-SFGR and anti-TGR IgG. To assess rickettsial exposition risk factors, serological status were used as response for univariable Chi square tests followed by multivariable Generalized Linear Mixed Model.
RESULTS A total of 1672 participants were included in this study. The global human seroprevalence of anti-SFGR and anti-TGR IgG were 42.9% [ranging from 11 to 72% for each site] and 22.5% [3 to 50%], respectively, with 8.4% positive for both ELISAs. For individuals' TGR exposed, univariable test revealed that age category, scholar level, professional activity, area and notification of exposition to flea-bite were retained for multivariable analyses. A correlation was also revealed between seroprevalences in urban and rural areas, suggesting important role of bioclimate variables in the spatial distribution of individuals seropositive to anti-rickettsial IgG. The ongoing multivariable analyses will surely provide more interesting results on the factors associated with rickettsial exposure in Madagascar.

Abstracts

CONCLUSION We found evidence of exposure to SFGR and TGR pathogens in general population, demonstrating that Rickettsiae are a threat for malagasy public health, and suggesting that they should be considered as causes of undifferentiated fever in Madagascar.

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2P26

Filarial parasites in cats and dogs represent a public health threat in Madampe, Sri Lanka

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INTRODUCTION Brugian filariasis has been reported from many parts of Sri Lanka in the last decade. Cats and dogs are known to harbour a zoonotic strain of *Brugia malayi* in the Southeast Asian region, but the role of reservoir hosts in the recent cases of Brugian filariasis discovered in Sri Lanka has not been established to date.

OBJECTIVES To study the prevalence of filarial parasites in cats and dogs in an area with known previous transmission of Brugian filariasis to human.

METHODOLOGY Ethical clearance was obtained from the Ethics Review Committees of the Faculty of Medicine University of Kelaniya and Medical Research Institute. Surveillance was done in a study area (SA) spanning a radius of 350 m (mean flight range of vector mosquito, *Mansonia* species) from the residence of an index case of microfilaria (mf) positive Brugian filariasis, in Madampe (Puttalam district). Cats and dogs (both stray and domestic) residing within the SA were screened for mf in January 2017 between 8.00 and 20:00 clock. Screening was done on site by thick blood smears (TBS) prepared following an ear-lobe prick. TBS were stained with Giemsa and examined microscopically for presence of mf.

RESULTS Out of 77 dogs (74 domestic and 3 stray) and 52 domestic cats, 63 dogs (82%) and 39 cats (75%) were mf positive. Interestingly, 39 dogs (50.6%) and 17 cats (32.7%) were co-infected with *Dirofilaria repens* and *Brugia* species. Mono-infections with *Brugia* species and *D. repens* were seen in 14 (18%) and 10 (13%) other dogs and 12 (23%) and 10 (19%) other cats, respectively.

CONCLUSIONS There is a very high prevalence of *Brugia* species and *D. repens* among cats and dogs in the SA in Madampe. Species identification of canine and feline *Brugia* parasites and their association with human infections requires further investigation.

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Brugian filariasis in Sri Lanka: a preliminary report on survey in Gampaha District

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INTRODUCTION Sri Lanka was declared to have eliminated lymphatic filariasis (LF) as a public health problem in 2016. Sporadic cases of Brugian filariasis have been reported during surveillance for evaluation of the LF elimination program.

OBJECTIVES To study the epidemiology of brugian filariasis in Gampaha district, identify the most vulnerable age groups affected and characterize the periodicity pattern of the microfilariae (mf).

METHODOLOGY Ethical clearance for the study was obtained from the Ethics Review Committees of the Faculty of Medicine University of Kelaniya and Medical Research Institute. A community-based cross-sectional survey was conducted in selected areas of the Gampaha district in December 2016. Selection of study areas (SA) were based on distribution of past positive cases. Areas with two or more positive cases within a 500 m radius were defined as a SA. An age stratified population was selected. Criteria for enrolment of study population were residence in a SA for more than one year and age above one year. Thick night blood smears (NBS) and a rapid dipstick test (Brugia Rapid, Reszon Diagnostics International, Malaysia) were used for detection of mf and IgG4 antibodies to *Brugia malayi* respectively. To study the periodicity of mf, counts were done periodically over a 24-hour period using Nuclepore Membrane Filtration.

RESULTS A total of 467 persons from 153 households in Pubudugama (Wattala MOH area) were screened. Two persons (0.4%) were antibody-positive but negative for mf (age groups, 5–10 and 10–20 years). Two mf positives were detected by NBS (0.4%). One person (age group 20–50 years) had a *Wuchereria bancrofti* infection, while the other (age group 10–20 years) had a *Brugia* species infection. Both mf positive individuals were negative for *B. malayi* antibodies. The *Brugia* mf counts in blood collected at 7.00am, 9.00am, 1.00 pm, 5.00 pm, 9.00 pm, 11.00 pm, 1.00am, 3.00am and 5.00am were 75, 24, 14, 39, 159, 143, 136, 109 and 128 per ml respectively.

CONCLUSIONS Low grade transmission of bancroftian and brugian filariasis continue to occur in Gampaha district. The *Brugia* species exhibited nocturnal sub-periodicity indicating a probable zoonotic origin. Definitive species identification of the Brugian parasite by molecular methods is envisaged.

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Abstracts

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Zika virus dynamics in body fluids and risk of sexual trasmission in a non-endemic area

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INTRODUCTION Zika virus (ZIKV) is the responsible for the recent pandemic in Latinamerica. ZIKV is mostly transmitted by Aedes infected mosquito. However, shedding of ZIKV RNA in genital tracts fluids and ZIKV sexual transmission has been described.
AIM To assess the dynamics of ZIKV in several fluids of infected individuals through RNA detection and to determine the risk of sexual transmission to non-traveler sexual partners.
METHODS Prospective study at two centers of the Catalan International Health Program. Symptomatic travelers diagnosed of ZIKV infection (positive IgG/IgM or positive ZIKV polymerase chain reaction (PCR) in blood/urine samples) were clinically followed up and ZIKV PCR was periodically performed in saliva, blood, urine and semen or vaginal secretion samples until they became negative, following the protocol study. Their sexual contacts were offered to participate.
RESULTS We included 11 travelers and 3 sexual contacts, 54.5% (6/11) were male. The median age was 38 (IQR 30–45). Travel reasons were visiting friends and relatives (6/11) and tourism (5/11). Median trip duration was 24 (IQR 11–34) days. Lab tests were performed 11 (IQR 3–31) days after symptoms onset. Nine out of 11 patients had a ZIKV IgM or PCR positive. One out of four women (25%) had a positive PCR in the vaginal swab 45 days after symptoms onset and 20% of men in semen up to 24 days. All patients with positive PCR showed positive IgG, while some patients with positive IgM never converted IgG.
CONCLUSION ZIKV RNA detection was positive in genital fluids of 25% women and 20% men. Time for clearance was 37 and 24 respectively. No sexual transmission was found among sexual contacts. Diagnostic algorithms should be updated to include genital tract fluid specimens in the process. More research is needed to help public health agencies to inform more accurate recommendations.

2P29

Trans placental transmission of visceral Leishmaniasis; Looking for the evidence – A case series

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INTRODUCTION Little information is available regarding the occurrence of childhood visceral leishmaniasis(VL) and the real risk of vertical transmission of this disease.
AIM Detailing the child hood VL and confirming the possibilities of vertical transmission.
METHODS Series of children under five cases and pregnant mother with VL observed in the Surya Kanta Kala azar Research Center(SKKRC) over a from 2012 to 2014.
RESULTS Total 30 children and 5 pregnant mother were admitted in SKKRC during the 3 year time period. The mean age of the children was 3.10 years (R 1–5 years). Amongst 63.3% were male. All were anemic, came from rural area and 90% had splenomegaly. They were confirmed by positive RK-39 or LD body on splenic biopsy. Four cases were diagnosed Post Kala-azar Dermal Leishmaniasis (PKDL). Five children had past history of treatment of VL with single dose (10 mg/kg) Ambisome; two developed PKDL and others were labeled as treatment failure. Twenty five (83.3%) baby's mother had positive history of VL and 26 (86.7%) had family history of VL in different time period. Most of them (65%) got treatment after the birth of the baby. Two baby's mother later diagnosed VL and treated accordingly. Five pregnant women also admitted during this time. One term mother died before starting treatment after the birth of a death baby due to pregnancy & disease complication. Fetal part placenta was collected; found PCR positive for LD body. Four mothers were treated during pregnancy and birth of a healthy baby. During follow up visit, all babies were found RK-39 positive with no other abnormality and they were still under observation. All VL patients were treated with 15gm/kg Ambisome in three divided doses and PKDL were treated with 30 mg/kg Ambisome in six divided doses.
CONCLUSION Evidence that the mother-to child transmission of VL is possible, although rare. .Kala azar in the mother may have been the cause of the fetal wastage.

2P30

Extensive serological survey in multiple African monkey species reveals complex reactivity patterns to four Ebola virus species

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INTRODUCTION Bats are considered as reservoir species for Ebola viruses (EBV), but non-human primates (NHP) represent an important source of infection for humans in EBV outbreaks. Great apes play a role as amplifying hosts but no clear information is availalble on monkeys.
AIM Study whether EBV circulate in monkeys from Central Africa.
METHODS Using a highly-specific and sensitive serological assay based on the luminex (xMAP) technology, to detect EBV antibodies in monkey bushmeat from Cameroon and the Democratic Republic of Congo (DRC). We included recombinant proteins (NP and/or GP and/or VP40) from Zaire (EBOV), Sudan (SUDV), Bundibunyo (BDBV) and Reston (RESTV) Ebola viruses. Samples are considered positive when it showed reactivity against NP and GP.
RESULTS 1332 samples from 21 species, collected at 11 different forest sites in southern Cameroon (n = 688) and DRC (n = 644) were analyzed. In Cameroon, the predominant species were C. cephus (38.9%), C. nictitans (27.1%), C. pogonias (14.3%), L. albigena (6.8%) and C. agilis (5.4%). In DRC, the predominant species were C. ascanius (37.4%), P. tholloni (13.4%), C. wolfi (11.2%), C. mitis (7.9%) and A. nigrovidis (7.3%). A significant proportion of arboreal Cercopithecus species were reactive with GP proteins from EBOV and SUDV, reaching 15% to >40% for certain species, but only a handful of samples showed reactivity with NP or VP40 proteins. When applying the algorithm (i.e., positivity to NP and GP), we did not observe a single EBV antibody positive sample. GP antibody reactivity is highest in C. cephus in Cameroon and C. ascanius in DRC; two ecologically equivalent and phylogenetically closely related species. High GP reactivity is also seen in C. nictitans from Cameroon, which forms polyspecific groups with C. cephus.

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CONCLUSION This is the first study that evaluated a large number of frequently hunted monkeys, especially from the Cercopithecus genus, and did not find clear evidence for exposure to EBV. However, However more samples should be tested from NHP but also from other animal species in order to define their role in the ecology of Ebola virus and in outbreaks.

2P31

Anopheles mosquitoes and transmission of malaria in the mountainous region of Rutshuru, in eastern Democratic Republic of Congo

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INTRODUCTION The transmission of malaria is a big problem in Rutshuru health zone in DRC.
AIMS The present study aimed to identify the species of Anopheles in Rutshuru Health Zone in Democratic Republic of Congo (DRC) to identify those involved in malaria transmission and to evaluate the susceptibility of *An. gambiae s.l*, the main malaria vector to insecticides.
METHODS Adult mosquitoes were collected using pyrethrum spray catches and human landing catches. Larvae were collected from breading sites and reared to adulthood. Identification of adults was made using morphological characters. Blood feeding stage and sporozoit index were determined using the Anopheles collected by pyrethrum spray catches (PSC). Identification of members of the *An. gambiae* complex was made using PCR. WHO susceptibility test and genotypic resistance mechanisms (kdr) were evaluated.
RESULTS Out of a total of 371 mosquitoes, the species collected were: 203 (54%) *An. funestus*, 160 (43%), *An. gambiae s.l*., 2 (0.5%), *An. brunipes*, 2 (0.5%), *A. tenebrosus*, 1 (0.26%) *An. swahilicus*, 1 (0.26%), *A. coustani*, 1 (0.26%), *An. salbaii* and 1 (0.26%) and *An. pharoensis*. For the *An. gambiae s.l*, 2 (5.26%) were *Anopheles coluzzii*, 13 (34.2%) were *An. gambiae s.s*. and 23 (60.5%) were hybrids (*An. coluzzii/An. gambiae*). Out of 88 *Anopheles* collected by PSC, 67 (71.4%) were bloodfed, 12 (13.6%) unfed, 6 (6.8%) gravid and 3 (3.4%) were semi-gravid. Out of 72 *Anopheles* from CSP-ELISA, 18 (25.0%) were positive for *P. falciparum* and 13 (18.0%) for *P. vivax* (Pv240). Total susceptibility (100% mortality) was found for pirimiphos methyl 0.1% and bendiocarb 0.1%, resistance was noted for permethrin 0.05%, deltamethrin 0.75%, and DDT 4%. An improvement in mortality was noted after pre-exposure of mosquitoes to piperonyl butoxide (PBO) for both permethrin 0.05% (96.0% mortality) and deltamethrin (98.0%). The frequency of the kdr gene was 0.80.
CONCLUSION This study shows a mosaic of different *Anopheles* species, a resistance to permethrin and deltamethrin used for the vector control, and malaria transmission linked with *P. falciparum* and *P. vivax*. Appropriate control strategies are needed to better fight malaria in this region.

2P32

Chagas disease transmission: importance of humans as triatomine blood source in an endemic area

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INTRODUCTION Triatomines are obligatory hematophagous insects of epidemiological importance due to the transmission of the parasite *Trypanosoma cruzi* that causes Chagas disease in humans. The complex interactions among hosts and parasites is important to unveil *T. cruzi* transmission. However, little is known about the blood meal preferences of triatomines and its impact in transmission dynamics.
AIM The aim of this study is to determine the main blood meal sources, with emphasis on human blood, in triatomines collected in human dwellings (domicile and peridomicile) and in sylvatic environments.
METHODS Triatomines were collected in southern and coastal Ecuador (2006–2012). PCR amplification of the *Cytb* was performed with the DNA of the intestinal content and sent for sequencing. Identification of the blood source was assessed by BLAST (> 95% of identity). Infection with *T. cruzi* was detected by amplification of the kDNA.
RESULTS Fifteen species were identified (1 reptile, 8 mammals, 4 birds, 1 invertebrate (insect), 1 amphibian). Human blood was identified in 44.5% (n = 103) of the triatomines from domestic, peridomestic and sylvatic environments. In domicile, peridomicile and sylvatic areas, the triatomines were mostly captured in the bedrooms, in chicken nests and in squirrel/rat nests respectively. The general *T. cruzi* infection rate was 69%. In triatomines fed with human blood, it reaches 71%, 36% of them infecting sylvatic triatomines.
CONCLUSION Detection of human blood in triatomines circulating in all environments, together with the elevated infection rate with *T. cruzi*, constitutes an important warning sign of the high risk of Chagas disease transmission in Ecuador. Our data suggests that prevalence is underestimated. Although previous studies reported a seroprevalence from 1% to 5.7%[1], and the presence of all the conditions for active transmission, the official data report no active transmission since 2007[2]. Furthermore, finding peridomestic and, especially, sylvatic triatomines fed with human blood raises the possibility of transmission related with outdoor activities, such as farming and challenges the effectiveness of insecticide spraying of houses as the main control strategy. Instead, it reinforces the importance of investing in long-term strategies to reduce the probability of transmission of *T. cruzi* to humans, such as home improvement.
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The mosquito borne West Nile virus infection: Is it threating to Egypt or a neglected endemic disease?

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West Nile virus (WNV) is a mosquito-borne zoonotic arbovirus belonging to the genus Flavivirus in the family Flaviviridae. The virus is found in temperate and tropical regions worldwide, but first identified in the West Nile sub-region in the East African nation of Uganda in 1937. Prior to the mid-1990s WNV infection was sporadically and considered a minor risk for humans, until an outbreak in Algeria in 1994, with cases of WNV-caused encephalitis, and the first large outbreak in Romania in 1996, with a high number of cases with neuroinvasive disease. WNV has now spread globally to Europe beyond the Mediterranean Basin and the United States, is now considered to be an endemic pathogen in worldwide especially in Africa

The WNV transmission is mainly by various mosquitoes species, also ticks were incriminated The birds especially passerines are the most commonly infected animal and serving as the prime reservoir host

In Egypt more than 110 mosquito species and subspecies and more than 32 genera of ticks were identified. Besides, not less than 150 species of migratory birds visit Egypt annually in addition to 350 resident ones.

This review provided an overview of the current understanding flaviviruses mainly WNFV. Primary care physician and senior nurse should be able to include the disaster diseases in differential diagnosis of various clinical conditions. They should take a thorough history to request specific dependable laboratory test(s) as soon as possible, and positive patient should be transferred to the fever hospital.

2P34

New methods to identify *Leishmania* super-spreaders in modeling targeted control

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INTRODUCTION Infection with the vector-borne protozoan parasite *Leishmania infantum* causes human and canine leishmaniasis occuring in much of Latin America, the Meditteranean countries, Central and South Asia. Dogs are the important reservoir host, maintaining the dog-sandfly-dog transmission cycle, whereas humans are not considered to be epidemiologically significant in onward transmission. Longitudinal xenodiagnosis studies of naturally infected dogs suggest that >50% of infected dogs may not become infectious, and that only a small number of the infected population is responsible for a disproportionately large fraction of transmission events to the sand fly vector. These "super-spreaders" are currently undetectable within the mixed canine population; commonly used serological diagnostic tests, rK39-based Kalazar Detect™ Rapid Test and rK28-based DPP® CVL, are designed to test for infection rather than for transmission potential. Preventing transmission is likely to require more specific tests to identify super-spreaders. Increasing test specificity is also likely to improve community compliance with control programs.

AIM The primary aim of the study is to differentiate super-spreaders in the mixed reservoir population.
METHODS Longitudinal canine sera samples of known infectious status were immunologically tested using 6 novel and 2 current anti-*Leishmania* antigens. ELISA assays were performed on archived sera collected from a naturally infected cohort population of Brazilian dogs. Their transmission potential was measured by xenodiagnosis during a two years follow-up. For purposes of analyses, dogs were classified based on both point xenodiagnosis and their infectious history results. A range of alternative cut-off titres to maximize test performance were defined.
RESULTS Applying non-standard antibody titer cut-offs to these samples demonstrated the potential of some of the novel candidates to out-perform currently available test antigens in their specificity to identify infectiousness. The impact of removing super-spreaders from the population from time pre infectious onset is quantified under different population dynamic scenarios.
CONCLUSION Correct combinations of anti-*Leishmania* antigen and threshold titers could have an impact on reducing transmission to both dogs and humans. Increased test specificity may also improve dog owner compliance with national VL control programs.

2P35

Examination of influencing factors and high-risk regions of dengue In Nicaragua, using spatiotemporal compartmental simulations

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INTRODUCTION Dengue is a mosquito-borne tropical disease, which may develop into a life-threatening haemorrhagic fever or even a shock syndrome. The main prevention method is mosquito habitat reduction. Predictions do not always adequately account for rainfall, climate or socioeconomic factors and movement dynamics. With cellular automata (CA) simulation, epidemic models can be combined with time series of geo-referenced data, to produce more fine-tuned predictions and to derive further insights on risk factors. Also, CA simulation performance scales well with both CPU and General-Purpose computing on Graphics Processing Units (GPGPU) parallelism, thus enabling fast simulations.
AIM To examine influencing factors and high-risk regions of dengue in Nicaragua and to assess the prediction accuracy of a model, combining ordinary differential equations (ODE) + CA, whose parameters are determined using a differential evolution algorithm.
METHODS The simulator is a multi-layer host/vector ODE model of Susceptible-Infected-Recovered (hosts) and Susceptible-Infected (vector) with births/deaths within gridded meta-populations. CA Population dynamics uses Moore neighbourhoods of varying size and commuting host movements. The training method is differential evolution and the fitness function is reverse weighted Root Mean Squared Error, applied on monthly time series of infected host counts. Time series of geo-referenced Host/Vector population data is used together with environmental, climate, poverty and travel accessibility

data. Data is integrated using weighted linear & non-linear link functions, normalization and feature scaling.
RESULTS The country studied is Nicaragua, in 2002–2005. Most important variables were: precipitation, travel time to major cities and normalized difference vegetation index. The link within the CA between detailed spatial data and transmission dynamics made it possible to identify these local effectors. The trained models have a mean absolute error of 30 infected humans per month. The predicted infected counts are overestimated on the first 3 months.
CONCLUSION High-risk areas in Nicaragua for the dengue disease seem to be isolated rural regions, with increased rainfall and vegetation. Differential evolution algorithms can be effective in training epidemic models from a large and diverse parameter space.

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Transmission dynamics of loiasis over twenty-three years in three communities of the Mbalmayo Health District (Central Cameroon)

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INTRODUCTION Loiasis is a parasitic disease caused by the filarial nematode *Loa loa* and transmitted by tabanids belonging to the genus *Chrysops*. Although loiasis has been ranked as the second most common reason for medical consultation after malaria, its clinical impact is yet to be elucidated though a recent study has reported an excess mortality associated with the infection. As such, loiasis is still consider as a benign disease eliciting very little attention. A collateral impact of ivermectin on loiasis transmission have been reported in some areas under ivermectin-based preventive chemotherapy. However, as a consequence of post-treatments severe adverse events occurring in individuals harboring very high loa microfilarial loads, ivermectin is not recommended in hypo-endemic areas for onchocerciasis that are co-endemic for loiasis. Thus, one can anticipate an increase in the transmission of the disease and the morbidity associated to the infection over time.
AIM The objective of this study was to investigate the long-term transmission dynamics of *Loa loa* in three neighboring communities of the Mbalmayo health district (Central Cameroon).
RESULTS A total of 271 individuals (51.6% females) were examined, and 27.3% (95% CI: 22.3 - 32.9) tested positive to daytime calibrated thick blood smear, with a mean microfilaria (mf) density of 1,922.7 (sd: 6,623.2) mf/mL. Loiasis was most prevalent in females than in males ($P = 0.0001$) and the infection rate was positively associated with age (OR = 1.018; $P = 0.007$). Similarly, the intensity of infection was higher among males than in females ($P < 0.0001$), and a convex in form trend was observed among age groups, the maximum microfilarial load being reached in individuals aged 35 to 49 years old. A positive association was observed between the prevalence of loiasis and the duration of residence in the community (OR = 1.016; $P = 0.003$). Both the rate and intensity of infection were similar between 1993 and 2016, though a slight increase was observed in 2016 ($P > 0.351$).
CONCLUSION After 23-years, the prevalence and intensity of loiasis infection was almost unchanged, indicating that this filarial disease might be noncumulative as regarded till now.

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Change in diversity and risk of rodent-borne diseases along a gradient of antropogenic habitat perturbation in Yasuni National Park, Ecuador

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INTRODUCTION Anthropogenic habitat perturbation is increasingly as a result of the global population explosion and the need for natural resources, with consequent effects on biodiversity dynamics. These ecological changes hold the potential to alter transmission patterns of pathogens to humans. Rodents are the most abundant mammals and are the reservoirs for up to 50% of emerging zoonotic pathogens. Understanding changes of rodent communities, associated with human habitat perturbation, will help assess the potential risk of rodent-borne pathogens to humans.
AIM The aim of this study is to evaluate the effect of landscape changes resulting from various types of anthropogenic habitat perturbation on abundance, distribution, diversity and composition of rodent communities.
METHODS The study was carried out in four communities along the Maxxus highway in the Yasuní National Park, Ecuador. Terrestrial small mammals were trapped every four months for two years (2015–16) along a gradient form unperturbed to highly perturbed habitat (forest, border, perturbed). Richness and diversity were calculated by Margalef and Simpon index, respectively.
RESULTS We captured a total of 69 individuals of ten species from five genera (*Hylaeamys*, *Neacomys*, *Oecomys*, *Proechymis* and *Rattus*). Two species were reported only in perturbed (*O. bicolor* and *R. rattus*) and border habitats (*H. yunganus, P. simonsi*). Abundance was similar in forest ($n = 28$), perturbed ($n = 22$) or border ($n = 19$) habitats. Richness was higher in border and perturbed (2.04 and 1.94) than in forest (0.6) habitats. The diversity index was similar in perturbed and border (0.78 and 0.75) than in forest (0.41).
CONCLUSION Different levels of habitat perturbation appear to have an impact rodent richness and diversity. More synanthropic species are present in habitats perturbed by human activities. The absence of exclusive species in the forest and the presence of synanthropic species in the perturbed habitats suggest a continuous flow of species among the different gradients of perturbation. This continuous contact could favor spread of zoonotic pathogens, especially by the presence of more human-tolerant species that are frequent pathogen reservoirs. This study reinforces the importance of rodent community surveillance to understand and prevent the emergence of rodent-borne diseases.

Abstracts

2P38

Higher tuberculosis transmission potential in South African compared to Tanzanian schools: Using carbon dioxide levels and re-breathed shared air to estimate airborne transmission

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INTRODUCTION The ambitious global tuberculosis (TB) control targets require novel approaches to study transmission and define the most appropriate intervention strategies. Traditionally, TB transmission has been studied using of molecular techniques and contact tracing. Carbon dioxide (CO_2) as a natural tracer gas has been previously proposed to estimate the potential of airborne transmission[1,2].

AIM Our aim was to compare the risks of TB transmission among students at schools in Tanzania and South Africa.

METHODS Environmental CO_2 data were collected using portable monitors developed by the University of Cape Town. Thirty student volunteers carried the monitors during the day at secondary schools in Dar es Salaam and Cape Town, and recorded the total number of people at each location within the schools. We calculated mean indoor CO_2 levels (parts per million [ppm]) and volumes of re-breathed shared air, and used Wilcoxon rank-sum test for comparison. We estimated the annual risks of TB transmission using modified Wells-Riley equations[1].

RESULTS The median indoor CO_2 levels at schools was higher in South Africa (1,418, interquartile range [IQR] 1,025–1,968 ppm) compared to Tanzania (602, IQR 555–665, $P < 0.001$). Students from South Africa significantly shared more re-breathed air (median 0.13, IQR 0.06–0.24 L/min) compared to students in Tanzania (0.03, IQR 0.02–0.04 L/min; $P < 0.001$). Assuming a classroom containing 50 students with an infectious source producing a quanta of contagion rate of 5.5/hour[3], considering each country's prevalence of TB, we compared the annual risks of TB transmission. The mean annual risk of TB transmission was higher in South Africa 50.6%, 95% confidence interval (CI) 50.3 – 50.9% as compared to that in Tanzania 11.0%, 95% CI 10.8 – 11.15%, $P < 0.001$ (see Figure).

CONCLUSION Our results indicate up to a 5-fold higher TB transmission potential in South African compared to Tanzanian schools, likely reflecting different ventilation conditions due to natural climate variations. Such differences in transmission potentials across sub-Saharan Africa may have important implications for planning TB control strategies.

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2P39

Spatio-temporal distribution of the schistosomiasis to *Schistosoma mansoni* in the area health of Kimpese of 2011–2015

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INTRODUCTION Kimpese is one of the endemic hyper of schistosomiasis in the South west part of the Democratic Republic of Congo (DRC), In spite of the efforts of the sanitary authorities to control the illness; the schistosomiasis remains always a problem of public health in this area. The reappraisal of the struggle policies against the illness requires like previous a precise cartography of the health areas finally touched by the illness to optimize resources dedicated to struggle against the illness

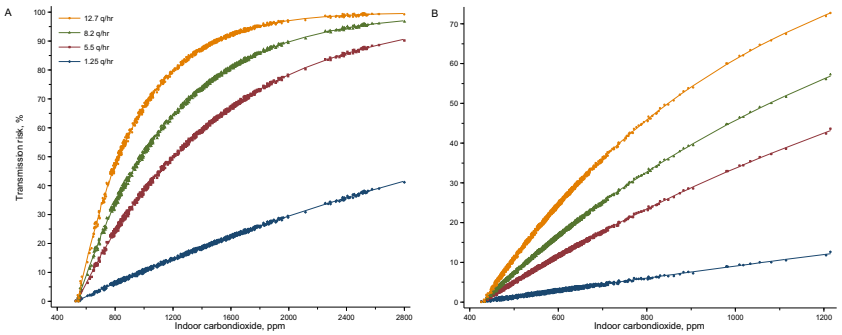

Figure. Estimated annual risks of tuberculosis (TB) transmission in South African (Panel A) compared to Tanzanian (Panel B) schools depending on indoor CO_2 levels (parts per million [ppm]) and time spent in the classroom (hours), assuming one infectious TB case per 50 students in a classroom and a different quanta of contagion rates.

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OBJECTIVES To describe the dynamic spatio-temporal of the schistosomiasis to *S. mansoni* in the Farming Health area (ZSR) of Kimpese of 2011 to 2015.
MATERIALS AND METHODS This study analyzes monthly sets of case of schistosomiasis to *S. mansoni* to the scale of the health areas on one period of five years. The data have been collected to the Office Power station of the Health Zone (BCZS). For every confirmed case, a suspension of stools has been analyzes by direct microscopy in the laboratories of the Health Centers for the research of œufs of *S. mansoni*.
RESULTS In total 4216 cases of schistosomiasis to *S. mansoni* have been reported by health structures of 2011 - 2015. The mean incidence rate was of 57, 3 for 10000 inhabitants during the same period. Analysis of the spatial dynamics showed a case of heterogeneity towers health area located East and South West Health Area. The detection of clusters identified four risk clusters in Zone health Kimpese. The analysis of the temporal sets showed that all areas of health notified at least a case during the period of the survey.
CONCLUSION This study permitted to make the recent cartography of the illness. It identified 7 health area to risk (CECO, Vundansole, Kiasungua, Lovo, Viaza, Vila, Kilueka). It is going to permit to target the zones to risk to refine the spatial description scale there (village/section) and to lead the investigations parasitology and malacology there, in order to determine the present prevalence of the illness and to describe the biotopes favorable to the intermediate hosts and to the transmission of the parasite.

2P40

Rats as a potential reservoir of invasive non-Typhi *Salmonella*: a field study in Kisangani, Province of Tshopo, Democratic Republic of the Congo

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BACKGROUND Non-typhoidal *Salmonella* (NTS) are a major cause of bloodstream infections in children in sub-Saharan Africa, but their reservoir remains unknown. We aimed to assess (i) the prevalence of NTS in rats in an area endemic for invasive NTS infections and (ii) to assess genetic relatedness between NTS recovered from rats and humans.
MATERIAL/METHODS From April 2016 – December 2016, rodent life traps were placed in Kisangani, Democratic Republic of the Congo. After anaesthesia and dissection, liver, spleen and rectal content were cultured for NTS. Human NTS were obtained from blood cultures of children admitted from 2014 to 2016 at the Kisangani University and related health centres. Genetic relatedness between NTS isolates was assessed with Multi-locus Variable Tandem Repeat Analysis (MLVA).
RESULTS In 619 traps, 218 (35%) rats were captured (12 *R. rattus* and 206 *R. norvegicus*). Nineteen (8.7%) rats carried NTS, they were isolated from rectum (n = 8), spleen (n = 7) and liver (n = 7, 3 rats had NTS grown from both spleen and liver). NTS serotypes (20 rats, one rat had two serotypes) comprised Enteritidis (40%), Typhimurium (5%), Weltevreden (16%), II:42:r:- (30%) and Orion and Kapemba (each 5%). Human NTS (65 isolates) comprised Typhimurium (62%), Enteritidis (34%) and II:42:r:- (1 isolate, 1.5%). Human NTS were multidrug resistant (>90%) whereas all rat NTS were pan-susceptible. Among rats, Enteritidis comprised 2 MLVA types (7 and 1 rats respectively); different colonies from the Typhimurium (1 rat) comprised 2 highly related MLVA types. Human Enteritidis and Typhimurium serotypes comprised 5 and 14 MLVA types respectively. MLVA types of human NTS were different from those obtained in rats, except for 1/65 (1.5%) Enteritidis isolate which shared the major rat MLVA type. Assessment of clonal identity between the human and rat II:42:r:- serotype isolates is currently ongoing – also the human isolate was pan-susceptible.
CONCLUSION NTS carriage rate among rats in a sub-Saharan city was 8.7% and comprised the Enteritidis and Typhimurium serotypes. The vast majority of MLVA patterns of human NTS was different from those obtained in rats, indicating that rats probably do not constitute a main reservoir for NTS.

2P41

Ecological approach of *Anopheles Labranchiae*, vector of malaria in north of Morocco: Larache Region

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INTRODUCTION Since 2004, Morocco became malaria-free despite the presence of the malaria vectors in the country. However, the relationship between environmental parameters and abundance of larval mosquitoes still requires further study to better understand the dynamics of larval habitats of malaria vectors in Morocco.
AIM This study was conducted to characterize larval habitats of Anopheline mosquitoes and to estimate the key ecological factors associated with this group's distribution.
METHODS The study was carried out during June and July 2009 at 25 localities in 10 sectors of Larache Province. The aquatic habitats were sampled by standard dipping techniques. The habitats were characterized based on water depth, pH, temperature, conductivity, salinity, distance to the nearest house, dissolved oxygen, algae and emergent plants (presence or absence), turbidity and habitat type.
RESULTS A total of 54 aquatic habitats consisting of swamps, rivers and rice fields were chosen. Fifty-two per cent of all habitat samples were positive for *Anopheles* larvae. Of all mosquito larvae collected, 1145 were *Anopheles* of which 316 (28%) were early instars and 829 (72%) late instars. Morphological identification of third and fourth larval instars revealed that 76% (n = 629) were *Anopheles maculipennis s.l.* and 24% (n = 200) were *An. cinereus*. The only species belonging to the *Anopheles maculipennis* complex was *An. labranchiae*. Multiple factorial correspondence analyses (MFCA) showed that the density of *An. labranchiae* was negatively associated with turbidity, pH and depth in aquatic habitats.

CONCLUSION These findings suggest that the distribution of *An. labranchiae* was driven by different environmental factors. This will help in understanding the relationship between habitats, environmental factors and abundance of *Anopheles* larvae, which is essential for the efficient application of mosquito control methods.

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2P42

Bio ecological charactereristic of malaria vectors in southeast part of Iran

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INTRODUCTION Malaria is one of the important infectious diseases In Iran. The country has two completely distinct eco-epidemiological zones for malaria: temperate and oriental zones. Oriental zone includes Sistan va Baluchestan, south of Kerman and Hormozgan Provinces with meso- endemicity of malaria infection which in total account for 96% of all cases in Iran.Temperate zone including other provinces and malaria transmission is very restricted in this area. This investigation was carried out in Kerman province.

AIM To determine Bio Ecological Characteristics of Malaria Vectors in Southeast Part of Iran.

METHODS Sampling was carried out biweekly to collect larvae and adult mosquitoes. All natural and artificial breeding places in and around the selected villages were visited and recorded. Sampling was conducted by standard dipping method, Adult mosquitoes were collected by hand catch, spray sheet collection, landing night catch on human/animal baits and artificial outdoor resting places (pit shelter) methods during the year. In the laboratory, all anopheline specimens were identified at the species level and their physiological status was recorded.

RESULTS During the study period, a total of 1055 adults and 3288 larvae of anopheline mosquitoes were collected and identified. The species of *Anopheles* mosquitoes including: *An. superpictus, An. fluviatilis, An. stephensi* and *An. dthali* were collected in this investigation. The results revealed that Among the 541 *Anopheles* species collected from indoors by total catch method, *An. stephensi* was the predominant species; also, 114 mosquitos belonged to *An. culicifacies*, 123 mosquitos belonged to *An. dthali*, 7 mosquitos belonged to *An. fluviatilis* and 40 mosquitos belonged to *An. superpictus*.

CONCLUSION In order to malaria elimination program in Iran to 2025, in these conditions, even low number of reported cases is very important. Understanding the behavioral characteristics of vectors coupled with their ecology is one of the important factors in planning and determining strategies to fight the malaria vectors.

2P43

Biodiversity and medically important ticks in northeast of Iran

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INTRODUCTION Ticks play a significant role as vectors of pathogens of domestic animals. They are considered as the main vectors for transmission of various pathogens such as fever and CCHF to human. This study was carried out to investigate the geographical distribution of ticks infesting ruminants in a veterinary site, North Khorasan Province, Iran during 2012–2016.

AIM To determine Biodiversity and medically important Ticks in Northeast of Iran.

METHODS Ticks were collected from infested ruminants including cows, sheep and goats, some specimens also were collected from turtles, rodents and hedgehogs. The collected ticks were placed in separate labeled vials and transferred to the laboratory of Vector-borne Diseases Research Center, North Khorasan University of Medical Sciences. All specimens were identified based on morphological characteristics using valid identification keys.

RESULTS A total of 1478 adult ticks were collected. The identified tick specimens were from to two families: Ixodidae (87.96%) and Argasidae (12.04%), 6 genera and 17 species including: *Rhipicephalus sanguineus* (55.9%), *Rh. bursa* (13.4%), *Hyalomma marginatum* (9.5%), *Hy. anatolicum* (9.5%), *Hy. asiaticum* (0.2%), *Hy. aegyptium* (0.5%), *Hy. scupense* (1.4%), *Hyalomma sp* (1.2%), *Haemaphysalis sulcata* (0.8%), *H. erinacea* (0.1%), *H. inermis* (0.1%), *H. punctata* (0.2%), *H. concinna* (0.1% *Boophilus annulatus* (1.2), and *Dermacentor marginatus* (6.1%) as well as *Argas persicus* (91.8%) and *Argas reflexus* (8.2%) amongst soft ticks.

CONCLUSION Several ticks were collected from this province. *Rh.sanguineus*, *Hy. marginatum*, *Hy. anatolicum*, *Hy. asiaticum* and *Hy. dromedarii* were known as the most frequent species. They play an important role for transmission of vector borne diseases to human such as CCHF virus in endemic areas of Iran. Based on tick distribution veterinary authority and other officials should act for implementation of disease control.

Abstracts

2P44

Combining area-wide mosquito repellents and long-range attractants to create a "push-pull" system that protects against disease transmitting mosquitoes in Tanzania

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Tanzania

BACKGROUND Despite high coverage of indoor interventions such as insecticide-treated nets, mosquito-borne infections persist partly because of outdoor-biting, early-biting and insecticide-resistant vectors. Push-pull systems, where mosquitoes are repelled from humans and attracted to nearby lethal targets, may constitute effective complementary interventions. This study assessed protective efficacy of a push-pull system against outdoor-biting and indoor-biting pyrethroid resistant *Anopheles arabiensis* sensu lato and *Anopheles funestus* sensu lato mosquitoes in a Tanzanian village.
METHODS A partially randomized cross-over design was used to test the efficacy of push-pull for 32 nights in four experimental huts and 16 nights in four local houses, in an area with high pyrethroid resistance. The push-pull system consisted of repellent dispensers (containing 1.1% or 2.2% w/v transfluthrin dispensed by active evaporation using a fan from polyester strips) and one lure-and-kill device (odour-baited mosquito landing box, (MLB)) situated outside two huts and households. Two other huts and households without push-pull were used as controls. Every night, adult male volunteers, assigned randomly to each hut and households, collected mosquitoes attempting to bite them outdoors hourly (from 1830 hrs to 0730 hrs). Mosquitoes were collected indoors hourly using exit traps in experimental huts and by HLC in experiments conducted in local houses. Primary outcomes were: a) number of mosquitoes of different species caught outdoors, and b) indoors. Ribosomal DNA (rDNA) of *Anopheles gambiae* s.l. and *Anopheles funestus* s.l. was amplified by polymerase chain reaction (PCR) to distinguish between sibling species in these complexes. Enzyme-linked immunosorbent assays (ELISA) were used to detect *Plasmodium falciparum* antigens in salivary glands, and host antigens in mosquito blood meals.
RESULTS Push-pull offered marginal protection against host-seeking mosquitoes. When tested in experimental huts there was a significant 30% reduction in outdoor-biting for *An. arabiensis* ($P < 0.001$), and 41.5% for *Mansonia uniformis* ($P < 0.014$). There was also a modest but non-statistically significant biting reduction of 12.2% for *An. funestus* ($P = 0.256$) and 5% for *Culex quinquefasciatus* ($P = 0.584$). Most of the protection against all species occurred between 1830 hrs and 2200 hrs, with 20.5% biting reduction for *An. arabiensis* mosquitoes at this time. The number of mosquitoes caught inside exit traps in huts with or without push-pull was statistically similar. In the village households, the push-pull system reduced outdoor-biting *An. arabiensis* by 25% ($P = 0.002$), but had no significant effect on the other species ($P > 0.05$) compared to controls. It also significantly reduced indoor densities of *An. arabiensis* by 48% ($P = 0.006$), but not any of the other species ($P > 0.05$). All *An. gambiae* analyzed by r-DNA PCR were identified as *An. arabiensis*, but for *An. funestus* group, 86.9% were *An. funestus* s.s, 9% *An. rivulorum* and 3.9% *An. leesoni*. No blood-fed *An. gambiae* were caught, but *An. funestus* were clearly anthropophagic (95% of blood meals being from humans and 5% from dogs) which were collected in the exit traps. No *Plasmodium* infected *Anopheles* were detected.
CONCLUSION Push-pull provided modest protection against early-biting and outdoor-biting, but did not affect number of mosquitoes inside huts and households, which is important as it did not divert more mosquitoes indoors. This approach could possibly contribute to reducing transmission of mosquito-borne infections, if used alongside bed nets, even in areas with high pyrethroid resistance. We recommend further optimization of push-pull to maximize protective efficacy.

2P45

Biting behavior of malaria vector species in the Democratic Republic of Congo

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INTRODUCTION The significant progress has been made in recent years, with >40 million LLINs distributed through mass distribution campaigns in all provinces between 2008 and 2013. In the subsequent 2013/14 DHIS survey, ownership of LLINs had increased to 70% of households with at least 1 LLIN. Entomological data to determine malaria vector species composition, biting times and behavior were collected in 2015 and 2016 in 7 sentinel sites spread throughout the country.
AIMS Human landing catches (HLC) were used to assess mosquito biting times and behavior in each sentinel site.
METHODS The collection period was from 18:00 to 06:00 broken into two shifts of six hours each.
RESULTS *An. gambiae* s.l. was the primary malaria vector in 6 of 7 Provinces, with particularly high biting rates recorded in Tshopo in July-September 2015 with 96 bites per person per night indoors and 68 outdoors. The biting rate of *An. funestus* s.l. was consistently high in Kasai in 2015 and 2016 with a mean >10 bites p/person/night indoors and outdoors. Other vectors, such as *An. moucheti*, and *An. nili* were found in small numbers but may have more importance in other areas. Biting times of *An. gambiae* s.l. were similar in Tshopo, Kinshasa and Sankuru, with the majority of biting occurring late at night between 22:00 and 04:00 and similar indoor and outdoor biting trends. In Haut Katanga considerable *An. gambiae* s.l. biting occurred before 19:00 and remained fairly consistent throughout the night, except for two peaks between 20:00 – 22:00 and 02:00 – 04:00. *An. paludis* biting in Haut Katanga was predominantly outdoors and peaked in January and August with a maximum of 82 bites per person per night. There was a large peak of between 4 and 9 bites p/person/hour between 19:00 and 22:00, followed by a gradual decrease until morning.
CONCLUSION Overall, biting rates from malaria vectors remain high in some Provinces of DRC despite increased LLIN coverage. A better understanding of vector biting trends and behavior will help the NMCP with future control efforts.

Abstracts

2P46

Expansion in the distributional range of ixodid ticks parasitising cattle in Zimbabwe

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INTRODUCTION Ixodid ticks are among the most important parasites affecting animal health in tropical and sub-tropical countries. One of the challenges facing authorities is the high dispersal rate observed in these ectoparasites. Of particular concern is the invasive cattle tick *Rhipicephalus microplus*. The expansion of the geographic range of ixodid tick species might lead to variability amongst different populations as an adaptation strategy. This will subsequently affect pathogen transmission and resistance to chemical acaricides used to control the ticks.
AIM The aim of this study was to investigate the expansion of ixodid ticks which parasitise cattle in Zimbabwe. Using the invasive cattle tick *R. microplus* as an example, we set out to explore interactions with the indigenous tick species *Rhipicephalus decoloratus*, investigate evolution of acaricide resistance and gene flow patterns leading to tick dispersal.
METHODS A nationwide tick survey was carried out in Zimbabwe between September 2013 and May 2015 at 322 communal dipping tanks. Habitat suitability models were developed for *R. microplus* and *R. decoloratus*. Molecular and microsatellite markers were used respectively to screen for resistance as well as investigate genetic differentiation in *R. microplus* populations.
RESULTS There was a notable expansion in the geographic range of the most economically important ticks namely *Amblyomma variegatum*, *Amblyomma hebraeum* and *R. microplus*. The habitat preferences of *R. microplus* remain restricted despite geographic range expansion with no apparent displacement of *R. decoloratus* in suitable areas. *R. microplus* populations are undergoing selection pressure for amitraz and organophosphate resistance but remain susceptible to the pyrethroid group of acaricides. There was little genetic differentiation of tick populations with gene flow patterns showing continuous exchange of genetic material amongst populations.
CONCLUSION Expansion in the geographic range of ticks will lead to unstable epidemiological situations for the diseases; cowdriosis, anaplasmosis and babesiosis. The high frequency of use of amitraz and organophosphate is leading to an increase in the selection of resistant genes in *R. microplus* ticks. Continuous exchange of genetic material amongst different populations supports the hypothesis that cattle movements are responsible for the dispersal of *R. microplus*, which was often found in climatically unsuitable areas.

2P47

High prevalence of bed bug infestation in Ethiopian residential institutions; its' psychological, social and health impact: a cross-sectional study

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BACKGROUND Despite heavy infestation of bed bug in Ethiopia; it is considered as a less public health problem. There is no information on epidemiology and associated psychological, social and public health impact. Thus, this study assessed the burden of bed bug infestation and its associated impacts in Ethiopia.
METHODS A community based cross sectional study was conducted in five Woredas of Amhara Regional State from 1 March 2015 to 30 June 2016. Bed bug inspection was done following the Michigan manual for prevention and control of bed bug recommendations. The presence of alive or dead bed bugs, eggs, shed skin and fecal stains or droppings was taken as an infestation. Additionally, data from households were collected using pretested, structured and interviewer-administered questionnaire; analyzed using SPSS version 20. Both bivariate and multivariate logistic regressions were computed to identify the associated factors.
RESULTS Among 203 residential institutions surveyed, bed bugs were isolated from that of 154 (75.9%). Among bed bug infested residents; 87%, 83.1%, and 71.4% had one or more of psychological, social and health impacts, respectively. Residential institutions in Bahir Dar city administration were 3.4 times more likely to be infested by bed bug than Amanuel (AOR: 3.4; 95% CI: 1–11). In Kobo city administration, it was 41 times more likely to infested by bed bug than Amanuel (AOR: 41; 95% CI: 8–206). However, the rate of bed bug infestation by the type of residential institutions was not statistically different.
CONCLUSIONS Bed bug infestation was found to be a major public health problem in Bahir Dar, Woreta and Kobo. Significant psychological, social and health impact was noticed in the community. Thus, effective pest management strategy is urgently needed. Moreover, larger studies are warranted in the future to assess associated impacts more precisely. Trial registration: HRTT1/154/15. Registered 04 February 2015.

2P48

Entomological studies to improve Chagas disease vector control in the Gran Chaco region

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INTRODUCTION Despite large-scale reductions in Chagas disease prevalence across Central and South America, *Trypanosoma cruzi* infection remains a considerable public

health problem in the Gran Chaco region where vector-borne transmission persists. Vector surveillance and control is the mainstay to prevent transmission and to reduce the clinical burden.
AIM To identify gaps in current vector surveillance and control measures, and to pilot methods towards improvement.
METHODS Studies were performed in the Bolivian Gran Chaco including: (i) observations of IRS compliance and practises; (ii) triatomine mark-recapture studies to measure sensitives of PAHO recommended surveillance techniques (e.g. 0.5 person/hour Timed Manual Capture); (iii) impact of an educational intervention to improve secondary student knowledge towards household-based surveillance; (iv) impact of house construction improvements on triatomine infestation levels following 60 households assigned to one of three treatments: current unassisted IRS practice, IRS alone, and house improvement + IRS, the latter two following strict insecticide delivery WHO guidelines.
RESULTS (i) Householder compliance was low (25%), and coverage unsystematic (22% of houses and 21% of peridomestic structures treated). (ii) The highest sensitivity of TMC was achieved in plastered adobe huts (20%) compared to the lowest (1%) in *tabique* (mud and sticks) construction, with sensitivity variably dependent on the seeded infestation density. Results from (iii) and (iv) will be available at the time of the conference.
CONCLUSIONS Difficulties to control domestic infestation were identified at management, operational and community levels. Increased house owner compliance, improved surveillance tools and technical training are recommended. Community participation in both house building improvement and triatomine surveillance are two possible approaches towards a more sustainable and efficient vector surveillance and control program.

2P49

Status of insecticide resistance of Anopheles populations and identification of resistance mechanisms in Kwilu Province in the Democratic Republic of the Congo

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INTRODUCTION Bednet use is the cornerstone of malaria prevention in all vulnerable groups. However, the effectiveness of this valuable tool is threatened by the emergence of vector resistance against insecticides. Therefore, monitoring of *A. gambiae sl* resistance to insecticides is essential.
AIM To evaluate the resistance level of *A. gambiae sl* to pyrethroid in the Kwilu province in DRC.
METHODS The larvae and nymphs of *A. gambiae sl* were harvested in three breeding sites of Kwilu province (Bandundu-ville, Bagata and Vanga) and raised in an insectarium. The resistant status of adults was assessed using WHO bioassay test kits for adult mosquitoes with 4 insecticides (permethrin 0.75%, delthamethrin 0.05%, DDT 4%, bendiocarb 0.1%) and 1 piperonyl butoxyde (PBO) inhibitor. Molecular biology allowed us to identify *A. gambiae sl* and resistance gene L1014F-kdr.
RESULTS Without PBO exposition, *A. gambiae sl* were resistant to pyrethroids and DDT. For exposed Anopheles to deltamethrin, the mortality rate was 52%, 64% and 81% respectively in Bandundu-ville, Vanga and Bagata. The correspondant mortality rates for Permethrin in Bandundu-ville, Vanga and Bagata were respectively 17%, 30% and 31%.

Anopheles exposed to DDT, showed a mortality of 21% in Vanga, 5% in Bagata and 2% in Bandundu-ville. However, exposition to bendiocarb demonstrated a mortality rate of 100% anopheline in all sites.

After pre-exposure to PBO, anopheline mortality was 100% in Vanga and Bagata, and 98% in Bandundu-ville with delthametrhin. The mortality of *A. gambiae sl* was 91% in Vanga, 100% in Bagata and 88% in Bandundu-ville with Permethrin. It was 0.76 for *A. gambiae ss* and 0.90 *A. Coluzzii* in Bandundu, Bagata it was 0.61 for *A. gambiae ss*, 0.87 *A. Coluzzii* and 1.0 for hybrids. This allelic frequency of the Kdr genes was 0.63 for *A. gambiae ss*; 0.77 *A. Coluzzii* and 1.0 hybrid in Vanga.
CONCLUSIONS This study shows a strong implication of the oxidases in metabolic resistance mechanisms associated with the Kdr genes.

2P50

First report of pyrethroid resistance in Rhipicephalus (Boophilus) annulatus (Say, 1821) from Iran

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INTRODUCTION *Rhipicephalus (Boophilus) annulatus* is one of the most important ectoparasites of cattle in northern Iran. The aim of this study was to evaluate pyrethroid resistance status of this species from Noor County, northern Iran where because of one confirmed human case of Crimean–Congo hemorrhagic fever, use of acaricide by livestock farmers peaked in 2012.
AIM In this study, the biochemistry of insecticide resistance in *Rhipicephalus (Boophilus) annulatus* was assessed.
METHODS The ticks were collected through a multistage cluster randomized sampling method in the study area and fully engorged female Rhipicephalus (Boophilus) annulatus were reared in a controlled insectary until they produced larvae for bioassay. Seventeen populations of the ticks were bioassayed with cypermethrin and 12 populations with lambda-cyhalothrin using a modified larval packet test (LPT). Biochemical assays to measure the contents/activity of different enzyme groups involved in pyrethroid resistance including mixed function

oxidases (MFOs), glutathione S-transferases (GSTs) and general esterases were performed.
RESULTS Population 75 showed a resistance ratio of 129 with cypermethrin when compared to the most susceptible population 23 at the LC99 level. With lambda cyhalothrin the resistance ratio based on LC99 was 5.32 when compared with the susceptible population. The resistance ratios of both pyrethroids tested confirm operational failure, with cypermethrin being more severe than lambda cyhalothrin. The results of biochemical assays demonstrated elevated levels of esterases, GSTs and MFOs in pyrethroids resistant populations tested.
CONCLUSION Based on the results, pyrethroid acaricides may operationally fail to control Rhipicephalus (Boophilus) annulatus in North of Iran. This study is the first document of pyrethroid resistance in Rhipicephalus (Boophilus) annulatus populations from Iran.

2P51

Esperanza window traps for the collection of anthropophilic blackflies (Diptera: Simuliidae) in Uganda and Tanzania

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INTRODUCTION There is an increasing need to evaluate the impact of chemotherapeutic and vector-based interventions as onchocerciasis-affected countries work towards eliminating the disease. The Esperanza Window Trap (EWT) provides a possible alternative to human landing collections (HLCs) for the collection of anthropophilic blackflies, yet it is not known whether current designs will prove effective for onchocerciasis vectors throughout sub-Saharan Africa.
AIM To evaluate the use of EWTs for the collection of host-seeking anthropophilic blackflies in Uganda and Tanzania.
METHODS EWTs were deployed for 41 days in northern Uganda and south eastern Tanzania where different *Simulium damnosum* sibling species are responsible for disease transmission. The relative efficacy of EWTs and HLCs was compared, and responses of host-seeking blackflies to odour baits, colours, and yeast-produced CO_2 were investigated.
RESULTS Blue EWTs baited with CO_2 and worn socks collected 42.3% (2393) of the total *S. damnosum* s.l. catch in northern Uganda. Numbers were comparable with those collected by HLCs (32.1%, 1817), and higher than those collected on traps baited with CO_2 and BG-Lure® (25.6%, 1446), a synthetic human attractant. Traps performed less well for the collection of *S. damnosum* s.l. in Tanzania where HLCs (72.5%, 2432) consistently outperformed both blue (16.8%, 563) and black (10.7%, 360) traps baited with CO_2 and worn socks. HLCs (72.3%, 361) also outperformed sock-baited (6.4%, 32) and BG-Lure®-baited (21.2%, 106) traps for the collection of anthropophilic *S. bovis* in northern Uganda. Contrasting blackfly distributions were observed on traps in Uganda and Tanzania, indicating differences in behaviour in each area.
CONCLUSION The success of EWT collections of *S. damnosum* s.l. in northern Uganda was not replicated in Tanzania, or for the collection of anthropophilic *S. bovis*. Further research to improve the understanding of behavioural responses of vector sibling species to traps and their attractants is needed.

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Bioepidemiology of intermediate host and *Schistosoma haematobium* infection in Angolan rural areas – systematic review

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INTRODUCTION The human schistosomes or blood flukes are digenetic trematodes which basic life cycle has an alternation of generations, with the sexual generation of adult schistosomes in the definitive vertebrate host and an asexual stage in a freshwater snail – intermediate host. The genus *Bulinus* contains most of the snail intermediate hosts of *Schistosoma haematobium*. The adult worms of *S. haematobium* inhabit the veins of the vesical plexus of the humans, although some parasites may live in the portal vein and its mesenteric branches. Oviposition normally occurs in the small terminal venules of the vesical plexus, but occasionally in the rectal venules, the mesenteric portal system and ectopic sites. Eggs (with prominent terminal spine) are partly mature when laid, and migrate through the bladder wall to be discharged in the urine.
S. haematobium is causal agent of urogenital schistosomiasis which cause high morbidity in endemic countries.
S. haematobium infection was categorized as carcinogenic by the International Agency for Research on Cancer in association with the World Health Organization. In Angola, *S. haematobium* infection is endemic.
AIM To contribute for the knowledge of bioepidemiology of the intermediate hosts and *S. haematobium* infection in Angola.
METHODS Literature reviewed has included our scientific works carried out in Angola and publications focusing freshwater snails and schistosomes in that country, as we found in PUBMED and IHMT databases.
RESULTS *Bulinus globosus* or *B. africanus* has been found naturally infected with *S. haematobium* in Angola. In experimental infections of *B. globosus* from Luanda with *S. haematobium* from Huambo and, on the other hand, with *S. haematobium* from Luanda have shown a greater compatibility with the strain of *S. haematobium* of Luanda. The prevalence of *S. haematobium* infection, range from about 35% and above 80% in certain rural areas.
CONCLUSION The compatibility between *B. globosus* and the strains of *S. haematobium* in Angola permits the spread of the parasite and the increase of foci of its transmission. It is an important public health problem, being urgent to establish effective, integrated control measures, aiming to diminish transmission and consequent morbidity and mortality associated with them.

Abstracts

2P53

Comparative entomological study on ecology and behaviour of malaria vectors in Badar-Abbas district, southern of Iran

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INTRODUCTION In areas in which malaria has been eliminated, disease transmission and vector are still the major challenges.
AIM Highland area of Bandar Abbas County located in southern Iran more recently became free of malaria transmission and to measure potential of malaria transmission, entomological study was conducted in the area.
METHODS Adult and larvae mosquitoes were collected monthly during 2014 using different collection methods. In addition, ELISA test was also used to measure the human blood index (HBI) of mosquitoes.
CONCLUSION Four species of malaria vectors including *Anopheles stephensi*, *An. culicifacies* s.l., *An. dthali*, *An. fluviatilis* s.l., were collected in the study area. Among total of 2330 female anopheles and 5881 larvae *An. stephensi* was the dominant species was captured in indoor places while *An. dthali*, *An. fluviatilis* s.l., were observed more in outdoor shelters. Although, all species were captured during landing catch collection, *An. fluviatilis* was the most abundant mosquito. In addition, the abdominal condition (gravid/semi gravid ratio) of female mosquitoes indicated that *An. stephensi* had more propensities to rest indoor places. Human blood index was calculated as 20.7% for *An. stephensi* 19% for *An. culicifacies* s.l. and 27% *An. fluviatilis* s.l.

Malaria vector control is always a big challenge in any eliminated area. The north of Badar-Abbas is a potent area for malaria transmission because three main vectors are present. Therefore the routine entomological survey for malaria free area such as north of Bandar-Abass is so essential.

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Lassa virus distribution and phylogeny in rodent populations in Bo district, Sierra Leone

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INTRODUCTION Lassa fever is a hemorrghagic fever caused by an arena virus called Lassa virus (LASV), first reported in Nigeria in 1969 and has also been reported in other West African countries. The multimammate mouse *Mastomys natalensis* and recently *Mastomys erythroleucus* have been implicated as vectors in the transmission of Lassa fever. Its case-fatality is low (1–2%) in communities of endemic areas, but reach 50% in hospitalized patients during outbreaks.
AIM The study was to investigate the presence of LASV in Bo villages, estimate the rodent LASV prevalence in the dry and rainy season, and perform the phylogeny of new LASV strains.
METHODS Six villages in the district of Bo were investigated in 2014–2016. Each 3 months, a standardized trapping session was performed in different habitats: houses, surrounding fields, and cultivated forest. The rodents were first morphologically identified using taxonomic keys and their necessary organs obtained for molecular identification and further analyses. Blood was spotted on filter papers and other organs stored in appropriate containers. Blood samples were tested by two RT-PCRs targeted on the small and large LASV segments. To access the phylogeny, a bayesian analysis was performed on the LASV sequences using the software BEAST.
RESULTS A total of 1490 rodents dispatched in 16 rodent species (510 molecular identifications) and 1 shrew genera were captured in the six villages. The most abundant species was *M. natalensis* (356, 24%), followed by *Praomys rostratus* (345, 23%) and *Rattus rattus* (260, 17%). *M. natalensis* and *R. rattus* were sharing the house habitat whereas *P. rostratus* was living outside. About 15 rodents samples have been tested positive for LASV. The LASV positive rodents were distributed in 4 of the 6 villages. There are too few positive animals per village to show a viral dynamics per season. First phylogenetic analysis showed these sequences different from many others obtained in Kenema.
CONCLUSION Our results shows that LASV is present in rodents in Bo district, and belongs to a Sierra Leonean sub-lineage within lineage IV.

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Manipulation of sandfly distribution within the peridomestic environment, and implications for the control of vector-borne disease

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INTRODUCTION A crucial component of vector-borne disease control is to reduce contact between vectors and infectious or susceptible hosts. In Brazil, sandflies are responsible for transmission of zoonotic visceral leishmaniasis (ZVL) between dogs, and to humans. The principal vectors, female *Lu. Longipalpis*, are eclectic in their blood-feeding habits, and readily bite a wide range of peridomestic hosts, but also exhibit complex aggregation dynamics in association with hosts (lekking). This results in highly heterogeneous contact between sandflies and specific hosts within the peridomestic environment and ultimately, complex host-vector interactions, which are likely to influence local ZVL transmission.
AIM Here, we aim to investigate heterogeneities in peridomestic sandfly distribution and identify possible 'push/pull' manipulation strategies that could reduce contact between vectors and susceptible hosts, with a view to transmission reduction.
METHODS We report a series of investigations into household distribution of sandflies between three common peridomestic host types (dogs, humans and chickens), and consequences for the estimated force of infection (FOI) to dogs under two separate experimental scenarios: (i) over a range of experimentally manipulated maintenance-host (chicken) densities, to examine zoopotentiation, and (ii) in households

with and without deltamethrin collars (Scalibor®) on dogs, to explore the effects of individual based insecticidal interventions on sandfly abundance and displacement.
RESULTS Results indicate significant non-linear shifts in sandfly distribution and FOI with changes in chicken (maintenance host) density and collar use, and interaction with vector density. Specifically, at high vector densities the FOI reduces as chicken numbers increase. At low vector densities a similar shift in FOI is induced by collar use. The pull of chickens at higher densities is likely related to host biomass in conjunction with pheromone mediated aggregation behaviour, whereby chickens act as sink of biting behaviour. The use of collars at lower densities also promotes aggregation on alternative hosts as collared dogs become inhospitable hosts for lekking.
CONCLUSION The implications of these complex host-vector interactions in relation to ZVL transmission are discussed in the wider context of host demography and vector control. In particular, highlighting benefits of impregnated collar use beyond individual protection and the potential for novel zooprophylactic control.

2P56

Evolution of multiple mechanisms of resistance to pyrethroids in *Anopheles gambiae* s.l populations in Niger

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INTRODUCTION Malaria is a public health problem in Africa and Niger. The progress made in its fight is threatened by rapid development and spread of mosquito resistance to insecticides in the context of universal use of LLIN. Between 2013 and 2016, the National Malaria Control Program of Niger conducted a longitudinal follow-up of insecticide resistance of malaria vector in line with WHO recommendations.
METHOD Larvaes of *Anopheles gambiae s.l* were collected from 2013 to 2016 in fourteen localities selected based on different use of insecticides and environment. WHO susceptibility tests in tube were used on females to detect insecticide resistance. Eight insecticides were tested and two synergists in 2016. Percentages of *knock down* during the time of exposure for pyrethroid and DDT, and mortality after 24 hr observation for all insecticides tested was determinated. Polymerase Chain Reaction and biochemical tests carried out to species identification and to determine mechanisms of resistance (*Kdr and Ace-1* allelic frequencies and activity of detoxification enzymes).
RESULTS *Anopheles gambiae s.l.* was resistant to pyrethroid and DDT all years, but susceptible to Bendiocarbe and Malathion in 2013, partially susceptible in 2014 and resistant in 2016. *Kdr* and *Ace-1* mutations were present and increasing in Niger. In 2005 the average frequency of *Kdr* was 36%. It was 56% in 2013, 48% in 2014 and 50% in 2016. This increase is seen in the years following LLIN distribution campaigns. Heterozygous form of *Ace-1* was found in 3/7 sites in 2014 and 8/9 sites in 2016. Biochemical tests showed the existence of enzymatic activities (Esterase, Oxidase and Glutathione S Transferase) every year.
CONCLUSION This survey showed evolutions of multiple resistances in Niger. Management of this resistance is imperative to protect the present available efficiency of pyrethroid, the only insecticides class for impregnated mosquito nets. Resistance evolution should be monitored and reflection on alternative strategies to slow down the appearance of these resistances is recommended.

2P57

Don't overlook the snail: the role of the intermediate snail host in the dynamic epidemiology of schistosomiasis in Northern Senegal

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INTRODUCTION While *Schistosoma mansoni* was the dominant parasite at the onset of the Senegalese epidemic in the early nineties, the urinary species, *S. haematobium*, was mostly absent. Nowadays this pattern is almost completely reversed. In addition, recent molecular analyses revealed that Senegalese children were infected with hybrid crosses between *S. haematobium* and *S. bovis*, the latter being a livestock parasite. This species uses a different freshwater snail host to complete its life cycle. However, nearly nothing is known about the distribution of this snail host and whether it can act as an intermediate host of the hybrid crosses.
AIM Here we want to (i) document the distribution and abundance of the main intermediate snail host species and (ii) study the role of bulinid snail species in the transmission of *S. haematobium, S. bovis* and their hybrids.
METHODS Malacological surveys were conducted in 2012 and 2013 in the lower and middle valley of the Senegal River Basin. We barcoded the bulinid snail species by sequencing a partial cytochrome oxidase 1 (*cox*1) fragment and tested each snail for schistosome infection using a new diagnostic multiplex PCR.
RESULTS The prevalence and abundance of *Biomphalaria pfeifferi*, the intermediate snail host of *Schistosoma mansoni*, was much lower than reported by studies from the nineties. The opposite was true for the bulinid species. The most dominant snail species was *Bulinus truncatus*, the host of *S. bovis*, followed by *B. globosus*, the main host of *S. haematobium*. The former was exclusively infected by pure *S. bovis* parasites, while the latter was infected with *S. haematobium* and with hybrid parasites. The distribution of both species was heterogeneous along the river basin, as was the distribution of the hybrid parasites in children that was obtained during a previous study.
CONCLUSION The shift from *S. mansoni* to *S. haematobium* in Northern Senegal is paralleled by a similar shift from *B. pfeifferi* to *Bulinus* spp., their respective snail host species. Molecular barcoding revealed that *B. truncatus* is the most dominant bulinid species. So far, none of the tested specimens appeared infected with the hybrid species, suggesting that *B. globosus* is the most important host in the transmission of human schistosomiasis. A detailed comparison between host and parasite distribution will be made in order to better understand the driving factors behind schistosomiasis epidemiology.

Abstracts

3P1

Discussion of two infection prevention and control training approaches to enhance biosafety in primary healthcare facilities during an outbreak of Ebola virus disease

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INTRODUCTION Implementing and maintaining infection prevention and control (IPC) strategies during an outbreak of Ebola virus disease (EVD) in order to provide proper biosafety in primary healthcare (PHC) facilities is challenging and crucial. The healthcare workers (HCW) there constitute the first line response and are at high risk of getting infected.

The Ebola Response Consortium (ERC) rapidly implemented, during the EVD West Africa Outbreak 2014–2015, an ongoing national IPC program in PHC facilities in Sierra Leone. The International Rescue Committee (IRC), the organization leading the ERC, carried out participatory research including a daylong workshop where IPC challenges identified in baseline data collection were discussed in order to develop improvement plans. Pre- and post- workshop data collection on adherence to IPC measures included observation and in-depth interviews. Biosafety challenges, e.g. lack of glove changing between patients and poor handwashing habits, were identified during observations and interviews explored the acceptance of IPC measures and beliefs regarding infection.

The ongoing EFFO project ('Efficiency by Edification'), funded by the Federal Ministry of Health of Germany, enhances IPC measures in primary healthcare facilities in two countries considered at that time as high risk for EVD importation by the World Health Organization, Burkina Faso and Senegal. A training program with the focus on HCW and their safety was developed in a participative and iterative process. The EFFO project provides an ongoing thorough methodological IPC emergency preparedness approach developed outside an EVD outbreak setting.
AIM The aim of the discussion is a clarification how IPC training concepts in outbreak settings can be adapted based on experiences made outside outbreak ('routine') settings.
METHODS This systematic comparison between EFFO and IRC projects compares IPC training approaches made and biosafety challenges identified in a crisis setting versus a non-crisis setting.
RESULTS Results will be developed together during the discussion. A reflective dealing and consideration of the context in which the IPC training takes place is primordial.
CONCLUSION Biosafety challenges identified during an outbreak setting could be addressed by IPC approaches developed in emergency preparedness projects. The need to improve and harmonize IPC trainings should be investigated further.

3P2

Impact of integrating a pre-referral treatment of severe malaria with rectal artesunate at the community level: a non-inferiority trial in the Democratic Republic of Congo

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INTRODUCTION The Democratic Republic of Congo (DRC) adopted the strategy of using at the community level, a single dose of rectal artesunate as a pre-referral treatment of severe malaria amongst under five children (CU5) who cannot reach quickly a health care facility and take oral medication. However, its feasibility and acceptability by the community and health care providers were unknown.
AIM To assess the impact of integrating the pre-referral rectal artesunate on the adherence to the referral advice provided by the community health workers (CHWs) and the CHWs and nurses' capacities to identify correctly the danger signs of malaria.
METHODS A non-inferiority (NI) community trial with a pre- and post-intervention design and a mixed approach was conducted in 51 community care sites (CCS) in 4 provinces (Kasaï-Oriental, Kasaï-Central, Lomami, Lualaba) from August 2014 through June 2015. Surveys targeted at pre-test 387 mothers of CU5, 63 CHWs and 45 nurses; at post-test, 346 mothers, 41 CHWs and 37 nurses.

Proportions at 95% confidence intervals were calculated for key indicators. A 15% threshold was considered for NI analyses due to the expected decrease of the adherence to the referral advice after the introduction of the strategy.
RESULTS Rectal route was often used (60.7%) and medicines given rectally were considered more effective (63.6%) and easily administrate (69.7%). Acceptability of the pre-referral strategy was relatively high: 79.4% (CI95: 75.4–83.3) among mothers, 90.3% (CI95: 82.3–96.8) among CHWs, and 97.8% (CI95: 93.3–100) among nurses.

In addition, 41.5% of CHWs and 32.4% of nurses could identify correctly the five danger signs of severe malaria at post-test compare to none at pre-test ($P < 0.05$).

The adherence to the referral advice at post-test [84.3% (CI95: 80.6–88.1)] was non-inferior to the pre-test adherence [94.1% (CI 95: 91.7–96.4)].
CONCLUSION Integration of the pre-referral strategy of severe malaria in the CCS in DRC is feasible and acceptable. It had positive impact on CHWs and nurses' capacities to identify correctly the dangers signs of malaria and on the adherence to the referral advice. However, more information, education and communication are needed for parents of CU5 and trainings for CHWs and nurses.

3P3

A training curriculum for conducting clinical research during outbreaks

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INTRODUCTION Patients are at the heart of every infectious disease outbreak and patient-centred research is essential to generate evidence to improve the care of individual patients and to guide the public health response to the outbreak. The challenges of clinical research during outbreaks cannot be adequately met by current approaches, which usually require long lead-times, predictable epidemiology and fixed research assets. The unpredictable nature of outbreaks requires methods and tools that are designed to meet these challenges and are established in the countries where these outbreaks are likely. The Clinical REsearch During Outbreaks (CREDO) training curriculum will support investigators in Low and Middle Income Countries (LMICs) to generate clinical evidence during outbreaks. The programme is being developed by TDR, the

International Severe Acute Respiratory and Emerging Infection Consortium (ISARIC), the University of Oxford and the UK Public Health Rapid Support team, funded by the UK Government.
AIM The CREDO training curriculum aims to strengthen capacity of research teams in LMICs to conduct clinical research on emerging and epidemic-prone infectious diseases, and to generate the evidence needed by clinicians and public health authorities.
METHODS CREDO uses a learning approach that blends face-to-face teaching and on-line training tools. The training modules cover: 'evidence-based' medicine for epidemic infections; rapid 'evidence-needs' appraisal; research study planning; study design; logistics and operational planning; data management; ethics; communications and engagement; special groups (children, pregnant women, mother/child); and good clinical practices.
RESULTS The first workshop was hosted 9–10 March 2017 by the Uganda Virus Research Institute (UVRI). There were four multi-disciplinary teams from Côte d'Ivoire, Ethiopia, Ghana and Uganda in attendance. The initial workshop is being used to refine the content and delivery of the curriculum through participant feedback, and will be followed by the participants completing the on-line modules and a second and final workshop in Addis Ababa from 12–13 July, 2017.
CONCLUSION The 2015 Ebola virus outbreak in western Africa exposed a major gap in research capacity. The CREDO training curriculum will contribute to developing a strong, sustainable capacity in the countries that are the most vulnerable to outbreaks.

3P4

Sample size calculation in malaria non-inferiority treatment trials with outcome assessed by product-limit estimates of failure

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BACKGROUND The World Health Organization (WHO) recommend using Kaplan-Meier (KM) product-limit estimate of time-to-event for the assessment of antimalarial treatment efficacy. This approach is attractive because all patients' data are accounted for within the underlying statistical model for as long as they are on study and up until such time that they meet an endpoint or they drop out (and are henceforth censored). With the availability of effective treatments, the non-inferiority design has become increasingly popular for randomized comparative trials (RCTs). This research intends to address the specific methodological challenges posed by the combination of non-inferiority design and survival analysis for sample size in power calculation.
METHODS Four non-inferiority RCTs were identified from the literature which used the KM method as secondary analysis. Sample size was recalculated as if the survival analysis was the primary analysis in a non-inferiority context with the aim to evaluate the difference in required sample size. Simulations were then applied to estimate the sample size across a range of cure rates and proportions of dropouts.
RESULTS The original sample size underestimated by 18%, 54%, 63% and 78% the recalculated sample size. The recalculated power for the original study sample size was 72% and 26% instead of the planned 80% for two studies, and 51% and 53% instead of the planned 90% for the other two. The sample size for low (5%) to high (25%) dropout rate was estimated for each success rate comparison. The requirement for the KM-calculated sample size meant an increase of 11–14% in sample size depending on success rate in the comparator arm (90–95%) and difference in success rate (5–30%).
CONCLUSION In non-inferiority designs in the presence of losses to follow-up, calculations for a difference in proportions underestimate by 18–78% the sample size required for survival analysis. Simulations based on similar assumptions between proportions and survival designs showed also underestimations although somewhat smaller. Adjustments should be made at design stage to preserve the power of non-inferiority studies.

3P5

Validating and promoting 'rapid ethical assessment' as a practical method for enhancing ethical conduct of tropical disease research projects in developing countries

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INTRODUCTION Universal biomedical principles provide overall guidance for all settings. However, ethical issues in specific communities vary subject to ethno-cultural contexts. Array of research have emphasized on the need for special attention to how universal ethical principles are applied to research projects in the developing world. Research on Neglected Tropical Diseases (NTD) is often conducted among socio-economically vulnerable group of the community with needs for higher standards for ethical sensitivity. Rapid Ethical Assessment (REA) is a kind of rapid ethnographic tool employed at the beginning of medical research to explore and address context specific ethical issues. The tool is believed to enhance the ethical conduct of research in such socio-economically vulnerable population.
AIM To validate and disseminate the REA tool for further use in NTD related research in Ethiopia and in so doing build local capacity in conducting REA for NTD in Ethiopia including system integration and policy advocacy.
METHODS Pilot REA studies were conducted in NTD research projects, in Ethiopia, in multi-ethnic and multi-cultural settings. REA tools were validated by introducing the REA approach to a selected ongoing NTD research project in Ethiopia. The project targets socio-economically vulnerable study participants as well as stakeholders of NTD research in Ethiopia. REA methods employing qualitative approaches will be used to collect data from research stakeholders in order to map out ethical issues.
RESULTS REA helped in identifying a range of ethical issues pertaining to the conduct of NTD research in a low-income setting in a vulnerable populations group. Issues such as conception of research, stigma, and expectations of participants were important issues identified. Flexibility of REA tool allowed its use in a range of settings. The tool was found to be feasible, affordable and acceptable. The tool is found useful to identify important context-specific ethical issues and contextualizing consent processes for community-based medical research.
CONCLUSION Given clear strategic guidelines, REA is a highly useful approach to identify important ethical issues in research conducted in the Ethiopian context. The approach is recommended for further dissemination coupled with continued documentation and validation. Validated REA tool for NTD research will be disseminated for further use.

Abstracts

3P6
Usefulness of PET-CT for the diagnosis of tuberculosis

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INTRODUCTION Molecular imaging FDG-PET/CT has been extensively allowing accurate measurement of oncologic burden. In tuberculosis (TB) FDG-PET/CT has been poorly studied.
OBJECTIVE To describe the FDG-PET/CT findings in TB patients and to correlate the findings of the FDG-PET/CT with the clinical outcomes.
METHODS A retrospective study was conducted at the Vall d'Hebron University Hospital from May 2010 to May 2015 were revised. We selected adult patients who had a FDG-PET/CT performed within the two months prior to TB treatment.
RESULTS 504 patients were diagnosed of TB. Forty seven (9.33%) had a FDG-PET/CT. The main reason for the realization of the FDG-PET/CT was characterization of pulmonary nodule (51.1%) and study of fever of unknown origin (25.5%). Median age was 64 (IQR 50–74) years and 31 (66%) were male. More than half of the cohort (55.3%) had an immunosuppressant condition. 28 (59.6%) of patients were diagnosed of pulmonary TB. A success outcome was achieved in 85.1% of the patients, 1(2.1%) patient was transfer out, 2 (4.2%) patient had a TB-related death and 4 (8.5%) patients had a non TB-related death. All patients, except 2, had an abnormal FDG-PET/CT. In the FDG-PET/CT 48.8% of the patients had more than 1 organ affected. Median SUVmax of the main affected lesion was 8.3 (IQR 3.57–13.53). The median SUVmax of the biggest affected lymph node was 10.4 (IQR 5–17.8). Patients with immunosuppression did show higher uptake of FDG in the SUVmax of the main lesion (11.44 vs. 6.72; $P = 0.02$). We found that patients treated with therapies longer than 6 months had a SUVtotal higher than patient treated for the standard 6 month therapy (43.72 vs. 13.56; $P < 0.001$).
CONCLUSION FDG-PET/CT is an accurate test to measure TB burden, even in inmunosuppressed patients. FDG-PET/CT may assist in the evaluation of the treatment response and even to identify patients with low burden of disease that may benefit from shorter regimens.

3P7
Herbal antimalarial, *Azadirachta indica*, decreases blood pressure and heart rate in Sprague Dawley rats

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INTRODUCTION Water extract of Azadirachta indica (Neem) leaf is ingested in many parts of Nigeria as an antimalarial and research has shown that Gedunin, a constituent of the herb is both gametocidal and schizonticidal against Plasmodium falciparum.
AIM The study was designed to evaluate the effects of three preparations of the herbal antimalarial, Azadirachta indica, (Water Extract, Neem Tea, and Acetone Extract), at normal and at high doses on cardiovascular functions of Sprague-Dawley rats.
METHOD Twenty eight (28) male rats were randomly assigned into seven groups of 4 animals each. Control (CTL), Water Extract Normal (WEN), Water Extract High (WEH), Neem Tea Normal (NTN), Neem Tea High (NTH), Acetone Extract Normal (AEN), and Acetone Extract High (AEH). Herb preparations were orally administered for ten days after which the animals were anaesthetized and systolic blood pressure, diastolic blood pressure, and heart rate of the animals were determined via an intra-femoral artery canula connected to Grass polygraph through a pressure transducer. Pulse pressure and Mean Arterial Pressure were calculated and data analysis was by one way analysis of variance supported by Newman-Keuls test, when pair wise comparison was done between groups.
RESULTS The extract decreased the systolic blood pressures, diastolic blood pressures and the heart rates of animals in all groups compared to the control, with the decrease being significant in many of the groups ($P < 0.05$). No consistent variations were seen with the different preparations and dosing.
CONCLUSION The blood pressure and heart rate lowering effects of the Neem extract, in addition to its antimalarial effect, could be of clinical benefits especially in resource limited tropical countries.

3P8
Biological confirmation of a Cholera epidemic in the Democratic Republic of the Congo, 2016

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INTRODUCTION The DRCregularly experiences recurrent cholera outbreaks; with endemic-epidemic patterns in the east and epidemic patterns in the west of the country. Thus, the observed varying magnitude ofcholera epidemics may be based on disease spread from endemic-epidemic source zones. This is especially true when equilibrium is broken in the source zones, and proper control and surveillance measures are not followed.
METHODS Stool specimens were collected from patients in 17 provinces in DRC with a suspected case of cholera according to the standard case definition and shipped using 'Carry Blair' to the National Public Health Laboratoryfor culture and serotyping.
RESULTS In 2016, 17of the 26 provinces (65%) in the DRC reported 28 333 suspected cases of cholera to the Direction for Disease Control (DLM). Among those, 1264 (4%) had stool samples collected, 13 provinces had confirmed positive samples.

In provinces with positive samples, the confirmation rate varied between 7–34% (mean 20% (253/1264)), depending on provincial location; 7%(1/15) Ituri, 7%(7/103) Ecuador, 13% (5/38) Haut Katanga, 15% (7/46) Mongala, 19% (5/27) Maindombe, 20% (3/15) Nord Ubangi, 21% (89/430) Nord Kivu, 21% (52/245) Tanganyika, 23% (40/173) Tshopo, 26% (7/27) Maniema, 29% (23/80) Kinshasa, 30% (3/10) Sud Kivu, and 34% (10/29) Kongo central.

Two serotypes were identified. *Inaba* was identified in all 13 provinces with positive samples (76%) and *Ogawa* was identified in three provinces (Tanganyika, Maniema and Tshopo).
CONCLUSION The cholera epidemic was confirmed in 13 provinces by identifying *Vibrio cholera O1*, serotypes *Inaba* and *Ogawa*. However, the proportion of specimens sent to the

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National Public Health Laboratory for confirmation was low. Further, the low confirmation rate can be explained by both low specificity of clinical case definition and the poor sampling conditions.

3P9

Implication of using the GeneXpert for the detection of STIs in pregnant women in Kisantu Health Zone, DRC

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INTRODUCTION The global prevalence of STIs is increasing, especially in low-income countries. However, most low-income countries rely on syndromic testing for diagnosis, which can be problematic, as over 50% of cases in women may be asymptomatic. In Kinshasa, DRC, syndromic STI prevalence increased from 6.1% to 15.9% between 2007 and 2014 among women 15–45 years old. The detection of STIs using available detection for rapid diagnosis, including the GeneXpert could lead to improved management and treatment.
AIM The objective of the study was to determine if use of new technology could be effective in a resource limited setting to increase disease management.
METHODS We conducted a cross-section study in pregnant women attending antinatal clinics in Kisantu health zone in DRC. Questionnaire and vaginal swabs were collected by trained clinic staff, who also observed if there were any symptoms of STIs. Samples were testing using a combination *Chlamydia trachomatis/Neisseria Gonorrhea* and single *Trichomonas Vaginosis* GeneXpert test, which is a PRC-based technology – which provides an in vitro diagnosis for DNA detection of the analyte. Currently, GeneXpert are used in resource-limited settings, including DRC for Tuberculosis diagnosis.
RESULTS Of the 352 women enrolled, we observed symptomatic infection in 10. Of those, 5 were found to be positive for at least one STI. Additionally, we identified 50 women who were considered asymptomatic to be positive for an STI.
CONCLUSION Based on our findings, additional asymptomatic women were identified and treated before giving birth. Thus, this technology could help improve diagnosis and break the transmission chain quicker in resource-limited settings – if a stable power source and trained clinicians are available. However, further analysis should be completed to determine if this is a cost-effective solution.

3P10

Safety of rVSV Ebola vaccine, after 6 months follow-up, in adults: a phase I trial conducted in Lambaréné, Gabon

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INTRODUCTION The Centre de Recherches Médicales de Lambaréné (CERMEL) in Gabon, member of the 'VSV-EBola CONsortium' (VEBCON), evaluated safety and immunogenicity of the rVSVΔG-ZEBOV-GP vaccine in African volunteers from an area with previous Ebola outbreaks before its use during the last outbreak in West Africa(1).
AIM To report the safety profile of rVSV-ZEBOV at various doses in 115 healthy adults volunteers in Gabon.
METHODS From November 2014 to April 2015 we performed an open-label, dose escalation phase 1 trial to assess safety, side-effect profile, and immunogenicity of rVSV-ZEBOV. A total of 115 healthy adults both male and non-pregnant or lactating female volunteers aged 18–50 years old living in Lambaréné (Gabon) were included. Participants were allocated to five vaccine dose groups: 3×10^3 PFU ($n = 20$), 3×10^4 PFU ($n = 20$), 3×10^5 PFU ($n = 20$), 3×10^6 PFU ($n = 39$) and 2×10^7 PFU ($n = 16$). Here, we present data on adverse events (AE) and serious adverse events (SAE) between days 180 and 365 after vaccine injection (Day 0).
RESULTS From Month six to Month 12, the proportion of volunteers with AE as well as number and grade of AEs per volunteer were similar in the five groups. A higher total number of events occurred in the cohort 3×10^6 PFU, the largest group. Most symptoms were mild to moderate. No clinically significant laboratory changes were observed. Three events – two episodes of *P. falciparum* malaria and one snake bite – were graded as serious, because they required hospitalizations. Both SAE were judged as non-related to the vaccine and resolved without sequelae. None of the adverse events was related to rVSV-ZEBOV vaccine.
CONCLUSION Our results confirmed an acceptable profile of safety and tolerability of rVSV-ZEBOV up to 12 months of follow-up. In order to investigate possible late-stage safety signals follow-up period of the study was extended to 5 years. Integrating data (assessment until 60 months) from all the VEBCON study sites is the next key step allowing a final conclusion about safety of rVSV-ZEBOV.
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3P11

Introducing single dose liposomal amphotericin B for the treatment of visceral Leishmaniasis in Nepal: an experience to support ongoing elimination programme

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INTRODUCTION Visceral leishmaniasis (VL) elimination is a priority programme of Government of Nepal. Early diagnosis and complete treatment is one of the important elements in the elimination strategy. The national strategic guideline for VL elimination programme in Nepal has introduced single dose Liposomal Amphotericin B (sLAmB) for the treatment of VL in Nepal. sLAmB has introduced in Nepal in January 2016 with the support from WHO Nepal. The treatment of VL with LAmB is free of costs in at public health system in Nepal.
AIM To assess the acceptability and feasibility of sLAmB to patients and healthcare providers.
METHODS We used a mixed method research approach combining quantitative and qualitative methods which includes direct observations during drug administration of drugs and open interview with patients and healthcare providers. Focus group discussions were conducted with the treating physicians and other health care providers at five treating health facilities, and review of patient's medical records were done. Data were collected using semi-structured questionnaire and direct observation at health facilities using pre-designed checklist. All interviews and discussions were audio recorded and the transcripts thematically were analyzed with the software QSR NVivo.
RESULT Single dose Liposomal Amphotericin B for the treatment of VL have demonstrated high satisfaction level in VL patients and healthcare providers, less adverse events, short duration of hospital stay and less out-of-pocket expenditure. Healthcare providers are committed to use sLAmB; existing government hospital facilities favors the roll out but further strengthening is required, particularly for training to healthcare providers for preparation and infusion of drug, drug storage below 25°C, refrigerators, and monitoring adverse events.
CONCLUSION The introduction and roll out sLAmB for the treatment of VL, has been welcomed and well accepted by physicians, programme and patients.However, capacity building of healthcare providers and strengthening of the government infrastructure, regular supplies of drugs and accessories is essential to support ongoing elimination programme in Nepal.

3P12

The potential impact of splenectomy in treatment of visceral Leishmaniasis in a multi-experienced HIV-coinfected patient

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INTRODUCTION Immunovirological restoration following the introduction of antiretroviral treatment (ART) has reduced incidence of visceral leishmaniasis in HIV-subjects. Nevertheless in severely immunocompromised patients the coinfection provokes a vicious cycle responsible for maintaining immunosuppression status. Guidelines of Opportunistic Infections in HIV suggest secondary prophylaxis till CD4 T cell-count (CD4+)>350 cell/mcl[1]. Splenectomy has never been considered a solution for leishmaniasis according to risks correlated.
AIM In this abstract we report a case of a 54-years old HIV-Leishmania coinfected woman who achieved clinical and hematological response after splenectomy.
METHODS Our patient was infected with HIV since 1993 and with *Leishmania donovani infantum* since 1997. She was treated with pentavalent antimonial compounds, amphotericin B, pentamidine isethionate, interleukin-2 and in 2009 she started maintenance therapy with miltefosine. From 1999 patient received ART changing different regimens reaching negative viremia without exceeding 100 cell/mcl $CD4^+$ even with good percentage (50%); the last HIV regimen was DTG + DRV/R + MVC started in June 2015. In July 2015 she underwent splenectomy because of the high risk of rupture. From November 2015 she started pentamidine isethionate IV (15 doses-4 mg/kg) followed by fortnightly pentamidine isethionate and daily miltefosine.
RESULTS Splenectomy intervention was complicated by Pneumocystis pneumoniae. After pentamidine was started, patient did not complain any symptoms (fever, fatigue) neither developed any laboratory sign; in particular she restored blood count and $CD4^+$ (>500 cell/mcl). Nevertheless she did not achieve complete recovery of leishmaniasis as demonstrated by PCR Leishmania 3.624.200 cp/ml in March 2017.
CONCLUSIONS This case report suggests to consider splenectomy in patients with leishmaniasis-HIV coinfection in whom there is no increase in CD4+ during ART and anti-Leishmania treatment. Following splenectomy the challenge is: immune reconstitution will be able to eradicate such an old infection or maintenance therapy will be necessary due to imbalance of T-helper response?
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3P13

Low probability for Zika virus (ZIKV) circulation in pregnant women from Madagascar in 2010 and evidence for cross-reactivity in malaria infected individuals leading to false positive anti-ZIKV IgG ELISA tests

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INTRODUCTION ZIKV gained global attention after its introduction into Brazil most likely in 2013 and subsequent rapid spread in the Americas starting in March 2015, however it was endemic in East Africa already before this large epidemic. It is yet unknown, if it also circulates in the human population of Madagascar. When assessing antibody prevalence in a human population one has to carefully consider the expected number of false positives in a population sample due to the test specificity being lower than 1.
AIM To assess if ZIKAV antibodies were prevalent in plasma samples from Madagascar indicating circulation of the virus in

the human population and assess the potential association between malaria infections and anti-ZIKV IgG ELISA test positivity.
METHODS We investigated 1216 plasma samples from healthy pregnant women collected in 2010 in six different cities at the coast and in the highlands of Madagascar using EUROIMMUN ZIKV IgG ELISA in order to assess the presence of ZIKV antibodies.
RESULTS Six of the 1216 plasma samples were anti-ZIKV IgG ELISA positive, however we assume that these were false positives due to the test specificity being lower than 1 or cross-reactivity with malaria.

Of 433 samples from coastal cities, two of four anti-ZIKV IgG ELISA positive samples were positive for *P. falciparum* (50%), compared to 73 (17%) of the remaining 429 anti-ZIKV-antibody negative samples (prevalence ratio 2.9, 95% Confidence Interval (CI) 1.1–8.0).

Of 783 highland samples, two were anti-ZIKV IgG positive and also positive for *P. falciparum* (100%), compared to 79 (10%) of the 781 anti-ZIKV-antibody negatives (prevalence ratio 9.9, 95% CI 8.0–12.2).
CONCLUSION The study results lead to two statements: First, the presence of ZIKV antibodies in pregnant women from Madagascar in 2010 is unlikely. Second, malaria parasites may interfere with anti-ZIKV IgG ELISA tests and may lead to false positive test results.

3P14
rHAT Sero-Strip, a new rapid diagnostic test for *gambiense* sleeping sickness using recombinant antigens

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INTRODUCTION *Trypanosoma brucei gambiense* human African trypanosomiasis (HAT) is a neglected tropical disease targeted for elimination. Commercially available rapid diagnostic tests of the first generation make use of native antigens purified from trypanosomes that are grown in laboratory rodents. The use of animals for antigen production can be avoided by replacing native antigens by recombinant antigens expressed in bacteria, yeast and other in vitro expression systems.
METHODS Based on the sequences of the genes that code for *T.b. gambiense* Variant Surface Glycoprotein LiTat 1.5 and Invariant Surface Glycoprotein 65, synthetic genes were constructed for expression in respectively *Escherichia coli* and *Leishmania tarentolae*. Both constructs contained a C-terminal His-tag for easy affinity chromatography purification on a Ni column. The purified recombinant rLiTat 1.5 and rISG65 were incorporated as capture reagents and as gold particle conjugate in an immunochromatographic strip format test. The test is run with one drop of whole blood, plasma or serum followed by four drops of chase buffer. The test results is scored by naked eye after 15 min reaction time. The diagnostic performance was tested on a collection of 100 *gambiense*-HAT patient sera and of 100 endemic control sera from the World Health Organization HAT Specimen Bank.
RESULTS AND DISCUSSION From the 100 patient sera, 94 scored positive. Among the 6 negatives, 5 were also negative in immune trypanolysis with Variant Antigen Type LiTat 1.3 and LiTat 1.5. From the 100 endemic controls, 98 scored negative. Among the 2 positives, 1 was also positive in immune trypanolysis with Variant Antigen Type LiTat 1.5 and not with Variant Antigen Type LiTat 1.3. Taking immune trypanolysis test as reference for the presence of *T.b. gambiense* specific antibodies in the test sera, the rHAT Sero-Strip shows an apparent sensitivity and specificity of 99%.
CONCLUSION Results obtained with the newly developed rHAT Sero-Strip on serum samples from the WHO HAT Specimen Bank are promising and warrant further evaluation of the test in the field.

3P15
Optimization of the Dna extraction and real-time PCR for low parasitemia *Leishmania* Infections

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INTRODUCTION Detection of low parasite levels can be challenging. In the context of a study on the prevalence of asymptomatic *Leishmania* infections in HIV-infected individuals in North West Ethiopia, we have optimized the DNA extraction and amplication to increase the sensitivity.
AIM To evaluate a manual and automated DNA extraction method and to compare the sensitivity of two real-time PCRs.
METHODS The manual minispin column-based DNA extraction (Qiagen) and the magnetic bead-based extraction with the LEV DNA kit on the Maxwell16 automate (Promega) were evaluated with two real-time PCRs targeting the small subunit ribosomal DNA (SSU) and the kinetoplast minicircles (kDNA) respectively on the Rotor-Gene Q cycler (Qiagen). The evaluation was performed on (i) serial dilutions of whole blood spiked with *Leishmania donovani* parasites; (ii) whole blood and bone marrow samples from visceral leishmaniasis (VL) confirmed patients of the University of Gondar Hospital, Ethiopia (n = 20) and of the Institute of Tropical Medicine in Antwerp, Belgium (n = 7); and 3) on whole blood of HIV-infected adults living in VL-endemic region in Ethiopia (n = 27). A PCR targeting the human Beta globuline (HBB) was used to evaluate the extraction efficiency and PCR inhibition. Cycle threshold (Ct)-values were used to interpret results with lower Ct-values corresponding to higher parasite DNA levels or to a more efficient DNA extraction and/or amplification.
RESULTS DNA extraction with the Maxwell showed better and more reproducible results when starting from 300 µl instead of 1 ml whole blood. The analytical sensitivity was at least 10 times higher with the Maxwell extraction compared to the Qiagen method. VL confirmed cases were more efficiently detected (decrease by 4 Ct-values) when extracted with the Maxwell16 automate than with the Qiagen method. Two of the 27 asymptomatic HIV-infected adults living in a VL endemic region were positive with both PCR methods. Ct-values were significantly lower with the kDNA PCR than with the SSU PCR in all samples tested.
CONCLUSION These results suggest that the Maxwell DNA extraction in combination with the kDNA PCR showed improved sensitivity to detect low parasitemia, and is the method of choice to diagnose asymptomatic *Leishmania* infections. The automated extraction method is easy to perform, and requires minimal hands-on time, resulting in standardized processing of samples and less risk of contamination.

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3P16

Cost-effectiveness analysis of new diagnostic tools for cutaneous leishmaniasis in Afghanistan

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INTRODUCTION Cutaneous leishmaniasis (CL) is responsible for chronic and disfiguring skin lesions resulting in morbidity and social stigma. The current diagnostic tools for CL are microscopywhich has low sensitivity, and PCR which has many requirements that hinder its implementation at peripheral levels. Thus, there is a crucial need for diagnostic tools that are highly accurate, easy to use, field-amenable and inexpensive in order to enable prompt diagnosis and treatment, such that morbidity, relapses and risk of anthroponotic can be reduced.
AIM The objective of this study is to evaluate the cost-effectiveness of two new point-of-care diagnostic tools: Loopamp™ *Leishmania* Detection Kit (Eiken Chemical Co, Japan) and CL Detect™ Rapid Test (InBios International Inc., USA), using a combination of microscopy and PCR as a reference.
METHODS Data were collected at the National Malaria and Leishmaniasis Control Program (NMLCP) health facility in Afghanistan through tailor-made questionnaires. The natural history of CL was represented through a Markov model, designed in TreeAge. Probabilistic analyses were run to account for parameters' uncertainty. Costs and DALYs were discounted at 3% per annum.
RESULTS Under the conservative approach (only one test is done at a time with LAMP), preliminary results from Monte Carlo simulations suggest a domination of the RDT over LAMP. The RDT has an associated cost of $68 USD [95% CI: 64.16, 72.26] and an effectiveness of 192 [CI 95%: 189.11, 196.84] DALYs, whereas the LAMP has an associated cost of $89 USD [CI 95%: 82.98, 94.67] and an effectiveness of 194 [CI 95%: 190.22, 198.06] DALYs. However, when relaxing the conservative approach and taking advantage of the diagnostic capacity of LAMP (e.g. 12 tests are done at a time) then this tool becomes more cost-effective than CL Detect™.
CONCLUSION The effectiveness of the tools (i.e. specificity: 100% and 94%; sensitivity: 65% and 92% for RDT and LAMP respectively) has little influence on the results; the associated DALYs to each tool are relatively similar. Instead, the costs are the main drivers of this cost-effectiveness analysis.

3P17

Accuracy of a rapid test for the diagnosis of cutaneous leishmaniasis in patients with suggestive skin lesions in Morocco

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INTRODUCTION In Morocco, cutaneous leishmaniasis (CL) is caused by *Leishmania tropica*, *L. major* or *L. infantum*. The diagnosis in patients with skin lesions is often based on clinical grounds. This clinical diagnosis can be confirmed through microscopic identification of parasites after Giemsa stain, but this test is only available in provincial and hospital laboratories. A rapid diagnostic test (RDT) for CL has recently become available.
AIM The aim of this study is to estimate the diagnostic accuracy of the RDT for CL.
METHODS Study participants with lesions suggestive of CL are consecutively recruited in ten health centres located in five CL-endemic provinces. The RDT under evaluation is the CL Detect™ Rapid Test (InBios, USA). For each patient, one dental broach sample and four skin smear samples are taken from a single lesion. The skin smear samples are sent to provincial laboratories for microscopy testing and to reference laboratories in Morocco and Belgium for PCR testing by ITS1/RFLP and Heat shock protein (HSP70) genotyping. Readers of index and reference tests do not have access to clinical information or results of other tests. Sensitivity and specificity of the RDT are computed in comparison to a composite reference standard defining CL cases as patients with positive skin smear and/or PCR results. Between-reader reproducibility of the RDT is assessed on a sub-sample.
RESULTS The study started in December 2016 and aims to recruit 240 patients. By the end of February, 135 participants had been enrolled, and 86 (64%) of them were classified as CL cases: 40 had positive microscopy and positive PCR results, 30 had positive microscopy only and 19 had positive PCR only. The sensitivity of the RDT was 66% (95% confidence interval: 58–74) and the specificity 98% (95% confidence interval: 95–100).

For 20 randomly selected participants, two independent readers performed the RDT. The inter-observer agreement was substantial (90%; kappa statistic = 0.78).
CONCLUSION The CL RDT could be a useful addition to the clinical case management especially in isolated localities far from provincial laboratories. However, ways to improve RDT sensitivity should be explored after investigating the importance of infecting species in the positivity of the results.

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3P18

Comparison of two Zika virus serological techniques and the influence of previous dengue infection for the screening of asymptomatic pregnant women in a reference centre in Barcelona

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INTRODUCTION Zika virus (ZIKV) infection in pregnant women has causal relationship with microcephaly among newborns. Pregnant women with possible exposure to ZIKV should be screened. Catalan Health Agency control and surveillance protocol includes detection of IgM and IgG antibodies in this population. On the other hand, ZIKV share endemic regions, many symptoms and some antigens with other flavivirus like dengue virus (DENV) so the serological diagnosis has cross-reactions between them. All positive ZIKV serological results must be confirmed by a plaque-reduction neutralization assay (PRNT).
AIM The objective of this study was to compare two serologic techniques, indirect immnunofluorescence (IIF) and Enzyme-Linked ImmunoSorbent Assay (ELISA), for ZIKV infection screening in asymptomatic pregnant women and assess the cross-reactions with IgG for DENV tested by chemiluminescence assay (CLIA).
METHODS Descriptive study done between February and September 2016 in Microbiology Department of the Hospital Universitari Vall d'Hebrón, Barcelona. All women who had risk of exposure to ZIKV were included. IIF, automated ELISAs and CLIA were performed following manufacturer's instructions. Positive sera for ZIKV were sent to the Microbiology National Reference Centre in Majadahonda, Madrid, to be confirmed by PRNT.
RESULTS A total of 212 sera were tested for ZIKV. In 24 sera, IgG results were positive and 111 were negative for both techniques. In 77 sera, IgG were positive by IIF and negative by ELISA, while none of the positive sera by ELISA were IIF negative. Among IgM results, 207 were negative for both techniques, four sera were positive by IIF and negative by ELISA and one serum was positive by ELISA and negative by IIF.

On the other hand, 206 sera were also tested for DENV (IgG), with 103 negative and 103 positive results. The comparative results between DENV and both ZIKV techniques are summarized in Table 1.

	ZIKV IgG IIF		ZIKV IgG ELISA	
	Positive	Negative	Positive	Negative
DENV IgG ELISA				
Positive	94	9	19	84
Negative	3	100	0	103

CONCLUSION ELISA has the advantage that is automated and more objective than IIF, so is easier to implement in laboratory routine. Moreover, ELISA has less cross-reactions with IgG for DENV.

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Diagnostic performance of the InBiOS rapid diagnostic test for the detection of *Burkholderia pseudomallei* in blood culture broth: results of a phase II evaluation study

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BACKGROUND *Burkholderia pseudomallei* is a severe community-acquired infection with a high case-fatality rate, requiring prompt diagnosis and treatment. InBiOS International (Inc., Seattle, USA) recently released a Lateral Flow Immunoassay RDT that detects *Burkholderia pseudomallei* specific antigens in blood, serum, urine and culture fluids. Subsequent to a successful pilot evaluation, we performed a phase II evaluation on an extended number of samples.
MATERIAL/METHODS This study was performed in the laboratory of Sihanouk Center of Hope (SHCH), a hospital in Phnom Penh, Cambodia where microbiological surveillance with blood cultures (BacTalert BioMérieux, Marcy L'Etoile, France) is implemented. Samples included stored blood culture broth grown with *B. pseudomallei* (n = 97) and other pathogens (n = 155), reflecting the most common blood cultures isolates (*Escherichia coli* (n = 22), *Salmonella* serotypes (n = 19), *Klebsiella* spp. (n = 15), *Staphylococcus aureus* and *Streptococcus species* (each n = 11)) and non-fermentative Gramnegative rods (n = 21), including *Burkholderia cepacia* (n = 6). Samples were assessed according to the manufacturer's instructions. Reading was done by two independent readers after 15 min and again after 60 min to scan for false appearing lines. Repeatability was performed on 51 samples.
RESULTS Diagnostic sensitivity and specificity were 95% [Confidence Interval (CI): 0.89–0.98] and 99% [CI: 0.96–0.998] respectively. Only one false positive test result (*Acinetobacter* sp.) was noted with a weak test line intensity. No invalid tests were noted and the background clearance of the RDT strips was satisfactory. Repeated testing of 51 samples, all but one result (showing a faint test line in the case of *Enterococcus sp*.) were identical. Test lines intensities within repeat testing did not differ by more than 1 category of line intensity (faint, weak, medium, strong), except for 1 (strong to weak). None of the tests read negative showed any appearing lines after 60 min.
CONCLUSIONS This phase II study confirmed the results of the pilot study of the InBiOS RDT that showed a high accuracy for detection of *B. pseudomallei* antigens in blood culture broth. Prospective testing on large numbers of fresh samples is planned to assess its implementation in the workflow of the diagnostic work-up of blood cultures at SHCH.

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Diagnostic accuracy of point-of-care circulating cathodic antigen, formalin-ether concentration and Kato-Katz techniques for *Schistosoma mansoni* infection in Niono, Mali

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INTRODUCTION There is a pressing need for point-of-care (POC) rapid diagnostic tests (RDTs) with high accuracy for the detection of pathogens giving rise to digestive disorders. In Mali, intestinal schistosomiasis remains a considerable public health problem. Accurate RDTs hold promise for an improved individual patient management and for epidemiological surveys.
AIM To assess the diagnostic accuracy of a urine-based POC RDT detecting a circulating cathodic antigen (CCA), which is found in patients with *Schistosoma mansoni*, in comparison to stool-based microscopy (duplicate Kato-Katz thick smear and formalin-ether concentration technique (FECT)).
METHODS In the frame of an international study on persistent digestive disorders within the NIDIAG project (www.nidiag.org), urine and stool samples from patients with persistent diarrhoea and/or persistent abdominal pain and from matched, asymptomatic controls were collected in Niono, Mali and subjected to (i) POC-CCA urine cassette test; (ii) FECT; and (iii) Kato-Katz. Duplicate Kato-Katz thick smears were considered as diagnostic reference standard for the calculation of sensitivity, specificity, positive predictive value (PPV) and negative predictive values (NPV) of POC-CCA and FECT. Infection intensity was assessed using faecal egg counts (FECs).
RESULTS Among 517 symptomatic cases, the overall prevalence of *S. mansoni*, as assessed by POC-CCA, FECT and Kato-Katz was 80.7%, 64.0% and 63.8%, respectively. The prevalence was significantly lower in 525 asymptomatic individuals (POC-CCA: 59.1%; FECT: 25.7%; Kato-Katz: 26.3%). FECs revealed a higher number of moderate and heavy infection intensities in symptomatic patients. The sensitivity of the POC-CCA and FECT were 100% and 97.9%, respectively. Specificity was higher for FECT (95.7%; PPV: 97.6%; NPV: 96.2%) than for POC-CCA (53.5%; PPV: 79.1%; NPV: 100%). FECT showed an almost perfect diagnostic agreement with the Kato-Katz technique in both symptomatic cases and asymptomatic controls, whereas the agreement was moderate between POC-CCA and Kato-Katz.
CONCLUSION The POC-CCA RDT revealed a higher prevalence of *S. mansoni* compared to FECT and Kato-Katz in individuals with and without digestive disorders in Mali. In the absence of a highly sensitive reference standard, it remains unclear whether these positive POC-CCA results indicate 'true positives'. Further research is needed to corroborate the diagnostic potential of the POC-CCA test.

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Formulation and evaluation of quinine hydrochloride loaded ethosomes

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INTRODUCTION Ethosomes are soft, malleable lipid vesicles with the ability to permeate intact skin due to its high deformability. Nasal delivery in recent times has received a lot of attention as an alternative route to achieve rapid and non-invasive delivery of drugs via highly vascularized mucosa to the brain (circumventing the blood brain barrier) and the systemic circulation. Quinine administered parenterally and orally is used for treating cerebral and server malaria and uncomplicated malaria respectively. Parenteral drug administration is difficult to achieve in some rural areas in Africa where access to healthcare professionals may be challenging. Moreso, the oral route may not be convenient for some groups of patients.
AIM The aim of this research work was to formulate and investigate the intranasal delivery of quinine-loaded ethosomes as a more convenient route of administration quinine for the treatment of cerebral, server and uncomplicated malaria.
METHODS Ethosomes containing quinine were formulated using 30% and 50% ethanol, Phospholipon 90H® (2%W/V) and Tween 80 (5.2%). pH stability study, encapsulation efficiency, *in vitro* release and *in vivo* studies were carried out on all batches of ethosomes. The results obtained from *in vitro* release analysis were fitted into mathematical models.
RESULTS Results from pH stability study showed a slight reduction in pH after 2 months. All batches of quinine-loaded ethosomes showed high encapsulation efficiencies (57.68–83.13%). *In vitro* release analysis of all formulations showed sustained release of drugs with an initial burst release within the first 30 min. Lag periods were noticed in all formulations between the 4th and 5th h. Release kinetics of formulations revealed a zero order drug release for all the formulations. *In vivo* evaluation of ethosomes and commercial administered intramuscularly showed a significant decrease in parasitaemia ($P < 0.05$). On the other hand, ethosomes and commercial formulations of quinine could not reduce parasitaemia level when administered through the nasal route.
CONCLUSION Quinine-loaded ethosomes were successfully formulated and achieved sustained release of drugs with significant clearance of parasitaemia when administered intramuscularly but not intranasally.

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Antibiotic stewardship programs in hospitals in low-and middle income countries: current status, priorities and barriers

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INTRODUCTION Antibiotic stewardship (ABS), is one of the key objectives of the World Health Organisation's Global Action Plan to contain antibiotic resistance. Hospitals in low-and middle income countries (LMIC) are urged to take action and set up ABS programs.
AIM We assessed the current status, the priorities and the barriers of ABS programs in hospitals in LMIC.

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METHODS We performed a cross-sectional observational study using an online survey targeting medical doctors, microbiologists, pharmacists and nurses working in hospitals in LMIC. The survey was available in English, French and Spanish. After validation of its completeness, dynamic and face validity, the survey was distributed between 1 December 2016 and 31 January 2017 using non-probability sampling (purposive and snowball). We report proportions with the Wilson 95% confidence interval in brackets.
RESULTS A total of 340 surveys were eligible for analysis. Of the respondents 53.5% were medical doctor, 25% microbiologist, 13% pharmacist and 8.5% nurse. The majority (54%) worked in a low-income country (LIC), 27% in a lower-middle income country and 19% in an upper-middle income country; most worked in a tertiary hospital (52%).

An antibiotic committee was present for 35%(30–40) of respondents; 61%(56–66) had a bacteriology laboratory within the hospital and microbiology surveillance reports were made at least once yearly in 39%(34–45); 75%(70–79) had a hospital pharmacy and antibiotic surveillance reports made at least once yearly in 26%(21–31). The following ABS activities were reported: education on ABS 35%(30–40); restricted antibiotic use 47%(42–53); audit and feedback 47%(42–53); guidelines for empiric treatment 55%(49–60) and for surgical prophylaxis 60%(55–65). Respondents from LIC reported the lowest number of ABS activities.

Respondents expected most effect from antibiotic treatment guidelines (77% (72–81)), education (62% (56–67)) and guidelines on specimen collection (46% (41–52)).

Healthcare staff's lack of awareness of the importance of ABS, lack of acceptance of ABS from the prescribers/ hospital staff and lack of experts to perform ABS were considered the most important barriers by resp. 61% (53–67), 61% (53–67), 58% (51–65) of respondents.
CONCLUSION The majority of hospitals in LMIC lack ABS activities. Education and guidelines are considered the main way forward and lack of awareness, acceptance and experts the main barriers.

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Improving basic hygiene among health care workers through Ebola-training: a field perspective

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INTRODUCTION During the recent West African Ebola-outbreak health care workers (HCW) were at higher risk of infection, as prevention and control measures were insufficient outside specialised Ebola care centres (ECC). Burkina Faso, although not affected, was classified by WHO as a highest priority country. The EFFO-project (Efficient by Edification) prepared first line HCW for the temporary management of suspect Ebola-cases until referral to an ECC. The project was conceived as a transcultural train-the-trainer program ranging from basic hygiene to barrier nursing and triage and isolation. Participating health services received training, basic hygiene and high protection kits, and follow-up assessments.
AIM To assess the effect of Ebola-training on practice of basic hygiene among Burkina Faso HCWs.
METHODS Ten local trainers, all medical doctors, received technical and didactic training and supervision. Between December 2014 and December 2015 these trainers held twenty four 3 – day training workshops with 425 HCW attending from 117 health services, including 72 health centres, 17 District and 9 Regional Hospitals. Participant knowledge was assessed with a written multiple choice test prior to and following each workshop. Follow-up visits were conducted in selected health services and HCW knowledge and implementation of basic hygiene measures recorded using a semi-structured guideline.
RESULTS HCW knowledge about Ebola increased directly after training, with 93% correct case definitions at follow-up, and two-thirds demonstrating best practice hand hygiene. Approximately half of health services visited could provide hand washing facilities for patients/visitors, and only a half had provision for temporary isolation. Most centres practiced some waste separation and incineration.
CONCLUSION The Ebola threat raised HCW awareness for potential infection risks associated with patient contact, as well as for the importance of basic hygiene for prevention. Best practice standard precautions require emphasis and regular supply and follow-up of health staff.

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Clinical mentoring via mobile teams – a new approach to visceral Leishmaniasis care in resource-constrained settings in Africa

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INTRODUCTION KalaCORE is a DFID-funded initiative aiming to reduce health impact and economic burden of visceral leishmaniasis (VL) in 6 highly endemic countries by ensuring access to early diagnosis and complete treatment. In Africa, VL puts high demands on the health system due to the complex diagnostic tree, long treatment courses requiring hospitalisation and frequent clinical complications due to the high prevalence of co-morbidities: malnutrition, anaemia, diarrhoea, pneumonia, malaria, HIV, and tuberculosis. VL occurs in settings where a lack of well-trained personnel and a high staff turn-over are common.
AIM Introducing clinical mentoring to improve the quality clinical care for VL in a hospital setting in East Africa.
METHODS Clinical mentoring teams consisting of a clinician, one or two nurse(s) and a laboratory technician are deployed in South Sudan and Ethiopia to visit VL treatment facilities (implementation in Sudan is planned). Additionally, a phone number ('hotline') is available 24/7 to health workers for clinical and other queries.
RESULTS In South Sudan, two teams responded to outbreak rumours and provided VL care in remote and often highly insecure settings where in some cases barely the most basic health services were available. In 95 mentoring visits between February 2015 and October 2016, 60 facilities were supplied with VL drugs and/or diagnostics where needed, and bedside teaching and training addressed clinical skill gaps for more than 150 health workers.

In Ethiopia, three teams performed 44 mentoring visits to 18 health facilities in 5 endemic regions between June and November 2016. Shortcomings were found in all aspects of care: clinical and laboratory practices, nursing, reporting, VL supply gaps and

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absence of guidelines, SOP's and diagnostic and clinical algorithms. Findings were discussed on-site and bedside mentoring and training were provided where needed. Problems were documented in detail and followed up in next visits.
CONCLUSION Clinical mentoring improves diagnostic and clinical skills of field staff in remote and resource-poor settings, addresses stock gaps and is expected to positively impact patient care and treatment outcome, It is therefore essential for strengthening VL control programs in the East African setting. Sustainability can be achieved by eventually identifying local clinical mentors within health facilities, similar to WHO's recommendations for clinical mentoring in HIV programs.

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Chronic multi-morbidity among Bangladeshi adult population

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INTRODUCTION Increasing number of patients with multimorbidity (presence of multiple chronic conditions in an individual) is a growing global concern. These chronic conditions challenge the health system's capacity and exacerbate economic burden at individual level. Despite the relative importance, global attention to this issue remains sparse including Bangladesh.
AIM This study aimed to explore the current situation and analyse the key determinants of chronic multimorbidity in Bangladesh.
METHODS Result of this study derived from 12 338 individuals above the age of 35 years, the sample was selected using a stratified multi-stage clustered random sampling strategy, we first report on the distribution and prevalence of such cases followed by results (crude and adjusted odds ratios) from a logistic model exploring the determinants of such conditions.
RESULTS Overall, we find approximately 8.4% of our population to suffer from multimorbidity, where the presence of hypertension (30.1%) and diabetes (10.6%) represent the highest prevalence rates. Mean age of the population suffering from multimorbidity is 58.6 years (men: 61.1 years and women: 56.5 years). Gender differentials for men versus women are found to be 7.7% vs. 8.9%. People of the highest economic status and with higher education level are more likely to report multimorbidity. The likelihood of the condition is nearly double among those who are overweight or obese (BMI $\geq$ 25) (15.8% vs. 7.1% for the overweight/obese and normal BMI range respectively.) People, who reported average to high physical activity have a lower risk (AOR = 0.54) of suffering from multiple chronic conditions. After adjusting for all covariates, higher age, higher educational& economic status and higher BMI were found to be significantly associated with multimorbidity.
CONCLUSION There is no satisfactory documentation of its risk factors and effective preventive measures of multimorbidity. A further and more detailed exploration is urgently needed to meet the health care need of the aging population and to adopt efficient strategies to improve quality of life in the adult and elderly population.

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Prevalence of selected cardiovascular risk factors in ART-naïve HIV infected patients in Lilongwe, Malawi

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INTRODUCTION Non communicable diseases such as cardiovascular diseases are increasingly recognized as an important health issue in resource limited countries and as co-morbidity of people living with HIV (PLWH) surviving HIV due to access to antiretroviral therapy. According to the 2009 Malawi national STEPS survey, arterial hypertension (32.9%), overweight (21.9%), and smoking (14.1%) were identified as the leading non-communicable diseases among participants from the general population.
AIM As part of the ongoing prospective LighTen Cohort Study (ClinicalTrials.gov NCT02381275) we aimed at determining hypertension prevalence as well as easy to detect cardiovascular risk factors in ambulatory HIV$^+$ patients prior to starting antiretroviral therapy in Lilongwe, Malawi.
METHODS BP values of patients (age $\geq$18 years) who consented to participate in the study were documented in a standardized fashion together with data concerning overweight (BMI $\geq$25 kg/m^2), obesity (BMI $\geq$30 kg/m^2), diabetes mellitus, smoking and known hypertension or antihypertensive medication. Definite arterial hypertension was defined as treated controlled or uncontrolled hypertension or BP $\geq$140/90 mmHg independent of a hypertension history during $\geq$2 measurements on $\geq$2 occasions within 8 weeks after inclusion into the study.
RESULTS Data from 1387/1415 HIV+ patients (794 females, 593 males, mean age 36.0 $\pm$ 9.3 years) were analyzed, however, BMI was available for only 1364 patients. Hypertension (7.7% vs. 7.1%; $P = 0.014$), overweight (27.9% vs. 14.9%; $P < 0.000$), and obesity (18.1% vs. 3.4%; $P < 0.000$) were significantly more common in women while smoking was the leading cardiovascular risk factor in men (17.4% vs. 1.6%; $P < 0.000$). There was no significant difference in previously diagnosed diabetes (1.4% in women vs. 0.8% in men; $P = 0.216$). At least three cardiovascular risk factors were found in 23 men and three women, respectively.
CONCLUSION While the prevalence of hypertension was lower than in the general population there seems to be a need for specific lifestyle advice in this cohort of HIV infected patients. Systematic measurements of arterial blood pressure and risk factor assessment together with integrated patient instruction, education and treatment programs at HIV centers may be helpful in the prevention of cardiovascular disease in settings like Malawi.

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Epidemiology and clinical presentation of MERSCoV in Saudi Arabia: a systematic review

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BACKGROUND Middle East Respiratory Syndrome (MERS-CoV) is caused by a novel betacoronavirus (MERS) which was first reported in Saudi Arabia in September 2012. It is caused by

a corona virus called MERS-CoV. The disease resulted in severe respiratory illness and mortality rates ranging between 40–60%.
AIM OF THE WORK This systematic review analyses the clinical presentations of MERS-Cov infection in the Kingdom of Saudi Arabia.
DATA SOURCES AND STUDY SELECTION We searched for all relevant English language publications with the terms 'Middle East respiratory syndrome', 'MERS-CoV', and 'HCoV-EMC' individually and in combination with the terms epidemiology, transmission, clinical presentation, sequence. We searched MEDLINE, conference abstracts, Saudi Ministry of Health data, World Health Organization data and Centers of Disease Control data and statistics from 2012; references until 2015.
DATA EXTRACTION Two reviewers extracted information on study design, population characteristics, clinical characteristics, disease outcomes and assessed risk of bias.
DATA SYNTHESIS We included 139 studies published in Medline, 218 Saudi MOH, WHO and CDC notifications. As of 24 August, 2015, 1154 cases of MERS-CoV (67% of men and 33% women) were reported in KSA. The mortality rate was 43.5% (492 patients). 592 patients were managed and resolved the infection and 68 patient under treatment. The majority of cases (72%) are above 40 years, 25% are 20–40 years old, and 3% are less than 20 years. Early cases were clustered in the Eastern region, however by mid-2013 cases emerged in central and Western Saudi Arabia. Intrfamilial spread, occupational transmission for health care workers, exposure to camels were the identified modes of transmission. In 82% of cases, flu like symptoms and fever were initially observed. Positive cases showed progressive rise in fever, cough, and shortness of breath. Pneumonia, respiratory failure that requires mechanical ventilation and support in an intensive-care unit occurred in advanced cases. Gastrointestinal symptoms particularly diarrhoea, has been reported. Some patients developed renal failure and septic shock.
CONCLUSION More studies are required to elucidate the modes of transmission of MERS Cov. Interpersonnal transmission is an important risk factor particularly in familial abd hospital settings. Severe upper respiratory infection is the prominent clinical presentation.

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Correlation between cytokine profile and left ventricular function in chronic chagasic patients

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INTRODUCTION Chronic Chagas' heart disease (CCHD) is a dilated cardiomyopathy with chronic inflammation, usually in low intensity, but incessantly, that causes progressive tissue destruction and extensive fibrosis in the heart. Pro-inflammatory cytokines such as IFN-γ and TNF-α, anti-inflammatory such as IL-10 and IL-17 have a fundamental role in the immunopathogenesis of Chagas heart disease and its evolution. Interleukin 17 (IL-17) has been linked to the pathogenesis of several inflammatory activity, tumor, parasitic diseases and autoimmune diseases. Experimental data with *T. cruzi* infection suggests that IL-17 activity is highly correlated with a protective immune response in relation to the parasite.
AIM Evaluate the profile of Th1 and Th17 cytokines, the expression of interleukin 17 and interferon-γ in patients at different stages of the CCHD.
METHODS A cross-sectional study of 40 chronic chagasic individuals divided into stages according the Brazilian consensus of Chagas' disease (indeterminate form – 10 patients, cardiac form without left ventricular dysfunction – 12 patients, cardiac form with left ventricular dysfunction – 10 patients and digestive form – 8 patients) was conducted in outpatients division of the Clinical Hospital of the Federal University of the Triângulo Mineiro in Uberaba city, Minas Gerais State, Brazil. Serum analysis of IFN-γ, TNF-α, IL-10 and IL-17 and IL-17 and IFN-γ expression in three different situations (unstimulated, stimulated with *T. cruzi* antigen and stimulated with anti-CD3 and anti-CD28) were made.
RESULTS There was no difference in cytokines production between the groups (IFN-γ, $P = 0.6652$, TNF-α, $P = 0.1205$, IL-10, $P = 0.7273$, IL-6697). Lower serum levels of IFN-γ were detected among patients who used angiotensin-converting-enzyme inhibitors ($P = 0.0182$). Serum higher levels of TNF-α were detected among patients using amiodarone ($P = 0.0106$) and aldosterone antagonist ($P = 0.0187$). Serum TNF-α production had a negative correlation with left ventricular ejection fraction ($P = 0.0180$) and a positive correlation with left ventricular diastolic diameter ($P = 0.0880$). Both the production of serum cytokines and the expressions of IL-17 and IFN-γ did not correlate with left ventricular function.
CONCLUSION This study did not show correlation between the cytokine profile and IL-17 expression with left ventricular function.

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Cross-sectional analysis in young non-pregnant and pregnant women in Burkina Faso of associations between biomarkers of iron status and effect modification by inflammation and *P. falciparum* infection

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INTRODUCTION Iron deficiency is a major cause of anaemia and accurate biomarkers are needed to estimate iron status and its contribution to anaemia. Information is mostly available in children on adjustment and correction factors to nutritional biomarkers allowing for inflammation, but there are no previous comparative analyses of iron biomarker correlations in non-pregnant and pregnant women or the comparative effect modification by inflammation or malaria.
AIM In young non-pregnant and pregnant women living under endemic malaria transmission estimation of iron biomarker correlations, body iron stores, iron deficiency prevalence using single and multiple biomarker definitions, and effect modification by inflammation (measured by C reactive protein: CRP) and *P. falciparum* parasitaemia.
METHODS The data were derived from a randomised controlled trial of periconceptional weekly iron supplementation among young mostly adolescent nulliparous non-pregnant

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women and primigravidae living within the Nanoro Demographic Surveillance area, Burkina Faso. Data points were at the end assessment (FIN) survey for non-pregnant women ($N = 973$), and at the first scheduled antenatal visit (ANC1) for nulliparae ($N = 315$). Plasma ferritin, serum transferrin receptor, and CRP were measured in duplicate by ELISA, zinc protoporphyrin (ZPP) by fluorometry, and haematological indices by automated analyser. *P. falciparum* slide positivity and CRP cut-offs were used to define inflammation categories.
RESULTS At ANC1 69.7% were anemic (≤11 g/dl), and 53.7% parasitaemic, and at FIN 46.7% were anemic and 41.7% parasitaemic. Anemia prevalence was higher in non-pregnant ($P < 0.01$) and pregnant women ($P < 0.001$) with malaria. Prevalence of iron deficiency (sTfR/Log_{10}ferritin >5.6) did not differ in pregnant or non-pregnant women after adjustment for CRP values (<5 or <10 μg/ml), with or without *P. falciparum* parasitemia. High ZPP (>85 μmol/mol heme) was more frequent in non-pregnant or pregnant women (both $P < 0.01$) in the presence of inflammation.
CONCLUSION In pregnant or non-pregnant women living under endemic malaria transmission the sTfR/log_{10}Ferritin ratio >5.6 was not significantly affected by inflammation or concurrent malaria infection, and may be the preferred biomarker for estimating iron deficiency prevalence in areas with high infection pressure.

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The Global Point Prevalence Survey of antimicrobial consumption and resistance (Global-PPS): first results of antimicrobial prescribing in a tertiary care hospital in Guinea

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INTRODUCTION A uniform and standardized method for surveillance of antimicrobial use and resistance in hospitals was used to assess the quantity and quality of antimicrobial prescriptions at Donka National Hospital, CHU Conakry, Republic of Guinea (www.global-pps.com). BioMerieux provided unrestricted funding support for the survey.
METHODS A cross-sectional Point Prevalence Survey (PPS) was conducted in April 2015 including all adult and paediatric medical and surgical services. Detailed data were collected for all patients receiving anti-infective agents, present at 8:00 am on the day of the survey. Information was retrieved from the patient's medical and nursing records as well as the prescription books. Missing data was supplemented by information obtained directly from the professionals in charge of the patients. Denominator data included all admitted patients on the day of the PPS.
RESULTS Among adults ($n = 83$), 74.7% were on antimicrobial agents; 59.6% in medicine and 100% in surgery. All children ($n = 12$) and neonates ($n = 26$) received at least one antimicrobial. Antibacterials for systemic use were most often prescribed (81.7%), followed by antimalarials (8.1%) and drugs to treat tuberculosis (6.5%). Of all antibiotics, ceftriaxone was most often prescribed (22.4%), followed by ampicillin (17.8%); and metronidazole (16.4%) often prescribed in combination with ceftriaxone. Nearly all patients were treated for a community acquired infection (98%). No treatment was based on bacteriological data. Most antimicrobials were prescribed according to existing local guidelines (89.8%). Documentation of the reason of prescription was written in 89.9% of prescriptions, but a stop-review date was never documented.
CONCLUSION This study supports the excessive use of antimicrobials at the Donka National Hospital. There is a need to assess appropriateness of broad-spectrum antibiotic use. Organizational interventions would improve the use of antimicrobials in Guinea.

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Onchocerciasis associated epilepsy and blackflies in the Democratic Republic of the Congo (DRC)

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INTRODUCTION A high prevalence of epilepsy has been reported in many onchocerciasis endemic areas.
AIM To determine the prevalence of epilepsy in onchocerciasis endemic areas in the DRC and to determine the species complex of *Simulium* sp. transmitting onchocerciasis.
METHODS Between 2014 and 2017, epilepsy prevalence surveys were carried out in areas with a high level of onchocerciasis endemicity: 3 localities in the Bas-Uele, 24 in the Tshopo and 21 in the Ituri province. Blackfly larvae were collected from aquatic vegetation, rocks or crab bodies and adult flies by human landing catch or after incubation of mature pupa in emergence vials.
RESULTS Of 12, 408 people examined 407 (3.3%) were found to have a history of epilepsy. A high prevalence of epilepsy was observed in health areas in the 3 provinces: 6.8–8.5% in Bas-Uele, 0.8–7.4% in Tshopo and 3.6–6.2% in Ituri. Median age of epilepsy onset was 9 years. Different species of anthropophilic blackflies belonging to a vector complex were identified: *Simulium damnosum* in the Bas-Uele, *S. damnosum* and *Simulium neavei* in the Tshopo province. In the Logo health zone in Ituri, on the Lendu plateau west of Lake Albert, despite active searching we were unable to identify the vector. *S. vorax* larvae were found in rivers but no flies were collected actively biting humans. The Lendu plateau is historically a *S. damnosum* focus but the Albert lake shore of Uganda was a *S. neavei* focus. It may be that deforestation lead to the disappearance of the Albert lake onchocerciasis focus, and that seasonality plays a crucial role in the maintenance of *Simulium* populations. In Logo health zone 55.9% of persons with epilepsy had *Onchocerca volvulus* positive skin snips but an OV16 serosurvey among children 8–9 years old showed a prevalence of 7.8%, suggesting that there is currently limited transmission of onchocerciasis.
CONCLUSIONS The prevalence of epilepsy in onchocerciasis endemic regions in the DRC was 2-10 times higher than in most

non-onchocerciasis endemic regions in Africa. Different species of blackflies are responsible for onchocerciasis transmission in the DRC. In Logo health zone the vector transmitting onchocerciasis remains to be determined.

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Vitamin D related placental gene expression in women living in helminth endemic Gabon

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It is becoming increasingly clear that the propensity to develop allergies is determined not only by environmental but also by maternal factors to which the unborn is exposed in utero. Such factors include helminthic infections where an inverse correlation between infection and allergies is observed in people living in endemic countries. In this context, we previously demonstrated that experimental maternal infection with the tropical parasite *Schistosoma mansoni* during pregnancy leads to suppressed allergic airway inflammation in offspring. The underlying mechanisms were partly attributed to the inflammatory environment and cytokines such as IFN-g which were observed systemically as well as within the fetomaternal interface. Here, the vitamin D receptor (VDR) acts as an essential anti-inflammatory gatekeeper to ensure the maintenance of healthy pregnancy. Interestingly, during infection, we found the VDR to be strongly downregulated. Whether this observation is cause or consequence of the pro-inflammatory environment instigated by the systemic immune response towards the helminth is still unclear. To investigate whether maternal helminth infection in humans elicits similar effects at the fetomaternal interface, i.e. whether maternal inflammation is correlated with placental VDR downregulation, we initiated a pilot study. We compared inflammatory and anti-inflammatory placental gene expression between healthy German and healthy Gabonese women to determine an influence on placental gene expression by geographical or genetic factors. Gene expression levels of genes related to Vitamin D metabolism (VDR, Cyp27b1), immunologically important genes (e.g. IFN-g, IL-10) and pregnancy related genes (Hsd3b1) were analyzed. In addition, serum levels of Vitamin D, C-reactive protein and calcium serum levels from mothers and children at the time of birth were determined. Results from 22 German and 13 Gabonese mothers revealed distinct differences in placental gene expression and correlation patterns such as significantly lower VDR and Hsd3b1 expression in placentas of Gabonese women with enhanced levels of inflammation. Those results will be expanded by a larger cohort study in Gabon, to investigate the effects of helminth infection. In summary, these preliminary results indicate that the tight regulation within the fetomaternal interface could be indeed influenced by environmental or genetic factors whereby helminth infections might have an yet unknown impact.

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Frequency of *Taenia solium* antigen positivity in patients admitted for neurological disorders in the Rural Hospital of Mosango, Province of Kwilu, the Democratic Republic of Congo

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INTRODUCTION Neurological disorders account for an important proportion of hospital admissions in sub-Saharan Africa, but the etiological spectrum is poorly documented. There is evidence that cysticercosis is prevalent in both pigs and humans in several areas of the Democratic Republic of Congo (DRC).

AIM To investigate whether infection with viable Taenia solium cysticerci is present in patients admitted for neurological disorders in the Province of Kwilu, DRC.

METHODS From 2012 to 2015, a prospective clinical study was conducted by the consortium Neglected Infectious Diseases Diagnosis (NIDIAG) in the 350-bed rural hospital of Mosango, province of Kwilu. All consenting patients >5 years admitted with recent and/or ongoing (non-traumatic) neurological disorders were evaluated by a neurologist, submitted to a systematic laboratory workup and clinically followed-up until six months after discharge. Neither electroencephalogram nor neuroimaging was available in the study hospital. All available stored sera were in 2015 subjected to the B158/B60 ELISA detecting circulating *T. solium* cysticercus antigen. A test was considered positive if the ratio (optical density sample/cut off) was ≥1.0, and strongly positive when the ratio was ≥2.0.

RESULTS We enrolled 351 patients with neurological disorders (male: 46%; mean age: 39 years [range: 6–76]). The *T. solium* antigen assay was performed in 340 sera and was found positive and strongly positive in 43 (12.6%) and 19 (5.6%), respectively. Frequency of *T. solium* antigen positivity per presenting symptom was as follows: 13.7% (7/51) for altered consciousness; 13% (11/84) for seizure; 12.8% (11/86) for focal sensory-motor deficit; 12.2% (9/74) for behavior disturbance/cognitive decline; 11.3% (11/97) for gait/walking disturbances; and 10% (20/199) for severe headache. Symptoms often occurred in combination. Of the 60 tested patients who had a final clinical diagnosis of epilepsy, 9 (15%) and 6 (10%) had a positive and strongly positive *T. solium* antigen test result, respectively.

CONCLUSION Although no causal link between neurological symptoms and *T. solium* antigen test positivity can be established in the absence of neuroimaging, our study confirms that *T. solium* infection is endemic in the province of Kwilu and suggests that it may be associated with a sizeable proportion of neurological disorders.

Abstracts

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Treatment issues with acute schistosomiasis in a cluster cohort of 34 travelers infected in South Africa – an observational study

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INTRODUCTION The optimal treatment strategy of acute schistosomiasis is still controversial. During the early symptomatic phase, corticosteroids are given, but dose and duration are ill defined. In addition, early antiparasitic treatment with praziquantel may aggravate symptoms in up to 50% of cases and the optimal timing of administration remains unclear.
AIM To explore the optimal treatment schemes during in the early stages of primary infection with schistosomiasis.
METHODS Patients recently exposed to schistosomiasis were seen during the acute symptomatic phase (week 4–5) after infection and again during week 7–8. Patients presenting with fever at week 4–5 were given steroids (methylprednisolone 0.5 mg/kg) once daily for three consecutive days (=one cycle), and again when symptoms relapsed. All exposed patients, when asymptomatic, were given at week 7–8 praziquantel 40 mg/kg in two divided doses two hours apart, followed by a single dose of methylprednisolone 0.5 mg/kg two hours later. Patients developing fever under praziquantel were given an additional dose of steroids for one to three consecutive days.
RESULTS 32/34 (94%) travelers developed symptoms of acute schistosomiasis at a median of 25 (16–41) days after exposure. Diagnosis of *S. haematobium* infection was confirmed in 31/34 patients, and probable in one, by week 8. Out of 22/34 patients presenting with fever at week 4–5, 21 took steroids. Fever subsided sustainably after one cycle of steroids in 15/21(73%). Another cycle was given in 4, and a third in 2 because of fever relapse. At week 7–8, treatment with praziquantel and a single dose of steroids was given to all 34 patients. Of these, 30 developed none (21, 62%) of very mild and transient (9, 26%) symptoms. Four (12%) patients developed fever, and all took steroids, either a single dose ($n = 3$) or for 3 days ($n = 1$) with sustained remission.
CONCLUSION in acute symptomatic schistosomiasis, fever could be subdued with a three day course of steroids in a large majority of patients. Additional steroid treatment was successful when fever relapsed.

Early postsymptomatic antischistosome treatment with praziquantel was safe when given in combination with a single dose of steroids. Thereafter, additional steroid treatment is only occasionally needed.

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Epidemiological characteristics of snake-bite victims in Gadarif hospital, eastern Sudan

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BACKGROUND Snake-bites are well-known medical emergencies in many parts of the world and it is highly prevalent in rural areas.
METHODS Aiming to identify the epidemiological factors of snake bite we included 117 patients with a definitive history of snake bite and clinical features consistent with the presence of fang marks at the emergency department, Gadarif hospital, eastern Sudan from 1st January 2015 to 1st January 2016.
RESULTS The majority of these 117 patients were adult (86.3%) and male gender constituted 85.4%. Most of the patients were of rural residence (65.8%) and were involved in farming related activities (68.3%). A relatively high proportion of snake bite episodes happened in the afternoon times (53.9%) and half of the cases were reported during August (18%) and November (12.8%).

Lower limbs were involved in maximum number of cases (83.7%). The reported systemic reaction include: swelling (100%), sweating (100%), hypotension (54.7%), nausea (51.2%), vomiting (47.8%), local bleeding (13.6%), hymoptysis (1.7%) and neurotoxic symptoms (0.8%). In this study there were ten (8.5%) deaths; 7 had grade 3 and the other three patients had grade 4 Envenomation.
CONCLUSION Snake bites is a real medical threat in eastern Sudan thus it is very important to educate the native people to increase awareness about the risk of snake bites in particular among male, farmers and during the period from august to November.

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Health professionals and students' awareness of Chagas disease In Spain

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INTRODUCTION Chagas disease (CD) is a parasitic disease with a high public health impact and it is still largely unrecognized in Europe. Underdiagnosis of CD in Europe has three main component causes, related to: the population at risk (lack of knowledge about the disease, fear, stigma, barriers to access healthcare system); healthcare professionals (lack of training in tropical medicine, global health and cultural diversity in the consultation); and public health measures (so far, insufficient to address the challenge of detecting and controlling this emerging neglected tropical disease).
AIM To assess knowledge of CD among resident physicians and students of medicine and other health science disciplines in Alicante (Spain).
METHODS Cross-sectional observational study. Participants completed a 30-question survey about CD, focusing on five areas of knowledge: geographical distribution; routes of transmission; diagnosis; clinical presentation; treatment; and participants' opinion about some aspects of CD. Most of the questions'

responses were: 'yes,' 'no,' 'don't know.' Participants were recruited through three channels:

January 2016: sixth-year medical students at Miguel Hernández University (MHU) complete a web-based survey using the application tool *Google Spreadsheets*.

March 2016: during the celebration of the MHU 5th Meeting on Cooperation and Health, physicians, medical students and other health sciences students complete the questionnaire after the event.

May 2016, during a course on Immigrant Health aimed at residents in their last year of training as general practitioners.

RESULTS We compared three categories: medical students ($n = 48$), physicians ($n = 48$) and other health sciences students ($n = 41$). The results suggest a general lack of awareness across all groups. Nevertheless, some key aspects were well known among medical students and physicians, such as CD Latin-American endemicity and its asymptomatic character. Overall, CD awareness among medical students and physicians was similar, but physicians were more knowledgeable on some items.
CONCLUSION Lack of awareness among physicians could have a negative public health impact if CD is not recognized and appropriately treated. Moreover, our data suggest a substantial knowledge deficit regarding CD among medical students. This highlights the need to improve the education of future healthcare providers on CD in Europe and other non-endemic regions.

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Antibiotic resistance: the need for interdisciplinary education tailored to low-resource settings

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INTRODUCTION Antibiotic resistance (ABR) is a global threat to public health, affecting in particular low-resource settings (LRS). Containment of ABR in those contexts is challenging because of the high burden of resistant pathogens, scarce diagnostic and therapeutic options, lack of adapted guidelines or skills to implement surveillance and interventions. Hospitals in LRS concentrate the most vulnerable patients, are hotbeds of healthcare-associated infections and act as referral sites for difficult-to-treat infections. Local curricula rarely include aspects of Antibiotic Stewardship (ABS), Infection Prevention & Control (IPC) or Microbiological Surveillance (MS). Trainings tailored to participants from LRS are therefore needed.
AIM The Institute of Tropical Medicine in Antwerp organizes the AIM-course on containment of ABR in hospitals in LRS, addressing healthcare professionals involved in ABS, IPC or MS-activities. Main objective is to enable participants to develop and implement actions in the containment of ABR.
METHODS The AIM is a 3-week, interdisciplinary, interactive and hands-on course. The program consists of common and track-specific sessions, organized as lectures, practical exercises, role-plays and a group work simulating a hospital committee's activities. Participants develop a "personal action plan" to contain ABR in their facility, meant for implementation after the course. Teaching effectiveness is assessed through self-administered electronic questionnaires and course reports.
RESULTS AIM-courses were organized in 2016 and 2017. Participants were mainly from Africa (66%), followed by Asia (28%) and Latin-America (6%). They included medical doctors (34%), microbiologists (34%), pharmacists (16%) and nurses (12%); 54% were women. Participants found the course sufficiently adapted to the context of LRS (94%) and very useful for their future professional career (100%). All agreed on the added value of the interdisciplinary approach and mixed methodology. Six months after the first course 93% of the participants had started to implement their "personal action plan" and considered it as a relevant activity.
CONCLUSION Interdisciplinary, interactive education on the key components of ABR-containment in LRS proved relevant and effective. The mixture of professionals from different disciplines mirrors real-life in the hospital, offers opportunity for exchange and to build-up synergism required for successful action. Blended and LRS-located versions of the AIM course are explored.

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Incidence of adverse drug reactions resulting from the use of Amodiaquine-Artesunate in Nanoro, Burkina Faso

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BACKGROUND The World Health Organization recommends artemisinin-based combination therapy (ACT) for the management of uncomplicated malaria. Post-licensure safety data on newly registered ACT are critical for evaluating their risk/benefit profile in malaria endemic countries.
AIM The aim of this study was to evaluate the incidence of adverse reactions to ACT (Amodiaquine-Artesunate Winthrop) in Burkina Faso rural setting through active surveillance.
METHODS This was a prospective, observational, longitudinal, phase IV open label study. Active surveillance method was used to report adverse events between May 2010 and June 2012. In this surveillance study participants were visited at home at day 7, 14 and 28 following drug administration in order to collect the adverse events (AE) or adverse drug reactions (ADR).
RESULTS Overall 2679 patients were included in this study and 60 (2.2%) were lost to follow up. Among the 2650 patients having had at least one home visit, 2129 AE were reported (0.8 AE per patient). The most common AEs reported were general condition disorders, 32.3% ($n = 687$); gastrointestinal disorders 26.5% ($n = 564$) and respiratory disorders 14.8% ($n = 316$). Based on drug-related AEs classification, 721 (33.9%) were classified as 'absolutely not related', 1024 (48.1%) as 'unlikely', 261 (12.3%) as 'possible' and 123 (5.8%) as 'probable'. The intensity of these AEs was 96.1% mild/moderate, 3.4% severe and 0.4% life-threatening. One abortion case was recorded and classified as probably related. Also, we recorded six cases of death, none related to Amodiaquine-Artesunate.
CONCLUSION This study has proved that active surveillance system can be an adequate method for adverse events surveillance of new drugs in Burkina Faso. However, several strategies toward strengthening patient spontaneous report of encountered events should be tested in order to compare the cost-effectiveness of each strategy.

Abstracts

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The risk and predictors of visceral Leishmaniasis relapse in HIV co-infected patients in Ethiopia: a retrospective cohort study

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INTRODUCTION East Africa, where *Leishmania donovani* is prevalent, faces the highest burden world-wide of visceral leishmaniasis (VL) and HIV co-infection. However, data on the risk and predictors of VL relapse are scarce. Such information is vital to target medical follow-up and interventions to those at highest risk.
AIM To identify the risk and predictors of VL relapse in HIV co-infected patients in Ethiopia.
METHODS We conducted a retrospective cohort study at a Médecins Sans Frontières supported health center in north-west Ethiopia. We included adult VL-HIV co-infected patients treated for VL and discharged cured between February 2008 and February 2013. We followed-up all patients until December 31st, 2013 or until their last date of contact. The risk of relapse was calculated using Kaplan-Meier methods and predictors were determined using Cox regression models.
RESULTS Of the 146 patients included, 140 (96%) were male and the median age was 31 years (interquartile range (IQR), 27–38). At the index VL diagnosis, 110 (75%) had primary VL, 57 (40%) were on antiretroviral therapy (ART) and the median CD4 count was 149 cells/μl (IQR, 65–256). The median follow-up time after cure was 11 months (IQR, 4.0–30.0), during which 44 (30%) patients relapsed. At the end of the study period, 23 (15.8%) patients were lost to follow-up, occurring after a median of 7.4 months (IQR, 2.6–29.4). The risk of relapse was 15% at 6 months (95% confidence interval (CI), 10–23), 26% at 12 months (CI, 19–35) and 35% at 24 months (CI, 27–45). The risk of relapse was lower in those on ART at VL diagnosis (adjusted Hazard ratio (aHR), 0.22; 95% confidence interval [CI], 0.10–0.52; $P < 0.001$) or starting ART during VL treatment (aHR, 0.39; 95% CI, 0.17–0.86; $P = 0.02$) and higher in those with a high tissue parasite load (parasite grade 6+) at VL diagnosis (aHR, 6.63; 95% CI, 2.64–16.63; $P < 0.001$).
CONCLUSION The risk of VL relapse in co-infected patients was high, particularly in those not on ART or presenting with a high tissue parasite load. These patients should be preferentially targeted for secondary prophylaxis and/or regular medical follow-up. Timely ART initiation in all co-infected patients is crucial.

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Prevalence and risk factors of high blood pressure in HIV-infected patients at Parakou (Benin)

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INTRODUCTION Highly active antiretroviral therapies (HAART) have improved life expectancy of HIV-infected patients by reducing the mortality rate. However, these advances have also promoted the emergence of Non-Communicable Diseases (NCDs). Today, hypertension is one of those major diseases occurring in these patients. The major manifestation is a rise in blood pressure. It is important to evaluate it in our cohort.
AIM This study was to determine the prevalence and risk factors of high blood pressure (HBP) in HIV-infected people at Regional University Hospital of Parakou in 2016.
METHODS This is a cross-sectional study conducted at Regional University Hospital, Parakou (Benin) between September and December 2016. All adults HIV infected patients on HAART seen during data collection were recruited. Blood pressure was measured with electronic device. High blood pressure has been defined as a blood pressure higher than or equal to 130/90 mmHg. Known hypertensive subjects were also taken into account.
RESULTS The sample consisted of 322 subjects. The mean age was 40.09 years with a female predominance (74.22%). The average duration of exposure to HAART was 61.93 ± 40.23 months. The prevalence of HBP was 24.22% with a 95% CI of [19.72–29.35]. This prevalence was higher among men (30.12%) than women (22.18%, $P = 0.1455$). HBP increased with age and was statistically higher among subjects of 60 years old and more ($P = 0.000$), divorced ($P = 0.0168$). Moreover, subjects whose duration of exposure to HAART was higher or equal to 61 months ($P = 0.0219$) had hypertension.
CONCLUSION The Prevalence of HBP in HIV- infected patients is high. It is necessary to strengthen prevention and early detection of NCDs. More studies will be conducted to better analyze the impact of NCDs.

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Clinical observations implicate a gradual dormancy concept in malaria

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INTRODUCTION Malaria recurrences after an initially successful therapy and malarial fever occurring a long time after infection are well-known problems in malariology. Currently, two distinct types of malaria recurrences are defined: recrudescence and

relapse. A recrudescence is thought to originate from circulating *Plasmodium* blood stages which do not cause fever before a certain level of a microscopically detectable parasitemia is reached. Contrary, a relapse is thought to originate from quiescent intracellular hepatic parasite stages called hypnozoites.
AIM To look if the actual view is supported by clinical observations that recrudescences would typically occur.in infections due to *Plasmodium (P.) falciparum. P. knowlesi* and *P. malariae*, whereas relapses would be caused exclusively by *P. vivax* and *P. ovale*.
METHODS Publications on long incubation malaria and recurrencies were analysed with respect to the type of recurrency.
RESULTS The actual schematic view is insufficiently supported by experimental evidence. E.g., hypnozoites of *P. ovale* have never been experimentally documented. On the other hand, the non-finding of *P. malariae* hypnozoites turned into the 'proof' for the non-existence of *P. malariae* hypnozoites. Clinically, relapse-type recurrences have been observed in both *P. ovale* and *P. malariae* infections and decade-long incubation times have also been reported in P. falciparum infections.
CONCLUSION We hypothesize that the difference between the various *Plasmodium* spp. is quantitative rather than qualitative: there are *Plasmodium* spp. which frequently cause relapses such as *P. vivax*, particularly the *P.v.* Chesson strain, species which cause relapses less frequently, such as *P. ovale* and sometimes *P. malariae*, and species which may exceptionally cause relapses such as *P. falciparum*. All species may cause recrudescences.

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Arterial stiffness in chronic indeterminate Chagas disease: a case-control study

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INTRODUCTION Chagas disease (CD) is a complex zoonosis, endemic in continental Latin America. CD passes through two distinct clinical phases: the acute (usually asymptomatic), followed by the chronic one, which can be life-long indeterminate in most of affected individuals (characterized by latent parasitemia, positive *T. cruzi* serology and the absence of signs/symptoms) or evolve to determinate disease in 30–40% of cases. Traditionally, heart is considered the main target organ of CD but a comprehensive cardiovascular involvement has been seldom explored.
AIMS To evaluate the involvement of large elastic arteries as well as echocardiographic parameters (particularly, those estimating the diastolic function) in Bolivian individuals affected by CD in chronic indeterminate phase as compared with healthy controls of the same population (an homogeneous group of Bolivian immigrants).
METHODS Inclusion criteria for cases were: adult age, Bolivian origin, CD in the indeterminate phase, absence of any heart disease, hypertension, diabetes, whereas healthy controls belonged to the same population but presented negative *T. cruzi* serology. We collected medical history, anthropometric indices, smoking habit and lab exams exploring cardiovascular risk. Echocardiography was performed using GE Vivid 7 and Vivid E9 Ultrasound System. Carotid-femoral pulse wave velocity (cf-PWV) and other indices of arterial stiffness were measured using the PulsePen tonometer. All measurements were performed by an experienced physician, unaware of disease status of subjects.
RESULTS 21 CD cases and 14 healthy controls were enrolled, consecutively, in a 2-years period. No significant differences between the two groups with regard to age, sex, anthropometric, biochemical parameters, as well as blood pressure and echocardiographic parameters were detectable. To the contrary, cf-PWV was significantly higher in the group of CD patients with respect t to controls (7.87 ± 1.29 m/s vs. 6.43 ± 1.12 m/s; $P = 0.002$).
CONCLUSIONS Patients affected by CD in the indeterminate phase exhibit increased arterial stiffness, without a significant increase in blood pressure and diastolic dysfunction. This suggests a possible involvement of large elastic arteries in the early stages of CD even before cardiac involvement is present. Further prospective studies following the trend of arterial stiffness in CD patients during the chronic indeterminate phase, are warranted to confirm our finding which can have both pathophysiological and prognostic importance.

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Cost-effectiveness of liposomal amphotericin B treatments for paediatric visceral Leishmaniasis in Morocco

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INTRODUCTION Visceral leishmaniasis (VL) is a life threatening parasitic disease endemic in Morocco and other countries in Northern Africa where it mainly affects children living in poor rural areas. In Morocco, VL cases are treated using a toxic drug (Meglumine antimoniate) which requires long and painful treatments. Safer, shorter and more effective anti-leishmanial drugs (Liposomal Amphotericin-B) are available but their use in Morocco is limited due to their cost.
AIM To evaluate the cost and cost-effectiveness of two different regimens of liposomal amphotericin B (L-AmB) compared to meglumine antimoniate (SB) to treat paediatric VL in Morocco.
METHODS A decision-analysis model was used to estimate the cost-effectiveness of using SB or two short L-AmB regimens: six-day course (3 mg/kg/day) and two-day course (10 mg/kg/day). Incremental cost-effectiveness ratios, expressed as cost per death averted, were estimated by comparing costs and effectiveness of the alternative treatments. A threshold analysis was undertaken to evaluate at which price the use of L-AmB became cost-effective compared to current practices.
RESULTS Introducing the six-day course L-AmB would be highly cost-effective if the cost of L-AmB was below 100 US$ per vial. The two-day L-AmB treatment is highly cost-effective, with L-AmB at its current market price (165 US$/vial).
CONCLUSION Short-course L-AmB regimens should be implemented to treat paediatric VL in Morocco and other countries in the Maghreb.

Abstracts

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Tolerance of treatment of Chagas disease

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INTRODUCTION Chagas disease is caused by the protozoa *Trypanosoma cruzi*. The disease is endemic in 21 Latin American countries. Spain is the second country in the world receiving migrant population from endemic countries and the European country with the highest expected number of infected patients. Worldwide, eight million people are estimated to be infected with Chagas. Nifurtimox and benznidazole are an effective treatment for Chagas disease, however, both have some limitations. The efficacy of the treatment diminishes the longer a person has been infected and both show an elevated prevalence of adverse effects.
AIM To evaluate tolerance of treatment of Chagas disease.
METHODS This is a retrospective unicentric study using clinical and microbiological data of patients diagnosed with Chagas disease at the IIS-Fundación Jiménez Díaz (Madrid) between 2009 and 2016.
RESULTS During this time, 122 patients were diagnosed. A total of 69 patients (55.7%) received benznidazole during 60 days and only three patients were treated with nifurtimox. The main adverse effects of benznidazole were: rash (28.2%), nausea (7.7%), distal polyneuropathy (5.1%), muscle pain (2.6%) and arthralgia (2.6%). The change to nifurtimox in three patients was due to failed treatment (one case) or severe intolerance (2 cases) to benznidazole. These patients showed good tolerance to nifurtimox. The effect of treatment on PCR conversion was evaluated in a limited number of patients (21p) but with negative results in all of them at 6 months.
CONCLUSION It is necessary to investigate new drugs or strategies to improve the tolerance of the antiparasitic treatment with benznidazole, mainly limited by the exanthematic reactions.

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Histoplasmosis in Europe an uncommon condition, associated with HIV infection

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INTRODUCTION *Histoplasma capsulatum* is an endemic fungal infection in tropical and subtropical areas, mainly in the American continent, but it is very uncommon in Europe.
AIM To describe the main epidemiological, clinical and therapeutical features of histoplasmosis in a tertiary hospital in Madrid.
METHODS Retrospective study of patients diagnosed of histoplasmosis at Fundación Jiménez Díaz (Madrid) between 1/1/1998- 31/12/2016. Histopathological and microbiological diagnosis was performed in tissue samples or brochoalveolar lavage.
RESULTS 16 patients were diagnosed of histoplasmosis (87.5% male and mean age: 46 years (23–74)), 37.5% were Spanish and 62.5% Latin-American. All patients have lived in endemic areas, except one laboratory acquired infection. Diagnosed histoplasmosis were Disseminated disease (DHP) (12p), cutaneous or mucocutaneous (3p) and respiratory (1p). Immunosuppression was associated in 15p (94%): 13p (81%) infected with HIV, one liver transplant recipient and a chronic patient treated with metrotexate. Most HIV+ patients (92%) were not on effective antiviral treatment (10/13 without ARV treatment and 2/13 with poor adherence). Mean CD4 count was 48 ± 31 cel/μl, and all but one had <200 cel/μl.

Prevailing symptoms were fever (62.5%), malaise (56%), dyspnea (50%), cough (50%), and weight loss (37.5%). The main clinical findings were: lymph node enlargement (56%), liver or spleen enlargement (50%), bone marrow affection (37.5%), anemia (75%), pancytopenia (44%), respiratory insufficiency (19%) and renal failure (19%). In patients with respiratory affection, interstitial or reticulonodular infiltrate was the most common radiological pattern (67%).

Patients received different therapies; a) induction therapy with liposomal amphotericine and then a maintenance phase with itraconazole (57%) and b) azole derivatives from the beginning (43%). All patients completed treatment (≥6 months) except four patients (25%) with disseminated disease who died (two in the acute phase of the disease and two in the first two months). All HIV-infected patient started or resumed ARV treatment.
CONCLUSION *Histoplasma* spp infection is an uncommon disease in Europe, frequently associated with severe immunosuppression, mainly HIV-infected patients without ARV treatment and with a previous stay in an endemic area. Disseminated form is the most common, with predominant respiratory symptoms and a global mortality of 25%.

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Dermatophytosis In patients with podoconiosis in the Ethiopian highlands

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INTRODUCTION Podoconiosis, mossy foot or endemic non-filarial elephantiasis is a geochemical disease directly related to walking barefoot over volcanic soils which are rich in silica. Humid environment conditions favour skin colonization by fungi strains.
AIM Describe both dermatophyte prevalence and characteristics in patients with podoconiosis.
METHODS Presence of fungi strains in patients with podoconiosis was studied in Gambo General Rural Hospital (Ethiopia), from August until December 2013. Such samples were obtained under sterile conditions through cutaneous scraping of the crescent margins of skin lesions; one part was treated with 1–2 drops of 25% KOH dissolution and then observed in the optical microscope. The rest of the sample was inoculated in agar-Sabouraud-dextrose milieu, supplemented with cycloheximide (0.5–1 mg/ml) and then incubated in room temperature (22–25°C). Cultures were periodically examined every other day for four weeks in order to assess dermatophyte growth. Culture was considered positive if growth of fungi strains between 14 and 28 days was documented. Positive cultures were macro and microscopically examined for species identification, taking into account culture characteristics,

pigment production and microscopic features after lactophenol cotton blue staining.
RESULTS Samples were collected from 19 patients with podoconiosis for whom there was clinical suspicion for fungi overinfection, as they showed verrucosis and depigmentation. Culture was positive in 17 out of the 19 samples (89.5%). Dermatophytes were found in 12 patients: *Trichophytum rubrum* (n = 4), *T. verrucosum* (n = 4), *T. violaceum* (n = 2), *T. tonsurans* (n = 1) and *Microsporum audouinii* (n = 1). In 5 patients a non-dermatophyte was identified (*Geotrichum* spp -3p, *Exophiala* spp -1p, *Mucor* spp -1p). KOH studies were positive in 11 patients (57.9%). Among these, dermatophytes were isolated from 7p (63.6%), non-dermatophytes from 3p (27.3%) and culture was negative in only one (9.1%).
CONCLUSION In rural Ethiopia, skin folds seen in podoconiosis as well as a humid environment favour skin colonization by dermatophyte and non-dermatophyte fungi. As these patients showed evident clinical lesions suggestive of fungal infection but also consistent with podoconiosis, we need to contemplate that fungal skin colonization might develop an infection and, consequently, clinical worsening. Thus, the necessity of antifungal therapy in these cases should be considered.

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Diagnosis of cutaneous anthrax with the naked eye in resource poor settings

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INTRODUCTION Cutaneous anthrax is a zoonotic disease caused by the spore-forming bacterium *Bacillus anthracis* and is considered an occupational disease. It is rarely seen in industrialized nations but is common in rural areas of developing countries.
AIM To show the main clinical characteristics of cutaneous anthrax in resource poor settings without microbiological facilities for proper diagnosis.
METHODS We describe, through photographs, eight cases of cutaneous anthrax, which were diagnosed at the Gambo General Hospital (Ethiopia) between 2010 and 2013.
RESULTS Five female (7–53 years) and three male patients (≤2 years) were admitted with ulcers covered by a characteristic black eschar and a history of close contact with animals. The lesions started as erythematous papule located on exposed sites [head (7p) and thigh (1p)] and subsequently became a necrotic black eschar surrounded by an oedematous halo. Two patients showed painful ipsilateral adenopathy near the black eschar. A malignant pustule eventually developed on the suborbital part of the face in two patients. No other specific symptom was found.

Microbiologic diagnosis was not available, as in most rural areas of developing countries, rendering the clinical suspicion as the principal mean for diagnosis., however lesions can be confused with ecthyma, cutaneous leishmaniasis or other rare infections associated with black eschars, like scrub typhus, rat bite fever, tularemia, or brown recluse spider bites.

All patients were treated with endovenous penicillin G (7–10 days) (3p), ciprofloxacin (6 days) (3p) or intramuscular ceftriaxone (1p) accompanied by topical azithromycin in patients with periocular affectation. All patients responded to antibiotics, and the lesions resolved leaving scars. One patient lost her eye and another died after penicillin administration.
CONCLUSION Physicians working in rural areas of resource poor settings should be trained in the clinical identification of cutaneous anthrax. Early antibiotic treatment is essential for decreasing morbidity and mortality.

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Pathogenic fungal species associated with digestive system of *Periplaneta americana L.* (Blattaria: Blattidae) trapped from residential dwellings in Ahvaz city, Southwestern Iran

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INTRODUCTION Cockroaches are the most prevalent domestic pests and with a worldwide distribution. Nearly thirty species of cockroaches are cosmopolitan residents of human habitations and about sixteen species are associated with human sanitary challenges. They were recognized as possible vectors of pathogenic bacteria, viruses, fungi and parasites in residential dwellings and hospital environments.
AIM In this project, we evaluated the presence of yeasts and filamentous fungi of medical importance in the gut of American cockroaches collected from three residential regions in the city of Ahvaz, southwestern Iran.
METHODS In this study, seventy American cockroaches were sampled from human dwelling localities using direct collection (hand catch), vacuum cleaner and sticky traps, during 2009–2010. They were captured from kitchens, toilets or bathrooms of residential area and their medically important fungal microorganisms were isolated from digestive tract using standard mycological methods. Filamentous fungi were identified by macroscopic and microscopic examination. Yeasts were identified by API ID32C-32100 kit.
RESULTS A high percentage of cockroaches (88.6%) were detected to carry fungi of medical importance. A total, 23 fungi species/genera were isolated from the American cockroaches' alimentary tract. The fungi isolated from cockroaches, from the residential regions were species of *Aspergillus*, *Rhizopus*, *Penicillium*, *Mucorales*, *Alternaria*, *Cladosporium*, *Mycelia*, *Chrysosporium*, *Candida*, *Rhodotorula*, *Zygosaccharomyces* and *Debaryomyces*. *Candida* spp. (41.4%), *Aspergillus* spp. (37.1%) and *Rhodotorula* spp. (27.1%) were the most common fungi recovered on cockroaches. *Candida albicans* and *C. glabrata* were the commonest species of the genus *Candida*. Also, *Aspergillus niger* and *A. flavus* were the most frequent species of the genus *Aspergillus*.
CONCLUSION In this study, we revealed the presence of pathogenic filamentous fungi and yeasts in the gut of *Periplaneta americana* collected from the houses in the city of Ahvaz, Iran. Therefore, American cockroaches are a potential vector of pathogenic fungal microorganisms in residential environments.

Abstracts

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Intra-articular virus RNA shedding in ZIKA virus (ZIKV) and Chikungunya virus (CHIKV) co-infection correlates with long-lasting infection, higher severity and systemic poor viral clearance

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INTRODUCTION Most of the arboviral infections presents as asymptomatic or mild self-limited disease. But, risk factors for disease development and severity are poorly understood. For instance, the role of co-infections in morbidity and mortality remains elusive. Additionally, virus detection in blood and urine may persist for several weeks but, its correlation with disease evolvement is still unclear.
AIM To describe the clinical and virological features of ZIKV/CHIKV coinfection.
METHODS In 48 out of 165 individuals attending a tertiary-care hospital (HUCFF/UFRJ, Rio de Janeiro, Brazil), RT-PCR for detection of ZIKV and CHIKV RNA was performed in serial samples of sera and urine. And, synovial and cerebrospinal fluids (CSF) and tissue-samples tested when available. RT-PCR reactive samples underwent viral isolation.
RESULTS Among 48 laboratory-confirmed- infection, 25 were male (mean age: 45.7 ± 14.8 years old). Co-infection (CoInf) was diagnosed in 24 and 12 individuals in each group of ZIKV (ZIKVMono) and CHIKV mono-infection (CHIKVMono). Duration of symptoms in Coinf group increased in individuals with RNA shedding in synovial fluid (Synov+) when compared to CoInf individuals without detectable RNA (Synov−; mean: 225.8 ± 99 vs. 68.7 ± 78 days post onset-dpo, respectively. $P < 0.0001$). Also, ZIKVMono (10.8 ± 5.5 dpo) and CHIKMono (81.2 ± 71.2 dpo), showed shorter disease duration when compared to Synov+ group ($P < 0.001$). Hospitalization occurred in 8.3% of CHIKVMono and 12.5% of Coinfected groups, though Synov+ represented 40% of the last, including 1 death (4. 2%). Prolonged polyarthralgia/ arthritis (>2 week) developed in 4/12 (33.3%) of ZIKVMono, 6/ 12 (50%), CHIKVMono, and 21/24 (87.5%) of Coinf cases. RNA shedding in sera and/ or urine persisted for 18.6 ± 16.9 dpo in ZIKVMono, 17.2 ± 13.6 dpo in CHIKMono, 31.2 ± 25.2 dpo in CoInf and 88.2 ± 112.5 dpo in CoInf Synov+. In 4/5 (80%) individuals with detectable RNA in synovial liquid, CHIKV was isolated in 3/4 (75%) and ZIKV, 1/4 (25%) individuals. One CoInfSynov+ also presented with CHIKV in CSF.
CONCLUSION ZIKV/CHIKV co-infections associated with intra-articular virus replication and RNA shedding might be considered a risk factor for prolonged arbovirus infection.

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Prevalence and risk factors of CTX-M *Enterobacteriaceae* in hospitalised patients at a tertiary hospital in Kilimanjaro, Tanzania

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INTRODUCTION Emergence and spread of extended spectrum beta-lactamase (ESBL) producing *Enterobacteriaceae*, mainly due to CTX-M is a major global public health problem. Patients infected with ESBL-producers have an increased risk of treatment failure and death. We investigated the prevalence and risk factors of CTX-M *Enterobacteriaceae* in patients hospitalised at a tertiary hospital in Kilimanjaro, Tanzania.
METHODS Isolated *Enterobacteriaceae* from inpatients admitted at Kilimanjaro Christian Medical Centre (KCMC) between 2013 and 2015 were fully genome sequenced. The prevalence of ESBL was determined based on the presence of $bla_{CTX\text{-}M}$. The odds ratio (OR) and risk factors of ESBL due to CTX-M *Enterobacteriaceae* were assessed using logistic regression models.
RESULTS The overall CTX-M prevalence (95% CI) was 13.6% (10.1–18.1). Adjusted for other factors, the OR of CTX-M *Enterobacteriaceae* for patients previously hospitalised was 0.26 (0.08–0.88), $P = 0.031$; the OR for patients currently on antibiotics was 4.02 (1.29–12.58), $P = 0.017$; the OR of for patients currently on ceftriaxone was 0.14 (0.04–0.46), $P = 0.001$ and the OR for patients with wound infections was 0.24 (0.09–0.61), $P = 0.003$.
CONCLUSION The prevalence of ESBL due to CTX-M in *Enterobacteriaceae* in this setting is relatively low compared to other previous reports in similar settings. To properly stop their spread in the hospital, we recommend screening for all types of ESBLs, and to focus on disinfection and controlled antibiotic usage. We further recommend setting up a regional surveillance system that takes full advantage of the available Next Generation Sequencing facility.

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Autochthonous cases of strongyloidiasis in the Czech Republic

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INTRODUCTION Strongyloidiasis is a soil-transmitted helminthic intestinal infection distributed widely in tropics.

Historically, there were reports on transmission of strongyloidiasis in Ruhrland, Switzerland and Slovakia, but there are only a few recent reports on autochthonous infections originated in the Central Europe. The infection is caused by nematodes *Strongyloides stercoralis* or *S. fuelleborni*, which can cause zoonotic infections in dogs, cats and primates. Humans are infected by invasive filariform larvae either percutaneously or by the alimentary route after ingestion of contaminated food or water. These worms have a unique ability to develop in the free-living cycles in the soil. Most infections in immunocompetent persons are asymptomatic, however, hosts can remain infected for decades due to autoinfection. Immunosuppression may lead to hyperinfection and fatal complications.
AIM The objective of this presentation is to describe the clinical and epidemiological characteristics of autochthonous cases of strongyloidiasis in the Czech Republic.
METHODS This is a review of five cases of strongyloidiasis managed in a tertiary-care centre in Prague since 2008. We will present two imported ceses, one uncomplicated case in 8-year-old girl from Subcarpathian Ruthenia (Ukraine) and two autochthonous cases in immunocompromised male patients.
RESULTS A 67-year-old man originating from Eastern Slovakia but living in the Central Bohemia was investigated for diarrhoea. Due to signs of colitis seen on colonoscopy gastroenterologists initiated treatment with sulfasalazine (3.0 g daily). However, in the stool samples, there were later detected *Strongyloides* larvae. In addition, patient presented with eosinophilia (1700/μl) and positive serology. Treatment with a single dose of 12-mg ivermectine was successful. An 84-year-old patient living in Prague with lymphoma and treatment with cytostatic agents was diagnosed with disseminated strongyloidiasis from duodenal biopsy and stool microscopy. Absolute eosinophilic count was 1270/μl and serology for strongyloidiasis was positive. One-week treatment with albendazole (400 mg/day) was unsuccessful, but after two 12-mg doses of ivermectine (one week apart) larvae from stool and symptoms disappeared. Both patients never travelled to tropics or subtropics.
CONCLUSION Strongyloidiasis represents a neglected soil-transmitted helminthic infection that can be rarely diagnosed even in the Central Europe. However, more detailed information on parasite distribution and risks of zoonotic transmission are needed.

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Factors associated with indeterminate cause of death in rural Southern Mozambique

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INTRODUCTION Mozambique as many African countries has limited vital registration. To identify and quantify causes of death (CoD), verbal autopsy (VA) tools have been implemented. However, important fraction of deaths from this methodology is still classified as indeterminate.
AIM To identify factors associated with indeterminate cause CoD among deaths occurring at Manhiça Health and Demographic Surveillance System (HDSS).
METHODS Manhiça HDSS collects VA since 2000. In 2014 new data collection tools based on WHO 2012 VA forms were introduced and implemented electronically to comply with the InterVA-4 format. InterVA-4, per case, uses a deterministic probabilistic algorithm to establish 1 to 3 CoD. The complementary of the sum of these probabilities gives the probability of the indeterminate CoD per case which is our dependent variable on a log-binomial regression with robust standard errors. The predictors include deceased individual (age at death, gender and place of death) and VA respondent (education and relationship to deceased) characteristics and time between dates of death and VA.
RESULTS From January 2014 to December 2016 there were 4133 deaths throughout the HDSS. So far 2301 (55.7%) deaths had a VA attempt from which 1605 (38.8%) were complete. The main reason for uncompleted of VA is lack of an informant (383/2301). Overall the fraction of indeterminate CoD (iCoD) was 11.0% (176/1605) corresponding to 17.5% (11/63), 10.2% (37/364) and 10.9% (128/1178) respectively among neonates, children and adults. Overall, the age of the deceased was the only factor associated with iCoD chance (P-value <0.001) with neonates with higher probability. Among neonates, a respondent that is the mother of the deceased was associated with 8.78 (95 CI: 1.50–51.28) times lower probability of iCoD. For children, an informant with at least secondary level education was associated with 2.45 (95 CI: 1.01–5.91) times higher probability of iCoD. Among adults we couldn't find any associated factor.
CONCLUSION Age at death, the relationship of the respondent to the deceased and level of education of the respondent were the factors associated with the indeterminate CoD probability among neonates and children through InterVA-4 in Manhiça HDSS. No associated factor were found among adults.

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Safety and tolerability of two regimens used to treat multi-drug resistant tuberculosis in Kinshasa: a prospective cohort

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INTRODUCTION Democratic Republic of Congo (DRC) accounted among high multi-drug (MDR) Tuberculosis (TB) burden countries (1). Since 2013, the national TB programme has introduced a shorter regimen for treatment of MDR TB (9 months vs. 20 months for the existing one) under operational research conditions.
AIM The aim of the present study was to assess the safety and tolerability of shorter regimen (SR) in comparison with the long regimen (LR).
METHODS This was a prospective cohort carried out in Kinshasa (DRC) over one-year period (2015–2016) in 16 health centres dedicated to MDR TB management. All TB MDR patients under course treatment with second-line agents were monitored for adverse events (AEs).
RESULTS In total, 258 patients were followed up of which 210 patients treated with SR (males accounted for 61%) and 48 patients with LR (sex ratio of 1). About 81% of patients experienced at least one AE regardless of treatment. A total of 479 (clinical) AEs (2.3 AEs per patient) and 98 AEs (2.0 AE per patient) were reported respectively in SR arm and LR arm.

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Gastro-intestinal disorders (nausea and vomiting) were mostly reported in SR group (48%) than in LR group (29%, $P = 0.017$). No differences were found concerning ear and labyrinth disorders (tinnitus, decreased hearing and deafness), general disorders (asthenia) and neurologic disorders (dizziness, headache). Other relevant AEs reported included increased libido, abortion, venous thrombosis in SR arm and suicide attempt, gait shuffling in LR arm. Serious AEs affected 38 patients (18%) in SR group or 9 patients (19%) in LR group. Treatment was interrupted temporarily or permanently in 33 patients (16%) under SR and 3 patients under LR (6%).
CONCLUSION Although short regimen effectiveness is actually well demonstrated, toxicity of many anti-TB drugs remains a particular concern. MDR TB treatment cannot be separated from AE management.

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Safety and tolerability of artesunate and amodiaquine combination in the treatment of uncomplicated malaria in Kinshasa: a pilot cohort event monitoring study

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INTRODUCTION Artesunate and amodiaquine (ASAQ) combination was adopted as first line therapy for uncomplicated malaria in Democratic Republic of Congo since 2005. But compliance to treatment was a particular concern due to multiple tablet formulation (non-fixed combination) and rumors about adverse events (AEs) induced by amodiaquine. In 2010, fixed-dose combination of ASAQ came into the market through donors.
AIM To assess the safety profile of ASAQ new formulation and compliance to treatment.
METHODS A pilot cohort event monitoring was implemented in 10 sites in 2012 where National Malaria Control Programme had deployed antimalarials (ASAQ) from WHO prequalified quality control laboratories.
RESULTS Overall 387 patients attended at least one of scheduled visit of which 197 (50.9%, CI 95% 45.9–55.9) were females and 190 males (49.1%, CI 95% 44.1–54.1). Children under 5 years accounted only for 8.0% ($n = 31$, CI 95% 5.3–10.7) of the study population. Three hundred three patients (78.3%, CI 95% 74.2–82.4) developed at least one AE. A total 639 AEs (as 1.7 AE per patient) were captured, about 6% of events occurred after treatment termination. The following systems were commonly involved: general (39.0%, asthenia mainly), gastro-intestinal (19.4%, nausea and vomiting in half of cases), nervous (16.9%, dizziness in most of cases), metabolism and nutrition (9.5%, anorexia and decreased particularly) and psychiatric (5.3%, somnolence and insomnia especially). Other relevant AEs included agitation (0.3%), dysguesia (0.5%), hyperhidrosis (2.1%), hypoacusis (0.3%), nightmare (0.3%), tinnitus (1.6%) and vision blurred (1.6%). Six AEs (0.9%) led to hospitalization and were judged as serious. Five patients (1.3%) discontinued their treatment because of AE severity. Ten cases of extrapyramidal reactions (1.6%) were reported and consisted of muscle twitching or spasm and tremor.
CONCLUSION In this study, ASAQ shows a relative good safety profile. Healthcare providers should be encouraged to prescribe this medicine. Continuous monitoring is a necessity in the context widespread deployment of artemisinin-based combination therapies.

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The epidemiology of *Taenia Saginata* and *Taenia Solium* in Western Europe: a systematic review

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INTRODUCTION Humans are the final hosts of *Taenia solium* and *Taenia saginata*, two zoonotic cestodes of public health and economic concern. Data on the occurrence of these parasites in humans and animals in Western Europe are fragmented and incomplete.
AIM Our objective was to update the current knowledge on the epidemiology of these parasites in the region.
METHODS A systematic review was conducted and included scientific and grey literature published from 1990 to 2015 on the epidemiology of *T. saginata* and *T. solium* in humans and animals. Furthermore, to gather additional data on disease occurrence, local experts were contacted.
RESULTS Taeniosis cases were identified in twelve out of eighteen Western European countries studied. No cases were found in Iceland, Ireland, Luxembourg, Norway, Sweden, and Switzerland. The highest number of cases originated from Spain (21–77/year) and UK (64–114/year). Epidemiological studies reported prevalences ranging from 0.05% to 0.27%, while prevalence estimates based on anthelmintic sales, ranged between 0.02% and 0.67%. A high proportion of cases were reported as *Taenia* spp. and the majority of cases reported at species level were *T. saginata* cases. Taeniosis caused by *T. solium* was a rare finding, reported in only seven countries. Human cysticercosis was diagnosed in all countries except for Iceland, with Spain and Portugal recording the highest number of cases. The majority of human cysticercosis cases were linked to immigration and travel to endemic areas although few cases were suspected to be autochthonous. Five countries reported porcine cysticercosis cases but only one (Portugal) confirmed *T. solium* as the causative agent. Bovine cysticercosis was detected in all countries except for Iceland. Based on meat inspection, detected prevalences varied within and between countries and ranged from 0.0002% up to 7.82%.
CONCLUSIONS Given the public health impact of *T. solium*, species identification in taeniosis cases should be performed and suspected porcine cysticercosis should be confirmed by molecular methods. Attention should be paid to suspected autochthonous

human cysticercosis cases. The economic impact of bovine cysticercosis should be further assessed. Taeniosis and human cysticercosis should be made notifiable and surveillance systems in animals should be improved.

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Long term evolution of the clinical complications of Ebola virus disease: results of the Postebogui cohort

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INTRODUCTION The number of survivors from the 2013–2016 West Africa outbreak of Ebola virus disease (EVD) has raised new issues on the sequelae of this infection. In March 2015 we set up an observational cohort study to assess the long–term outcomes in EBV survivors in Guinea and we previously reported the high burden of clinical symptoms at inclusion (1).
AIM To assess the clinical evolution of EVD during the two first year after Ebola Treatment Centre (ETC) discharge.
METHODS Patients aged more than 1 year were recruited in four sites in Guinea. Prospective registration of clinical outcomes was done at recruitment and at each follow-up visit, 1, 3, 6, 9, 12, 18, and 24 months after enrolment. Prevalences were estimated for a range of symptoms.at six months from ETC discharge.
RESULTS Between March 23, 2015, and July 11, 2016, we recruited 802 patients, among them 791 patients were remained for the current analysis. The median age was 28 years, 20% are under 18 years and 44% were male. The median delay after discharge was 716 days. Prevalence of general symptoms reaches 19.2% (CI 95% = [13.3; 26.4]) during the 1st semester after discharge, increases to 22.5% [18.5; 26.9] during the 2nd semester, then decreases to 17.3%[14.4; 20.6] for the 3rd and 9.4% [7.0; 12.1] for the 4th semester. Slight decrease was observed for ocular disorders (7.3% [3.7; 12.7] to 3.2% [1.9–2.0]) and musculoskeletal pain (21.2% [15.0; 28.6] to 16.6% [13.5; 20.1]) between the 1st and 4th semester. Prevalence of abdominal pain remains stable from 11.9% [7.2; 18.2] to 13.5% [10.7; 16.8] between the 1st and 4th semester. Similar trend was observed for neurological disorders (13.9% [8.8; 20.5] to 13.4% [10.6; 16.6]).
CONCLUSION Two years after the ETC discharge the prevalence of general symptoms is the only one to decrease whereas other remains stable (abdominal pain, neurological disorders) or slightly decrease (ocular disorders and musculoskeletal pain). This justifies the long term care of these patients.

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Systematic literature review of antibiotic stewardship interventions in hospitalized patients in low- and middle-income countries

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INTRODUCTION Antibiotic stewardship (ABS) is one of the key actions to contain antibiotic resistance. ABS interventions in hospitals in high-income countries have shown improvement of antibiotic prescribing but generalizability of these results to low- and middle-income countries (LMIC) is uncertain.
AIM We systematically reviewed the literature for studies assessing the impact of ABS interventions in hospitalized patients in LMIC.
METHODS We searched MEDLINE, Embase, Cochrane CENTRAL and regional indexes until June 2016. We included (non)-randomized controlled trials ((n)RCT), controlled before-after studies and interrupted time series (ITS) which studied any intervention aiming to optimize antibiotic prescribing in hospitalized patients in LMIC (World Bank classification), reported a prescribing, clinical or microbial outcome and were written in English, French of Spanish. Two authors independently screened the literature, extracted data and assessed the methodological quality using EPOC quality criteria. Results are synthesized per main intervention, using a narrative approach. The protocol was registered (PROSPERO; CRD42016042019).
RESULTS We screened 5338 titles and abstracts, assessed 217 full text articles and included 16 studies from 10 countries: 9 ITS, 5 RCTs, and 2 nRCTs. Four studies introduced a diagnostic test and reported a reduction in the proportion of patients receiving antibiotics ($n = 2$) and a reduction in days on treatment (DOT) ($n = 2$). Four studies implemented treatment guidelines and reported a reduction ($n = 1$) or no effect ($n = 1$) on antibiotic consumption and an improved timing of antibiotic administration ($n = 2$). Three studies performed audit and feedback and reported a reduction in DOT ($n = 1$), no effect on DDD/100 patient days ($n = 1$) and an improved prescription quality ($n = 1$). Three studies implemented a multifaceted intervention and reported a reduction in DDD/100 patient days ($n = 1$) and in the proportion of patients receiving antibiotics ($n = 2$). Two studies provided education and reported improved timing of antibiotics ($n = 1$) and a reduction in inappropriate use of antibiotics ($n = 1$). The risk of bias was medium ($n = 6$) to high ($n = 10$).
CONCLUSION ABS interventions in hospitals in LMIC have a positive effect on the quantity and quality of antibiotic prescriptions, however, the overall quality of the studies is low. The diversity of interventions and reported outcomes hinders comparability and interpretation of the results.

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Clinical patterns of tetanus and HIV co-infection in a Referral hospital in Ethiopia: a case series

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INTRODUCTION Tetanus remains to be an important public health problem in developing countries. Although much has been published on the clinical characteristics of tetanus patients, there is paucity of evidence on its interaction with HIV. The objective of this study was to describe the clinical characteristics and outcome of HIV patients with tetanus.
AIM To describe clinical profile of patients with tetanus in ICU.
METHODS The patients are cases of tetanus – HIV co-infection admitted to Addis Ababa University Hospital, Ethiopia. A case series study design was utilized.
RESULTS We presented two HIV patients who never had immunization or post exposure prophylaxis presenting with cephalic tetanus with later generalization. The first was a 50 year old male patient with CD4 38 admitted with a diagnosis of WHO stage I HIV with Ableitt Grade 3 generalized tetanus. The second was 41 years old male on ART for 6 years with CD4 520 admitted with a diagnosis of grade 3 generalized tetanus, and Stage T1 HIV. The incubation period and period of onset were 10 days and 12 hr for the first and 3 days and 18 hr for the second patient. They received tracheostomy, Tetanus antitoxin, metronidazole, diazepam infusion, Chlorpromazine, and supportive care. Both patients developed dysautonomia and received Magnesium sulphate. Both received mechanical ventilation for hospital acquired pneumonia. The second patient was successfully weaned after 4 days while weaning was difficult in the first. Control of spasms and dysautonomia was very difficult in the first patient even following phenobarbitone and thiopental. He later developed Ventilator associated pneumonia and died from severe sepsis. The second patient had a smooth course and was discharged improved. On discharge, he received 2 doses of tetanus toxoid and was enrolled into chronic care. The total ICU stay was 16 and 21 days respectively.
CONCLUSION The difference in the control of spasms, dysautonomia and outcome in the two patients might indicate the variability of clinical manifestations and prognosis of tetanus in HIV patients depending on the degree of immunosuppression. There is a need of further studies to characterize tetanus – HIV-co-infection.

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Clinical management and outcomes of alveolar echinococcosis in a tertiary care centre in Prague

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INTRODUCTION Alveolar echinococcosis (AE) represents one of the most important endemic parasitic diseases in the Central Europe. The infection is relatively rare, however, the incidence has been increasing during the last years. AE is caused by a metacestode of *Echinococcus multilocularis* and it is potentially life-threatening disease due to its progressive tumor-like growth in liver coupled with metastatic dissemination.
AIM The objective of this study is to describe epidemiology, clinical management and outcomes of patients with AE treated in a tertiary care centre in Prague.
METHODS This is a prospective descriptive study of AE cases treated at the Department of Infectious Diseases, Hospital Na Bulovce in Prague since 2012. Clinical and laboratory data has been collected in all patients and subsequently evaluated.
RESULTS There have been managed a total of 11 patients with AE since 2012. Age median was 42 years (IQR 30–64) and female to male ratio 2.7:1. Potential risk factors were identified in all 11 patients including keeping dogs (9; 81.8%) or cats (4; 36.4%), going into forests for vocational reasons (7; 63.3%), hunting (2; 18.2%) and work as a vet tech (1; 9.1%). The initial symptoms were abdominal pain in 4 patients (36.4%), a palpable mass in hepatic area (3; 27.3%), asymptomatic elevation of LFTs (1; 9.1%), icterus and biliary obstruction (1; 9.1%). Median period from symptoms onset to diagnosis was 5 months (IQR 3–27). The diagnosis was established by imaging techniques and positive serology in 4 patients, the remaining 7 cases were confirmed by diagnostic biopsy and microscopy of histological samples. Serology was positive in all 11 patients. Significant eosinophilia was not presented, however, the serum IgE levels were elevated in 6 patients (54.5%) with median concentration 397 IU/ml (IQR 100–2112). Liver function tests were initially altered in 9 patients (81.8%), predominantly cholestatic markers. The treatment is based on long-term continuous chemotherapy with albendazole, in addition 6 patients underwent curative liver resection and one liver transplantation.
CONCLUSION AE with its increasing incidence represents an emerging parasitic infection in the Czech Republic that is expensive to treat. Due to different approaches to treatment in specialized centres more detailed studies on clinical management and outcomes are desirable. This presentation was partially supported by the grant of Scientific Board of Regional Hospital Liberec.

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Zika virus infection on human umbilical vein endothelial cells induces cell death and activation of secondary hemostasis

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INTRODUCTION Zika virus (ZIKV) is an emerging arbovirus that belongs to the *Flaviviridae* family. Symptomatic patients generally develop a mild febrile illness which lasts for 3–7 days. However, during the recent outbreaks, several hemorrhagic manifestations were reported. In addition, a recent study found segmental thrombosis in the umbilical cord of pregnant rhesus macaques that were infected with ZIKV.
AIM We intend to characterize the effect of ZIKV infection in human umbilical vein endothelial cells (HUVECs) and determine whether infection induces activation of secondary hemostasis.

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METHODS We infected HUVECs with two ZIKV strains and performed virus titration, immunostaining, and flow cytometry to determine replication kinetics and induction of cell death on HUVECs. We also performed ELISA to determine interleukin (IL)-6 and IL-8 production. A thrombin generation test (TGT) was performed as a functional test to asses secondary hemostasis.
RESULTS Both ZIKV strains infected and replicated to high titers in HUVECs. There was a significant increase of IL-6 and IL-8 production after infection. Flow cytometry data revealed that ZIKV infection induces cell death mainly through direct infection. Furthermore, we found evidence that infection induces shortened TGT time.
CONCLUSION Here we demonstrate that ZIKV replicates efficiently on HUVECs and induces production of pro-inflammatory cytokines and cell death mainly through direct infection. Additionally, we also showed for the first time that infection induces activation of secondary hemostasis.

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Epidemiology of human Histoplasmosis in Germany: 2000–2016

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INTRODUCTION Histoplasmosis is a fungal infection that has been diagnosed on all continents. Reports of human autochthonous cases in Europe are poorly documented. Veterinary cases in wild mammals have been described necessitating the need for molecular surveillance to identify potential autochthonous cases in Europe.
AIM To characterize the molecular epidemiology of *Histoplasma capsulatum* cultivated from German patients by Multilocus sequence typing (MLST).
METHODS All *Histoplasma capsulatum* single patient strains cultivated at the German Reference Laboratory for Histoplasmosis were typed using a 4 gene scheme (arf, H-anti, ole and tub) previously described by Kasuga[1]. Concatenated sequences were aligned with previously reported sequences of worldwide isolates as published by Teixeira[2] and including one from the Histoplasma infection of a wild badger from Germany. Neighbour joining trees were constructed to demonstrate relationship between isolates using the geneious software suite.
RESULTS All four genes could be sequenced for eight isolates while the amplification of the ole gene failed for six isolates. The phylogenetic analysis demonstrated clustering of the German isolates with previously defined clades, including the African clade (n = 4), the Latin American A clade (n = 5), the Latin American B clade (n = 1) and the North American clade 2 (n = 1). Of note, three patient isolates clustered with the badgers' sequences within the suggested Eurasian clade, suggesting related organisms. Two of the patients had a travel history to Southeast Asia, while for one no travel history was reported.
CONCLUSION Our molecular epidemiological study demonstrates that Histoplasmosis in Germany is mostly imported from endemic regions such as Africa and Latin America. Of note, some human isolates seem to be related to an autochthonous veterinary case in Germany. The phylogenetic study through MLST with four genes doesn't allow to differentiate the autochthonous European strains from the Asian strains. Further molecular studies from *Histoplasma* isolates are needed to define with more accuracy the Eurasian clade.

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3P62
Prevalence of hepatitis C virus co-infection among patients enrolled in routine HIV care in three outpatient departments with varying risk profiles in Phnom Penh, Cambodia

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INTRODUCTION Limited epidemiological evidence concerning the prevalence of HCV co-infection among HIV patients is available in Cambodia.
AIM Using routinely collected program data from Médecins Sans Frontières' (MSF) HCV program, we aimed to describe the prevalence of HCV co-infection among patients from three different HIV outpatient departments (OPDs) with varying risk profiles in Phnom Penh, Cambodia.
METHODS We retrospectively reviewed routinely collected program data of HCV test orders and results of adult patients (age 18 or above) receiving HIV care in three different OPDs in Phnom Penh between May 2016 and January 2017 – one OPD with low-risk general HIV patients and two high-risk OPDs with FEW (female entertainment workers), MSM (men who have sex with men), TG (transgender), and PWID (people who inject drugs). We described the prevalence of HCV by age groups, and used multivariate logistic regression with age, sex, and risk status (FEW/MSM/TG or PWID) as covariates in the model to identify the odds being anti-HCV antibody positive.
RESULTS A total of 3234 HIV patients, 41.3% male, with a mean age of 42.8 (SD 9.2) were tested for HCV. We found that 8.2% (95% CI 7.2–9.3) of the patients in the low-risk general HIV OPD were anti-HCV antibody positive, and 3.3% (95% CI 2.6–4.0) were positive for viral load. The prevalence of viremic HCV infection by PCR was progressively higher in the advancing age groups (lowest prevalence between 30 and 34 years old at 0.5% and highest at 60 years and above at 9.6%). Using the multivariate model, PWID (OR 22.3; 95% CI 7.0–70.9) was found to be strongly associated with higher odds of being infected with HCV, whereas no statistically significant increase was found for FEW/MSM/TG. The genotype distributions were 1a (3%), 1b (36%), 2a (13%), 3a (1%), 6 (44%), and 3% had indeterminate genotype.
CONCLUSION Although this study is not generalizable, results of HCV testing from three unique HIV OPDs suggest that HIV

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programs aiming to screen HCV patients in Cambodia may consider targeting testing to older patients and PWID if resources are limited. Future prevalence studies targeting high-risk populations are warranted.

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Infectious aetiology of persistent digestive disorders (≥2 weeks) in Niono, Mali, and implications for treatment

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INTRODUCTION Long-lasting digestive disorders, such as persistent abdominal pain (≥2 weeks) and persistent diarrhoea (≥2 weeks), are frequently encountered clinical syndromes and cause considerable morbidity worldwide. Individuals living in resource-constrained areas with poor hygiene and inadequate access to clean water and improved sanitation are prone to such syndromes. The aetiology of digestive disorders includes bacterial, parasitic and viral pathogens. In Mali, treatment is usually empirical and a detailed laboratory work-up to identify the causative agent is rare.
AIM To identify infectious pathogens giving rise to digestive syndromes in a selected area of Mali and to develop treatment guidelines for the management of symptomatic patients with persistent digestive disorders.
METHODS The study was embedded in a multi-centric study by the NIDIAG research consortium (www.nidiag.org) and was conducted in a reference health centre of Niono, located around 330 km from Bamako, the capital of Mali. Patients presenting with persistent digestive disorders (abdominal pain and/or persistent diarrhoea) were enrolled, clinically examined and subjected to a suite of microbiological techniques on urine and stool specimens, including stool microscopy, rapid diagnostic tests and bacterial stool culture.
RESULTS Between August 2014 and November 2015, 553 symptomatic patients with persistent digestive disorders were recruited; 97.6% had abdominal pain, while the remaining 2.4% had diarrhoea. Among all stool samples examined by direct faecal smear, 89.0% were positive for at least one intestinal protozoa or helminth species. Using the Kato-Katz technique, 66.9% of the samples were positive for either *Schistosoma mansoni* or *Hymenolepis nana*. Other frequently detected parasites included the protozoal species *Entamoeba histolytica/E. dispar*, *Giardia intestinalis* and *Trichomonas intestinalis*. Based on these results, a combination of metronidazole and praziquantel was proposed for the management of digestive disorders in the study area.
CONCLUSION This study provides data on the most prevalent parasitic pathogens detected in patients with digestive symptoms in the Niono area. Infections with *G. intestinalis* and *S. mansoni* were the most frequently encountered treatable conditions in these patients. Hence, metronidazole and praziquantel are suitable treatment options for individuals with persistent digestive disorders in this Malian setting.

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Digestive disorders in Mali: assessment of a neglected public health issue

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INTRODUCTION Diarrhoea, abdominal pain and other digestive disorders are common reasons for healthcare consultations in resource-constrained settings. The patient's medical history and a thorough clinical examination can provide valuable information regarding the need for additional examinations. Helminths and intestinal protozoa are common infectious agents giving rise to abdominal pain in tropical areas, but the extent of their contribution to the development of digestive disorders is insufficiently described. NIDIAG (www.nidiag.org) is an international research consortium aiming to elucidate the aetiology of digestive disorders in the tropics.
AIM To quantify the extent of digestive disorders as a health problem in Mali and to document currently employed diagnosis-treatment strategies.
METHODS In July 2011, we conducted a health facility-based assessment in two regions of Mali (Segou and Sikasso). In the Segou region, which is endemic for intestinal schistosomiasis, the two districts Niono and Macina were selected, and four community health centres were visited. In Sikasso, the districts Bougouni and Selingue (where hookworm infection is known to be particularly prevalent) were selected and seven healthcare centres were visited. In each centre, we reviewed patient data charts to identify the major clinical complaints of patients presenting to these centres, as assessed by medical history, clinical examination and documentation of the patients' respective laboratory results. Additionally, we assessed the available laboratory diagnostic capacity.
RESULTS We recorded 4148 cases of digestive disorders among a total of 30 270 medical consultations (13.7%). The highest rates were recorded in Kangare (51.6%) and Tagan (28.4%), followed by Ndebougou near Segou (22.8%). Stool microscopy for intestinal parasites was performed and revealed an infection in 32.0% of all cases. Most of the surveyed laboratories were not sufficiently equipped and the staff not adequately trained to perform sensitive diagnostic methods (e.g. stool microscopy using concentration techniques). The most frequently prescribed anti-infective drugs were antibiotics (e.g. metronidazole) and the anthelminthics albendazole and praziquantel.
CONCLUSION The study identified digestive disorders as a major health problem in the surveyed areas of Mali. There is a need for setting-specific diagnosis-treatment algorithms to improve the clinical management of digestive disorders.

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Multicenter surveillance of bloodstream infections in Kisangani, Oriental Province, Democratic Republic of the Congo: auality indicators from blood cultures

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INTRODUCTION Bloodstream infections are associated with a high mortality, which can reach 25% in children. Blood cultures allow quality controlled identification of isolates and are considered the reference method for diagnosis of bloodstream infections. Surveillance of blood cultures has been set up in different hospitals in the Oriental Province, Democratic Republic of the Congo.
METHODS Blood cultures (BioMérieux, Marcy l'Etoile, France) were collected in 2 private centers and 7 public hospitals in the Oriental province, Democratic Republic of the Congo, for patients presenting with signs of Systematic Inflammatory Response Syndrome (SIRS). Blood cultures were incubated at 37°C during 7 nights and visually checked for growth every day. Identification of retrieved isolates was done according to standard procedures.
RESULTS During the 6-years period, 3.646 blood cultures were collected of which the majority (n = 3107, 85%) from children (<15 years). The samples were collected in 9 health facilities, compromising 2 private centers (47% of samples) and 7 public hospitals (53% of samples). The overall positivity rate was 8.3%. This rate was more elevated in the public hospitals compared to the private centers (10.8% and 6.2% respectively). The key pathogens retrieved were *Salmonella* non Typhi (n = 74, 24%), *Staphylococcus aureus* (n = 46, 15%), *Klebsiella pneumoniae* (n = 36, 12%), non-fermenting bacteria (n = 34, 11%) and *Salmonella* Typhi (n = 28, 9%). The contamination rate was defined as 9.8%. For 1262 blood culture bottles, the site of venipuncture was registered, compromising the elbow vein (n = 597, 47%), the back of the hand (n = 458, 36%) and the femoral vein (discouraged for venipuncture; n = 74, 5.8%). The latter site showed the highest contamination rate (16/74 bottles, 21%) compared to 10.9% (n = 307/2991) for bottles collected from the back of the hand. In addition, contamination rate was higher in health facilities were 6 phlebotomist collected cultures compared to facilities with 1–3 phlebotomists (10% and 8% respectively).
CONCLUSION Blood cultures are quintessential for surveillance of key pathogens in a particular setting. In this study setting, a close follow-up of contamination rate and training of phlebotomists is needed to decrease the contamination of blood cultures and as such the laboratory workload.

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The influence of dengue virus serotype on disease severity

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INTRODUCTION Dengue is an endemic disease that occurs in the tropical and subtropical regions of the world. The dengue virus belongs to the family Flaviviridae and comprises four antigenically distinct serotypes (DENV-1 to DENV-4). The four serotypes of virus, cause a broad spectrum of clinical manifestations ranging from asymptomatic to severe presentations. Hyperendemicity with multiple serotypes is believed to be one of the significant factors influencing dengue severity. Indonesia is a country with several hyperendemic regions. Previous study show that all four dengue serotype are present in Indonesia, including Yogyakarta, and dengue virus infections due to DEN-3 serotype are more prevalent.
AIM The purpose of this study was to assess the influence of dengue serotype on the hematologic profiles and disease severity.
METHODS A cross-sectional study was conducted in Panembahan Senopati Hospital, Bantul. Individuals with acute febrile disease were enrolled in the study. Dengue infection and viral serotypes were confirmed by reverse transcription polymerase chain reactions (RT-PCR), and hematology profiles were obtained from medical records.
RESULTS Thirty-nine, PCR-proven, dengue infected patients were studied. They were infected with DEN-1, DEN-3, and DEN-4 in 49%, 8%, and 5%, respectively. Hematological parameters (except Hematocrit) showed significant differences in DENV-3 group when compared with nonDENV-3 group (DENV-1 and DENV-4). DENV-3 patients showed lower platelet count (P-value 0.042) and leucocyte count (P-value 0.001) than nonDENV-3. This study also showed that the dengue severity in DENV-3 group was significantly different than nonDENV-3 patients (P-value 0.037).
CONCLUSION The present study found that hematology parameters and disease severity appear to be different for patients infected with DENV-3 and nonDENV-3 (DENV-1 and DENV-4).

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Investigation of markers of artemisinin resistance at selected intervals during the 72-hr period after artemisinin based combination therapy dosing in Kisumu western Kenya

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BACKGROUND Persistent parasitemia occurs in at least 25% infections in sub-Saharan Africa despite continued efficacy of artemisinin-combination therapy (ACT) across Africa. *Plasmodium falciparum* mutation in chloroquine resistance transporter gene (*pfcrt76*) multi drug resistance gene1 (*pfmdr1*), deubiquinating enzyme gene (*pfcubp-1*) and clathrin vesicle associated adapter 2, u subunit encoding gene (*pcap2mu*) and multidrug resistant protein 1 gene (*pfmrp1*) have been associated with subsequent parasitemia. As there are no validated markers of ACT resistance in Africa to-date, surveillance of changes in

these polymorphisms is useful in establishing their role in ACT treatment outcome.
METHODS Each of the 118 *P. falciparum* sample from a 2013–15 ACTs clinical efficacy study was screened at three or four-time points; day zero before start of treatment then days 2 and 3 after initiation of treatment plus the day of subsequent parasitemia by microscopy prior to day 42 for some of the subjects. Sequence analyzers were used to genotype for frequency of drug resistance polymorphisms, genetic diversity typing of the 12 microsatellite loci. Worldwide Antimalaria Resistance Network's (WWARN) parasite clearance estimator (PCE) was used to determine parasite clearance rates.
RESULTS The most polymorphic loci of *Pfap2mu* and *pfcubp-1* genes were S145C at 18% and E1528D at 19%. *Pfmdr1* 86,184 and 1246 had significant increase in wild type alleles at time-points 3 and 4. Multiple copies of the Pfmdr1 gene were observed in 4.55% of the samples analysed. Microsatellite profile analysis show that the mean number of alleles in all the loci across the 8 populations ranged from 9.250 to 1.000. Poly a was the most polymorphic with 35 alleles. The mean unbiased heterozygosity (H_e) was 0.672 while Shannon diversity index for the 8 populations was ranging between 0.182–0.000, none of the parasite analyzed had matching haplotypes. The mean parasite clearance half-life was 2.63 hr (IQR), 95% confidence interval) and the median clearance.
CONCLUSION Low clearance rate attained in this study suggests that ACTs are still effective treatment in Kenya. However, increased wild-type *Pfmdr1* 86,184 and 1246 as well as polymorphisms in *pfap2mu* and *pfcubp-1* in post day zero suggest that these genes could be responding to ACT dosing and require continued monitoring. Samples with multiple copies of the *Pfmdr1* did not indicate any effects on parasite clearance.

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SMS photograph-based external quality assessment of reading and interpretation of malaria rapid diagnostic tests in the Democratic Republic of the Congo

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INTRODUCTION The present External Quality Assessment (EQA) assessed reading and interpretation of malaria rapid diagnostic tests (RDTs) in the Democratic Republic of the Congo (DRC).
METHODS The EQA consisted of (i) 10 high-resolution printed photographs displaying cassettes with real-life results and multiple choice questions (MCQ) addressing individual health worker (HW), and (ii) a questionnaire on RDT use addressing the laboratory of health facilities (HF). Answers were transmitted through short message services (SMS).
RESULTS The EQA comprised 2344 HW and 1028 HF covering 10/11 provinces in DRC. Overall, median HW score (sum of correct answers on 10 MCQ photographs for each HW) was 9.0 (interquartile range 7.5–10); MCQ scores (% of correct answers for a particular photograph) ranged from 54.8% to 91.6%. Most common errors were (i) reading or interpreting faint or weak line intensities as negative (3.3%, 7.2%, 24.3% and 29.1% for 4 MCQ photographs), (ii) failure to distinguish the correct Plasmodium species (3.4–7.0%), (iii) missing invalid and negative test results (8.4% and 23.6%) and (10.0% and 12.4%) respectively. HW who were trained less than 12 months ago had best MCQ scores for 7/10 photographs as well as a significantly higher proportion of 10/10 scores, but absolute differences in MCQ scores were small. HW who had participated in a previous EQA performed significantly better for 4/10 photographs compared to those who had not. Except for two photographs, MCQ scores were comparable for all levels of the HF hierarchy and non-laboratory staff (HW from health posts) had similar performance as to laboratory staff. Main findings of the questionnaire were (i) use of other RDT products than recommended by the national malaria control programme (nearly 20% of participating HF), (ii) lack of training for a third (33.6%) of HF, (iii) high proportions (two-thirds, 66.5%) of HF reporting stock-outs.
CONCLUSIONS The present EQA revealed common errors in RDT reading and interpretation by HW in DRC. Performances of non-laboratory and laboratory staff were similar and dedicated training was shown to improve HW competence although to a moderate extent. Problems in supply, distribution and training of RDTs were detected.

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Effect of additional instructions for sputum sampling on microscopic tuberculosis detection in Kinshasa, Democratic Republic of Congo

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BACKGROUND Microscopy after ZN staining is the reference tool for diagnosis and monitoring of TB patients even If its sensitivity remains low. Democratic Republic of Congo (DRC) is listed as a country with high burden of TB. However, the case detection remains below the threshold set by WHO.
AIM The aim of this study is to determine the effect of additional instructions for the collection of sputum among TB patients in Kinshasa, the capital city of DRC.

METHODS A randomized intervention study was conducted on suspected TB patients in eleven selected TB screening centers randomly assigned into intervention group (5) and control group (6) in Kinshasa. In the intervention group, a sputum sample was collected from all patients after instruction of 5 to 10 min on sputum sampling using illustration images; while, the standard process was carried out in the control group. A total of 608 patients were included (295 in the intervention group and 313 in the control group). Sputum samples were examined for volume, quality and presence of acid-fast bacilli by experienced laboratory technicians blinded to study groups.
RESULTS It was found that most patients with tuberculosis (>80%) were aged 25 years and older, with a predominance of male subjects (53%) and an estimated median age of 39 years. We found no statistical significance difference between the two groups (intervention and control) for the detection of TB cases (22.7% and 25.6%, *P* value 0.55).
CONCLUSION Additional sampling instructions show no effect on the rate of tuberculosis screening. Most sputum specimens collected had a volume of less than 3 ml, which in our opinion would have a negative impact on the Ziehl positivity rate in our study.

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Photo-based external quality assessment of malaria rapid diagnostic tests in a non-endemic setting

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INTRODUCTION In non-endemic settings, expertise in microscopy for malaria diagnosis is often limited and malaria rapid diagnostic tests (RDTs) are used as an adjunct to diagnosis.
AIM We performed an External Quality Assessment (EQA) on reading and interpretation of RDTs.
METHODS Participants were all medical diagnostic laboratories in Belgium and the Grand Duchy of Luxembourg using malaria RDTs; they received (i) 10 high-resolution photographs presenting the band patterns of real-life RDTs with the correct interpretation listed in a multiple choice format and (ii) a questionnaire about their practices in malaria diagnosis.
RESULTS Among 135 subscribing laboratories, participation rate was 98.5% (133/135); eligible answers for 137 RDT products (10 different brands) used by 133 participants were received. Scores of 10/10, 9/10 and 8/10 were achieved for 58.4%, 13.1% and 8.2% of the 137 products respectively among 133 participants. For three-band *P. falciparum* – pan-*Plasmodium* RDTs (8 products, 112 (81.8%) users), most frequent errors were (i) disregarding faint test lines as negative (18.7%); (ii) reporting invalid instead of *P. falciparum* (7.2%). and (iii) reporting '*Plasmodium* spp.' without mentioning the presence or absence of *P. falciparum* (11.6%). For four-band RDT, errors were (iv) disregarding faint *P. vivax* test lines as negative (47.6%) and (v) reporting '*Plasmodium* spp.' without mentioning the presence of *P. falciparum* and *P. vivax* (28.6%). Instructions of use (IFU) of only 4 out of 10 RDT products mentioned to interpret faint-intensity test lines as positive (conducive to errors 1 and 2) and IFU of two products displayed incorrect information conducive to errors 2 and 5. Outside office hours, 31.0% of participants relied on RDTs as the diagnostic test without microscopy confirmation of a negative RDT.
CONCLUSION Diagnostic laboratories performed well in reading and interpretation of malaria RDTs, but errors were embedded in the instructions for use of the products. Relying on RDTs alone for malaria diagnosis (about one third of participants) is not a recommended practice.

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Rethinking the approach of medicine stability testing

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INTRODUCTION To establish the storage conditions and expiry date of a new medicine, it must first undergo laboratory-based stability testing. The International Conference on Harmonisation (ICH) of Technical Requirements for Registration of Pharmaceuticals for Human Use recommends exposing the medicines to constant temperature and relative humidity (RH) for an allotted timeframe [1]. While these conditions are chosen to represent climatic conditions the medicine may be exposed to prior to consumption, constant temperature and RH conditions do not simulate the cyclic variation of a day/night cycle in a non-thermoregulated storage facility.
AIM The aim of this study was to assess the degradation profile of artemether and lumefantrine-based antimalarial medicines undergoing laboratory-based stability tests under (i) ICH accelerated conditions (constant 40°C and 75%RH for six months [1]) and (ii) cyclic conditions (cycling daily between 28 and 51°C and 38-85%RH for six months). These degradation profiles were also compared to authentic samples collected from five administrative districts in Uganda. The five districts were chosen using a statistically-based stratification process involving descriptive weather data ranging between July 2014 and June 2015, therefore creating five 'climate zones' within Uganda.
RESULTS A high-performance liquid chromatography (HPLC) method was developed and validated to detect substandard and degraded co-formulated artemether and lumefantrine antimalarial medicines. Three brands of artemether and lumefantrine-based antimalarial medicines were exposed to ICH accelerated conditions and novel cyclic conditions, based on weather information in Kampala, Uganda. The degradation of the target active pharmaceutical ingredients (API) was quantitatively measured as percent loss, while the generation of the identified degradation products was reported as relative percent gains. Surveys that were disseminated during the authentic sample collection process provided further insight into the procedures of sale, restocking and disposal of expired medicines in the pharmacies that were visited.
CONCLUSION The stability of the API and degradation profiles for each condition will be presented and discussed. The cyclic testing regime represents a novel approach to evaluate medicine stability that better reflects the anticipated climatic conditions of shipping and storage in targeted low- and middle-socioeconomic regions.

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A systematic review and meta-analysis of the risk of transfusion transmitted malaria from blood donors in sub-Saharan Africa

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INTRODUCTION Transfusion transmitted malaria (TTM) is a major component of global transfusion transmitted infections, however estimates of its incidence are limited. It is important as it may increase the morbidity and mortality of blood donation recipients, the majority of whom are young children and pregnant women who are often anaemic or suffering from other co-morbidities. It may also jeopardise global malaria elimination efforts by acting as a reservoir for subclinical parasite transmission.
AIM A systematic review was conducted to assess the current prevalence of Plasmodium parasite carriage in blood donors in high-endemic regions in sub-Saharan Africa and to provide estimates of spatial and temporal heterogeneity of TTM risk across Africa.
METHODS Publication databases and clinical trial registries were searched for articles reporting prevalence studies of malaria parasitemia amongst blood donors in sub-Saharan Africa, written in English and French published between 2000 and 2016. Grey literature sources such as the World Health Organization (WHO) website and individual countries' ministry of health websites were searched for published reports, and reference lists of papers were also screened. Risk of Bias was assessed using the Joanna Briggs Institute Prevalence Critical Appraisal Tool.
RESULTS 14 studies were included in the qualitative synthesis and 13 in the meta-analysis (4035 subjects). This included ten from Nigeria, one from the Democratic Republic of Congo, one from Benin, one from Cameroon and one from Senegal. Pooled prevalence of malaria parasitaemia was 34.1% (95% CI: 24.3–43.8%), ranging from 6.5% to 74.1%.
CONCLUSION A third of blood donors in SSA are estimated to be carrying plasmodium. Considering the location of the surveys included in this review, our point estimate reflects the situation in high transmission areas. As transmission and immunity wane in SSA, this prevalence will likely decrease but the severity of TTM will likely increase thereby posing a potentially serious threat to recipients, and possibly interfering with elimination efforts.

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Pre-travel guidelines needed for travelers with an immunocompromised status or chronic disease

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INTRODUCTION Travelers with an immunocompromised status or chronic disease (TISCD) have an increased susceptibility to travel-related diseases. Pre-travel care regarding vaccinations and prophylactics is complex. In certain conditions, an antibody titer check after vaccination or the prescription of standby antibiotics are recommended.
AIM The objective of this study was to evaluate the protection level by preventive measures in TISCD by analyzing rates of vaccination protection, antibody titers, and the prescription of standby antibiotics.
METHODS We analyzed, and report, according to STROBE guidelines, pre-travel care data for TISCD from 2011 to 2016. We included patients with an immunocompromised status or chronic disease aged 0–90 years old who visited the medical pre-travel clinic at the Academic Medical Center, Amsterdam.
RESULTS We included 2104 subjects with a mean age of 46.6 years and mean travel duration of 34.5 days. TISCD treated with immunosuppressive drugs (29.7%), HIV (17.2%) or diabetes mellitus (10.2%) comprised the largest groups. Most frequently visited countries were Suriname, Indonesia, and Ghana. Vaccination rates were high (>90%) for DTP, hepatitis A, and typhoid fever; intermediate (>70%) for yellow fever; and low (< 20%) for rabies, Japanese and tick-borne encephalitis, and meningococcal disease. Of travelers in high need of hepatitis A and B protection, 56.6% and 75.7%, respectively, underwent titer assessments at least once before travelling. Travelers with HIV were more likely to have an antibody-titer-check. Only 50.6% of travelers with a respective indication received a prescription for standby antibiotics.
CONCLUSION Vaccination rates in our study population were overall comparable to those of healthy travelers studied previously in our center; however, since patients are more susceptible to infections, the question arises whether physicians should be more pro-active regarding vaccination and antibody-titer-checks. This study reveals that uniform pre-travel guidelines for TISCD are highly needed regarding antibody titer assessments and prescription of stand-by antibiotics.

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Lobomycosis in an Italian traveler acquired during 5 days-honeymoon in the Amazon region of Venezuela

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INTRODUCTION Lobomycoses is a cutaneous mycosis characterized by chronic nodular or keloidal lesions caused by *Lacazia loboi*, an uncultivable fungus.
AIM To describe the management of Lobomycosis acquired in Amazon region 18 years earlier.
METHODS In July 1999, a healthy 38-year-old Italian man and his wife spend honeymoon travelling for 30 days around Venezuela. During jungle trekking (5 days) the patient reported several insects bites but any skin trauma. Several weeks after he recalled pruritus and small painless papular skin lesions on the left lower limb, evolving to a plaque-type lesion. Blastomycosis and cryptococcosis were hypothesized. Although three consecutive biopsies and many long treatments with itraconazole, no definitive diagnosis and only minimal improvement were achieved.

The patient arrived to our attention in 2017. Physical examination showed a large nodular plaque covered by smooth and shiny skin over the brownish dyscromic surface of the left tibia

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measuring 15–20 cm. The case, diagnosis and treatment of Lobomycosis are discussed.
RESULTS Histopathologic examination of hematoxylin-eosin and periodic acid-Schiff stain sections showed histocytes and giant cells filled with numerous thick double wall yeast-like cells, fulfilling the morphologic diagnostic criteria of *Locazia loboi*[1]. Culture was negative for fungi. Sequencing of ITS1/2 amplicons from bioptical material, confirmed taxonomic identity. The phylogenetic tree constructed with representative ITS1/2 sequences of *Lacazia* and dimorphic fungi, showed a well supported (bootstraps value >95%) '*Lacazia* clade', clear separated from *Blastomyces*, *Histoplasma, Paracoccidioides and Coccidioides* clusters. Itaconazole 200 mg every 12 hr was started.
CONCLUSION Lobomycosis is endemic in rural areas of Amazon (Brazil, Ecuador, Venezuela, Guyana, Suriname, Bolivia, Peru, Colombia) where it affects indigenous people[1-2]. Rare imported cases have been described in industrialized countries. A case has been reported in an American traveller who walked beneath Angel Falls[3]. The increase of international travel may lead to an increase of imported cases of neglected cutaneous mycosis in no-endemic countries. Lobomycosis should be considered during clinical investigation of chronic nodular skin disease in patient reporting any recent or old trip in Amazon regions. *Lacazia loboi* does not grow in vitro and it can be identifiable only by molecular method.

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Cardiovascular disease risk prediction in sub-Saharan African migrant and home populations – comparative analysis of risk algorithms in the Rodam study

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INTRODUCTION Validated absolute risk equations are currently recommended as the basis of cardiovascular disease (CVD) risk stratification in prevention and control strategies. However, there is no consensus on a risk 'equation of choice' for sub-Saharan African populations.
AIM To assess the agreement between the Framingham laboratory, Framingham non-laboratory and the Pooled Cohort Equations in stratifying CVD risk of Ghanaian migrant and home populations with no overt vascular disease.
METHODS The 10-year risks of CVD were calculated for 3864 subjects aged 40-70 years in the multi-centre RODAM study conducted among Ghanaian adults residing in rural and urban Ghana and Europe using the Framingham laboratory and non-laboratory algorithms and the Pooled Cohort Equations (PCE) for African Americans. Patients were classified as having low, moderate or high risk, which corresponded to <10%, 10–20% and >20% respectively. Cohen's kappa coefficient was used to assess the agreement between the risk algorithms while correlation between continuous CVD risk estimates was assessed using the Spearman correlation. Differences in the correlation coefficients across the various settings was tested using the Steiger's Z test for correlation coefficient.
RESULTS In all, 18.6%, 10.9% and 4.8% of the study participants were ranked as high 10-year CVD risk by Framingham non-laboratory, Framingham laboratory and PCE, respectively. The estimated median (25th–75th percentiles) 10-year CVD risk score was 9.5 (5.4–15.7), 7.3 (3.9–13.2) and 4.8 (2.3–9.3) for Framingham non-lab, Framingham lab and PCE, respectively. The concordance between PCE and Framingham non-laboratory was better in the home Ghanaian population (kappa 0.39; 95% CI 0.35–0.43, $r = 0.72$) than the migrant population (kappa 0.23; 95% CI 0.20–0.25, $r = 0.71$) whereas concordance between PCE and Framingham laboratory was better in the Ghanaian population residing in Europe (kappa 0.54; 95% CI 0.51–0.57, $r = 0.76$) than home population (kappa 0.49; 95% CI 0.45–0.54, $r = 0.73$).
CONCLUSION This study shows that the prediction of CVD risk in sub-Saharan African populations is reliant on the risk algorithm adopted. Validation against hard CVD outcomes is needed to inform appropriate selection of CVD risk algorithm for use in African populations.

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An unusual case of leprosy from Germany – just an exception of the rule?

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In March 2009, a patient of Pakistani origin was diagnosed with multibacillary (MB) leprosy. Subsequent to laboratory confirmation (skin smear microscopy, bacteriological index [BI] 1+; positive PCR; PGL-I serology >100 antibody units [AU]; histopathology) the patient underwent 12 months MDT (rifampicin, dapsone, clofazimine). Clinical symptoms had completely receded in May 2010 and anti-PGL-I antibodies had significantly decreased (<30 AU). The patient was followed-up in yearly intervals including PGL-I serology.

In October 2015, the patient complained about painful swelling of the middle finger joints. There was a significant rise of the anti-PGL-I antibodies (>100 AU), unambiguous clinical signs of a relapse were however absent. Due to an external diagnosis of rheumatoid arthritis the patient received methotrexate over 6 weeks.

In February 2016, the patient had multiple lesions suggesting a relapse, which was laboratory confirmed by histopathology, microscopy and RLEP qPCR of nasal swab samples with a

remarkably high bacillary load (BI 4+, >100.000 bacilli per swab). Molecular testing revealed no drug resistance. Corresponding to a significant proportion of solid stained bacilli (morphological index [MI] 50%) a molecular viability assay (16S rRNA RT qPCR) proved the presence of viable *M. leprae* in nasal swab samples. The patient was put on a second course of MDT.

Treatment outcome and infectivity of the patient were assessed by microscopy (BI, MI), quantitative RLEP qPCR, RNA assay and PGL-I serology. Whereas subsequent to initiation of MDT a significant decrease of the bacillary load was noted, the RNA assay detected viable bacilli until day 110 and solid stained bacilli were seen until day 67 after start of treatment. Over a period of six months anti-PGL-I antibodies decreased again to low levels.

Although the infectious dose of *M. leprae* for humans is not known, the high BI and the prolonged excretion of viable *M. leprae* through the upper respiratory tract suggest infectivity for contact persons as well as an increased risk for further relapse and necessitate extended MDT.

To identify similar cases at greater risk of transmitting *M. leprae* or having a relapse we strongly recommend laboratory based follow-up including up-to-date molecular tools and PGL-I serology.

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The challenge of persistent parasitic and viral infections among prisoners from sub-Saharan Africa and Latin America: a cross-sectional study in Geneva, Switzerland

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INTRODUCTION More than 70% of detained people in Swiss prisons are foreigners who often originate from sub-Saharan Africa or Latin America. These two regions are endemic for various persistent infections, including neglected tropical diseases (NTDs). These diseases, often silent, are associated with poor health outcome, especially if they occur concomitantly: e.g. schistosomiasis with viral hepatitis B (HBV) or C (HCV), strongyloidiasis with HIV, HCV with HIV, or HIV with HBV.
AIM Our research aimed to study the prevalence of HIV, HBV, HCV, strongyloidiasis and schistosomiasis in people from sub-Saharan Africa and Latin America detained in a pre-trial detention center in Geneva, Switzerland.
METHODS We carried out a cross-sectional prevalence study using serological testing and a standardized questionnaire to collect data, and applied descriptive statistics methods.
RESULTS Among the 201 participants, 85.6% (n = 172) originated from sub-Saharan Africa and 14.4% (n = 29) from Latin America. We found the following prevalence ratios among overall participants (sub-Saharan Africans; Latin Americans): HIV: 3.5% (4.1%; 0%), HBV: 12.4% (14.5%; 0%), HCV: 2.5% (2.3%, 3.4%), strongyloidiasis: 8.0% (8.1%, 6.9%). The serological prevalence of schistosomiasis among participants from sub-Saharan Africa was 19.8%. Coinfections were detected only in participants from sub-Saharan Africa: schistosomiasis and chronic HBV in 4.7% (8/172), schistosomiasis and HIV in 0.6% (1/172), HIV and chronic HBV in 0.6% (1/172), and HIV and HCV in 0.6% (1/172).
CONCLUSION Our findings indicate that the prevalence of HIV, HBV and HCV among migrants in detention centers reflects the situation in the country of origin. Persistent parasitic NTDs, such as strongyloidiasis and schistosomiasis, should no longer be overlooked in custodial settings that host migrants from endemic regions. The high prevalence of persistent viral and parasitic infections among detained migrants from sub-Saharan Africa and Latin America reinforces the need to implement detection and control strategies that reach people in detention centers effectively. They must be part of the agenda for achieving target 3.3 of the United Nations Sustainable Development Goals: to end the epidemics of neglected tropical diseases and combat viral hepatitis.

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'He doesn't seem to understand it as an illness': mental health interventions for migrant victims of torture and other forms of ill treatment

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INTRODUCTION By focusing too heavily on psychiatric categories of questionable cross-cultural validity such as Post-Traumatic Stress Disorder (PTSD), humanitarian mental health interventions may run the risk of pathologizing and victimizing individuals, thereby ignoring wider social and political contexts and denying aspects of autonomy, self-reliance, and self-protection. The need for culturally relevant treatment for traumatized refugees, focusing on post-migration factors, is clearly of no small concern.
AIM In order to (i) explore culturally-informed perspectives on trauma from an individual, qualitative perspective and (ii) track the trajectory of post-traumatic responses in relation to processes of social integration, we present the results of 12 months of research among asylum seekers and refugees in a center for victims of torture in Athens, managed by Médecins Sans Frontières in collaboration with Babel and GCR[2].
METHODS Ten beneficiaries of the center for victims of torture were interviewed multiple times over the course of a year. Interviews were conducted in French or English without the support of cultural mediators, and focused on trauma symptomatology, explanatory models of distress, the current socio-political environment and processes of integration. We also interviewed 31 health professionals and cultural mediators and 21 leaders from refugee associations and communities across Athens. Interviews were transcribed, coded and thematic analysis conducted.
RESULTS Key themes highlighted included the substantial psychological impact of current material realities of migrant victims of torture as they adapt to their new environment. The periods before and after being granted asylum were identified as

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being two distinct phases in the psychological lives of migrants, each with specific stressors. Delayed asylum trials, poor living conditions and unemployment had a substantial impact on post-traumatic symptoms that in turn influenced the capacity for social and professional integration. Personal, social, and cultural resources did have a mediating effect on the stressors identified above.
CONCLUSION The research findings highlight the need for psychosocial interventions to incorporate a more contextualised understanding of trauma as being largely determined by larger cultural systems and socio-political contexts. Psychosocial interventions should focus on the practical realities of the post-migration environment, interdisciplinary approaches to care and quality cultural mediation.

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Epidemiological, microbiological and clinical data of traveller pregnant women returning from vector-borne endemic areas for Zika virus

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INTRODUCTION World Health Organisation (WHO) declared the spread of Zika virus (ZIKV) a public health emergency of international concern in February 2016. ZIKV has been associated to neuro-developmental abnormalities of the foetuses and infants born in Latin American and Caribbean countries. However, few data is known about traveller pregnant women (PW) returning from vector-endemic areas for ZIKV.
AIM To analyse the ZIKV infection prevalence, and epidemiological, microbiological and clinical characteristics of the PW screened for ZIKV in the main referral Maternal-Child Health Hospital of Barcelona city, Spain.
METHODS Prospective observational cohort of PW screened for ZIKV infection in University Hospital Vall d'Hebron (Barcelona, Spain) from January 2016 to March 2017. Epidemiological, clinical and laboratory data were recorded on a RedCAP® database. Ethics approval was obtained from the participating centre.
RESULTS Overall, 183 PW were screened, 21.3% (39/183) had a probable or confirmed ZIKV infection, 43.6% of them (17/39) were primiparous, returning from Dominican Republic 33.3% (13/39), Honduras 23.1% (9/39), Colombia 12.8% (5/39), Bolivia 12.8% (5/39), Ecuador 7.7% (3/39), Venezuela 8.2% (2/39), and El Salvador 7.7% (2/39). Median [IQR] mother's age and gestational age for diagnosis were 30.5 [23.5–34.4] years and 20.6 [15.5–28.5] weeks, respectively. Most of them were asymptomatic 56.4% (22/39); in symptomatic cases, rash was the main clinical manifestation 76.5% (13/17). Amniocentesis was performed in 38.5% (15/39), with positive ZIKV RT-PCR in only one case (6.7%; 1/15), which was the only foetus with neurologic abnormalities. ZIKV infection was confirmed by RT-PCR in 20.5% (8/39), and was probable by positive ZIKV-IgM in 10.3% (4/39) or positive ZIKV neutralization test in 69.2% (27/39). One of the three elective abortions tested positive ZIKV RT-PCR in placental tissue. Co-infections with dengue (positive IgM) were observed in three cases, one of them in the woman with the microcephalic foetus. Prevalence of ZIKV infection was of 21.3% (39/183). After birth, all the children born-to-ZIKV-infected mothers tested negative for ZIKV RT-PCR and IgM.
CONCLUSION This is the largest series of traveller ZIKV-infected PW in Europe. One third returned from Dominican Republic, most of them were diagnosed in the second term (20.6 weeks), and were asymptomatic (56.4%). ZIKV infection was confirmed by RT-PCR in 20.5% of cases. Prevalence of ZIKV infection in PW was 21.3%.

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Human filariasis: transversal study on imported cases at an International Health Reference Unit in Barcelona

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INTRODUCTION Human filariasis are included in the group of the so called neglected tropical diseases (NTD). They represent an important health issue in low income countries where they can lead to chronical manifestations. Even though they are circumscribed to tropical areas, some cases may be present in the increasing number of immigrants coming from endemic areas.
AIM The objective of this study was to describe the imported cases of human filariasis reported during the last three years at a Tropical Medicine Unit in Barcelona.
METHODS We analysed 47 cases of imported filariasis diagnosed at our microbiological laboratory between January 2014 and December 2016.
RESULTS Twenty-seven (51.1%) were women, median age was 45 (IQR 24–65). Forty (85.1%) were immigrants and 14.9% were 'visiting friends and relatives'. Most of them came from: Equatorial Guinea (35/47) followed by Senegal (6/47) and Cameroon (2/47). Twenty-seven (57.4%) infections were caused by *Mansonella perstans*, seventeen (36.2%) by *Loa loa*, three (6.4%) were a coinfection of both. Median levels of microfilaria in bloodstream were 130 mf/ml (IQR 53–>1000) for *Loa loa*, and 25 mf/ml (IQR 4–60) for *M. perstans*. Most of them (63.8%) were asymptomatic. *Loa Loa* cases showed a greater increase of immunoglobulin E (median of 1353 KU/l, IQR 231-4890) and absolute and relative eosinophilia (median 800/µl, IQR 500–2300; 12.8%, IQR 8.8–27.3%); *M. perstans* median of immunoglobulin E was 459 (IQR 71–1989); median absolute and relative eosinophil count were 400/µl (IQR 100–700) and 6.5% (IQR 2.9–13.3%). Thirty-three (75%) cases showed a positive test for helminths in stool or urine: 43.2% trichuriasis, 20.5% schistosomiasis (6 *Schistosoma intercalatum*, 2 *S.mansoni*, 1 *S. haematobium*), 20.5% ascariasis 15.9% hookworms and 4.5% strongyloidiasis. We also checked other comorbidities: 8 anti-HVC+, 5 HBsAg+, 4 latent tuberculosis infection, 3 malaria (*P. falciparum*), 3 syphilis and 1 HIV being the most relevant.
CONCLUSION Filariasis is a relatively unseen infection in non-endemic areas. Nevertheless, they are sometimes asymptomatic what can lead to underdiagnosis and underestimation of their prevalence. Thus, active screening for filarias in immigrants

coming from endemic African countries, with special relevance in those with eosinophilia and/or high levels of immunoglobulin E, is fundamental.

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3P81

Delayed *Plasmodium falciparum* malaria in three migrants

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INTRODUCTION Imported *P. falciparum* malaria in travellers occurs mostly in the first two months after returning from endemic areas, but delayed presentation has been described, especially in particular risk groups.
AIM Report 3 cases of clinical *P. falciparum* malaria occurring years after arrival in Europe and discuss contexts in which delayed presentation may occur.
RESULTS The 3 subjects were Sub-Saharan Africans migrants arrived in Belgium respectively 2, 4 and 6 years before with risk factors for delayed presentation of *P. falciparum* malaria: Patient 1 was pregnant, Patients 2 and 3 had treated and well controlled HIV infection. All patients had to be hospitalized, clinical presentation of malaria was classical, with Patient 3 having criterion for neuromalaria. Parasitaemia was 4/1000 RBC, 30/1000 RBC and 3/1000 RBC respectively. Clinical and biological evolution was favorable in the three patients after treatment.

Emerging evidence from both epidemiological studies and case reports indicate that migrants are particularly at risk for presenting clinical *P. falciparum* malaria long time after arrival. The underlying hypothesis is that subclinical parasitemia may last for years in migrants who have acquired *P. falciparum* specific immunity, late clinical malaria being secondary to immunity's decrease with time. In pregnant women, it likely reflects the unique physiopathology of placental malaria, whereas in HIV infected patients, it is probably due to impaired parasite clearance in a context of defective immunological response. Chronic HIV infection is indeed associated with T and B cells dysfunction that may persist even after antiretroviral treatment
CONCLUSION Threshold suspicion of delayed malaria must be low in migrants even without recent travel history, especially in those with risk factors. In these patients, new prevention and screening strategies should be studied.

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Colonisation of German soldiers returning from deployment with enterobacteriaceae with resistance against 3rd generation cephalosporins

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INTRODUCTION German soldiers are screened for colonisation with resistant bacteria at the Department of Tropical Medicine at the Bernhard Nocht Institute after deployment. The screening is focused on Gram-negative rod-shaped bacteria with resistance against 3rd and 4th generation cephalosporins, e.g., in case of expression of ESBL (extended spectrum beta-lactamases), and against carbapenems as well as on MRSA (methicillin resistant *Staphylococcus aureus*) and on VRE (vancomycin resistant enterococci).
AIM A retrospective assessment was performed to quantify the dimension of the colonisation with resistant bacteria in soldiers after deployment in comparison with civilians. By this approach, it was assessed whether or not deployment is a considerable risk factor regarding the acquisition of colonisation with resistant bacteria.
METHODS Two to three months after deployment, a screening for resistant bacteria was offered to the soldiers. Between 2008 and September 2017, nearly 800 returnees were screened. Stool samples, swabs from the perianal region, pharynx, nostrils, and - if present- wounds were screened on selective agars for MRSA, VRE and resistant Gram-negative rod-shaped bacteria.
RESULTS About 50 out of 800 soldiers were colonised with ESBL, while only one individual showed VRE colonisation. In detail 6.2% of the returnees were colonised with ESBL-positive strains, 0.1% were colonised with VRE. During the course of the assessment, a trend towards increased colonisation was observed. From 2008 to 2012, 3.3% individuals were colonised. In contrast, 8.7% of the returnees who were assessed between 2013 and 2017 showed colonisation with resistant bacteria. In the German population, the average ESBL-colonisation rate is estimated to be about 10% while VRE colonisation largely differs depending on the geographic region.
CONCLUSION In spite of a trend towards increased colonisation with resistant bacteria in returnees from military deployments, the colonisation rate is still acceptably low compared with the average colonisation of the German population. This finding is in contrast with previous assessments with international travellers, showing high colonisation rates after their return. Restoration of the enteric microbiome after the soldiers' return within the two to three months prior to the screening is a likely reason for this result. At least regarding intermediate- and long-term carriage of resistant bacteria, military deployment does not seem to play a major role.
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TRIP (Travel Remote Infomation Platform) – a platform for monitoring traveler's health

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INTRODUCTION Most of the studies reporting symptoms during the travel are done retrospectively (1),(2), increasing the odds of recall bias. Moreover, there is no information about the percentage of travelers that suffer mild or no symptoms during their trips because they never attend to a clinic afterwards.
AIM The main aim of the study is to detect incidence of symptoms real-time amongst travelers visiting tropical and subtropical countries. Also, comparing symptoms between travelers taking or not malaria chemoprophylaxis and other demographic variables.
METHODS Participants were recruited at a Travel Clinic in Barcelona (February–May 2016). Participants downloaded a Smartphone Application (App) that checked their health status daily while travelling, asking for diarrhea, abdominal pain, cutaneous lesions, fever, headache, joint pain, oral ulcers, and insomnia. User's health status was monitored through a web-based platform in real-time. Exclusion criteria were: travelling more than one month and taking malaria prophylaxis other than atovaquone-proguanil. An informed consent was signed prior to participate in the study.
SUMMARY OF THE RESULTS 106 participants were recruited, 62.26% (66/106) were male with mean age of 36 years (±11SD). Main travel purpose was tourism in 58.1% (61/106). A 35/106 (33%) users were on chemoprophylaxis. Thailand was the most visited country in 12.26% (13/206). The mean days of travel was 12 (±11SD). A 15% (13/106) had two or more symptoms during the trip. Main recorded symptoms were diarrhea in 13/106 cases (15%) and abdominal pain in 11/106 cases (13%). No differences between symptoms were observed by sex, purpose of travel, age, duration of the trip or prophylaxis status. Main observed incidence was diarrhea: 1.4% per person per day, and abdominal pain 1.2% per person per day. Travelers used the App a mean of 9.99 days (±SD 6.89).
CONCLUSION The study showed no severe health complications in trips less than 30 days but incidence of symptoms, specially diarrhea, could be higher than previously reported (2),(3). There were no differences in symptomatology between travelers on prophylaxis and those without. The platform showed good usability and worked in order to detect symptoms real-time. The platform is ready to be used at bigger scale.

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Epidemiological and clinical characteristics of imported Chagas disease in a hospital in Madrid

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INTRODUCTION The increase of population mobility during last decades has lead to the spread of Chagas disease outside Latin America endemic countries. Spain is the European country with the highest expected number of infected patients by *Trypanosoma cruzi*.
AIM To describe the main characteristics of Chagas disease in a hospital in Madrid.
METHODS We performed an retrospective descriptive study using hospital records database of diagnosed patients of Chagas disease in Hospital Fundación Jiménez Díaz (Madrid) between 2009 and 2016.
RESULTS A total of 122 patients were diagnosed of chagas disease. The mean age of the patients was 40 years (range: 2–69 years), being 94% of patients from Bolivia and 81% were female.

Cardiological manifestations were found in 20% of patients and digestive symptoms in 13%. Alterations in the ECG and echocardiogram were found in 36.3% and 15.7% of the patients, respectively.

Considering only cardiological manifestations, the main symptoms were: chest pain (6%), palpitations (6%), dyspnea (4%), dizziness (2%), syncope (2%) and orthopnea (1%), being altered ECG and echocardiogram in 45% and in 29% of patients with cardiological manifestations respectively.

The main digestive symptoms were: constipation (7%), reflux (2%), abdominal pain (3%) or dysphagia (2%). Esophageal manometry was performed in five patients, finding achalasia in three patients (60%) and hypoperistaltic in 1 (20%). Altered manometry was found in 4 patients, three of them had showed digestive symptomatology. The rest of the patients were asymptomatic at diagnosis.
CONCLUSION In our study, the predominant patients' profile was an asymptomatic women at fertile age from Bolivia. This and the conditions associated with organ affectation underlines the need for increased efforts towards the early detection of *T. cruzi*. Continuing research on NMR appears fully justified because. It could be a useful tool for myocarditis early diagnosis.

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Risk factors of imported malaria in a non-endemic country

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INTRODUCTION Malaria is a rising problem in non-endemic countries as a result of changing immigration and travel patterns.

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AIM To describe the travel patterns of imported cases of malaria diagnosed in two Spanish hospitals.
METHODS Retrospective study of clinical and laboratory data from malaria cases managed in Hospital 12 de Octubre and Hospital Fundación Jimenez Díaz (Madrid, Spain) from January 2012 to December 2015. The epidemiological, clinical and biological characteristics of imported malaria in immigrants (i) from endemic areas or (ii) from endemic areas living in Europe and visiting friends and relatives (VFR) were compared with those of travelers of European origin.
RESULTS During this time, 58 patients (50.0% males) were diagnosed of malaria. The average age was 35.5 ± 20.3 years (range 0.1–87 years). In 40 patients (70.0%), the infection arose during a visit to friends and relatives in the country of origin, 13p (22.4%) were travelers of European origin and only 5p (8.6%) were immigrants from endemic areas. Severe malaria, according WHO criteria, was diagnosed in 26 patients (44,8%), Considering each group: 60.0% (3p) of immigrants from endemic areas showed severe malaria, 42.5%(17p) of VFR and 46.2%(6p) of travelers from Europe. ($P > 0.05$, Chi-square test)

Plasmodium falciparum was detected in 45p (78%), mixed infection was diagnosed in 7p (12%), *Plasmodium vivax* in 2p (3%) and in 4p (7%), *Plasmodium* spp. antigen was detected without identification. Intravenous treatment was administered in 22 patients (38%), being artesunate the most common (86%). A total of 55 patients (88%) received oral treatment, 18 of them after initial intravenous treatment. The vast majority of VFR did not receive malaria prophylaxis or had a pre-travel health care encounter compared with travelers from non-endemic areas (98% vs. 54%; $P \leq 0.01$).
CONCLUSION People living in non-endemic areas travelling back to their home country to visit friends and relatives remain as the commonest group for imported malaria in developed countries. Lack of counselling and chemoprophylaxis is extremely frequent in this group of travelers.

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Serological screening for cysticercosis in internationally adopted children in Italy

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INTRODUCTION Neurocysticercosis (NCC) is a leading cause of epilepsy worldwide. In Europe, the majority of cases are diagnosed in immigrants. In Italy, internationally adopted children from resource limited countries are screened with a serological test for cysticercosis.
METHODS We retrospectively reviewed the features of pediatric patients serologically screened for cysticercosis at two pediatric reference centers for internationally adopted children in Italy in the period 2001–2016. Patients were screened with at least one commercial serological test: Enzyme Linked Immune Assay (ELISA) and Enzyme Linked Immune Electro Transfer Blot (EITB).
RESULTS Three thousand and four hundred ninety children were included. The median age was 6 years and 57.5% were male. According to the country of origin, 1528 (43.8%) were from Asia, 1157 (33.1%) from Latin America, 570 (16.3%) from Africa, 82 (2.3%) from Europe, and for 199 (5.7%) the country of origin was unknown. One thousand seven hundred and forty two (49.9%) subjects were screened with EITB only, 1193 (34.2%) with EITB and ELISA, 555 (15.9%) with ELISA only. One hundred eighty eight children were seropositive, 139 (73.9%) with ELISA, 35 (18.6%) with EITB and 14 (7.4%) with both EITB and ELISA. The seroprevalence of cysticercosis in the whole population ranged between 1.7% and 8.7% according to the EITB and ELISA, respectively. Among the 188 seropositive children, only 14 (7.4%) were diagnosed with NCC according the diagnostic criteria proposed by Del Brutto in 2001 (6 positive were positive to EITB only, 7 to both EITB and ELISA and 1 to ELISA only). Of these children, 8 were asymptomatic and 6 presented epilepsy. Among seronegative children ($n = 3302$), 8 presented with neurological symptoms (epilepsy or headache) that lead to the diagnosis of NCC according to the Del Brutto criteria. Among the 22 children with NCC, all the symptomatic (6 seropositive and 8 seronegative) had active lesions at neuroimaging, while among the 8 asymptomatic seropositive subjects 5 had calcified lesions and 3 had active lesions.
DISCUSSION AND CONCLUSIONS NCC is rare in internationally adopted children. The need for serological screening of cysticercosis should be reconsidered after a cost-effectiveness evaluation.

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Impact of antimalarial chemoprophylaxis on clinical presentation of imported malaria in children: a retrospective study in a Parisian university hospital

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INTRODUCTION Imported malaria is one of the most common cause of hospitalisation in children with fever back from the tropics. France is the European country where the incidence of imported malaria is the highest.
AIM This study aimed to estimate the adequacy of antimalarial chemoprophylaxis prescriptions to French health guidelines and the impact on the clinical and biological presentation at admission of imported malaria.
METHODS Ninety-eight children with diagnosis of imported *falciparum* malaria were reported over a 8-year period (2006–2013) in a Parisian university hospital. Three groups of patients according to the type of chemoprophylaxis: absent (A: $n = 48$), inappropriate (B: $n = 25$) or adapted (C: $n = 25$), were compared based on clinical and biological characteristics at admission of hospitalisation, with R software.
RESULTS 77 non-severe (78.5%) and 21 severe malaria cases (21.5%) were reported. 94 cases of this study (96%) had none or inadequate or poorly taken chemoprophylaxis. 48 children (49%) did not use chemoprophylaxis. Use of non-recommended

antimalarial was reported into 25 children (25.5%). Only 25 patients (25.5%) had chemoprophylaxis prescriptions adapted to the age and the endemic area visited. Only 14 families (28%) reported full compliance. Twelve of 50 users (24%) stopped prematurely. Forgetfulness was the main cause of poor compliance, whereas only 3 children (6%) stopped due to side effects. Mean parasitemia was significantly higher in group A than in group C (6.3 ± 8.8% vs. 1.5 ± 1.8%; $P = 0.02$) and so was the proportion of severe malaria (A: 31% vs. C: 4%; $P = 0.07$). The proportion of severe thrombopenia (<50 000/mm^3) and the mean of hospitalisation stay were also significantly higher in group A than in group B and C ($P = 0.003$ and $P = 0.008$).

CONCLUSION Antimalarial chemoprophylaxis is insufficiently followed by families and still poorly adequately prescribed by health practitioners. Improvement of heath practices are needed for reduction of imported cases of malaria in children. Patients without any chemoprophylaxis seem to have a significantly more severe presentation at admission compared to patients with an appropriate chemoprophylaxis, even poorly taken.

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Artemisin-based combination therapy for the treatment of non-severe imported malaria in children: a retrospective study in a Parisian university hospital

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INTRODUCTION Artemisinin-based combination therapies (ACT) are recommended by WHO guidelines for the first line treatment of severe and non-severe malaria in adults and children in endemic countries where they are largely used[1]. French guidelines (2007) recommended either atovaquone-proguanil (non ACT) or artemether-lumefantrin (ACT) for treatment of non severe imported malaria in children. Among the 1893 *P. falciparum* malaria cases reported in 2014 by the French National Malaria Center, 51% patients were treated with atovaquone-proguanil (AP, $n = 971$) and only 35% with ACT: artemether-lumefantrin (AL, $n = 253$), dihydroartemisinin (DHA)-piperaquin ($n = 227$) or Artesunate IV ($n = 182$).

AIM This retrospective non-randomised study aimed to describe use of ACT in non severe malaria in children and to report the comparison of efficacy and safety between artemether-lumefantrin and atovaquone-proguanil treatment in one Parisian center where ACT were used since 2011.

METHODS 154 children with malaria were admitted in the pediatric emergency department at Bicêtre Hospital from February 2006 to September 2014. 21 severe malaria were reported. 69 children with non severe malaria were treated with atovaquone-proguanil (AP: $n = 46$) or with artemether-lumefantrin (AL: $n = 23$). Efficacy and tolerance were compared between the two groups with R software. Characteristics at baseline in the two groups were comparable.

RESULTS 23 non severe cases (33%) were treated with ACT (AL: $n = 23$ and none with DHA-piperaquin). All parasitological controls at day 3–7 and 28 were negative with AL. Two examinations were positive at day 3, one at day 7 and none at day 28 with AP. Delay of apyrexia was significantly shorter with AL compared with AP (20.4 hr vs. 34.9 hr, $P = 0.003$). None side effects were observed with AL, especially neither significant prolongation of interval QTc nor delayed anemia.

CONCLUSION Artemeter-lumefantrin in treatment of non severe imported malaria is efficient and safe in children in our study. ACT are still insufficiently prescribed by French practitioners. Randomised double-blinded prospective controlled trials should be performed to confirm the first choice of artemisinin-based combination therapy (ACT) in non severe imported malaria in children.

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3P89

Severe cases of imported *Plasmodium ovale* malaria in a French University Hospital Center: a 2015–2017 retrospective cohort study

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INTRODUCTION Since 2015, there has been a substantial increase of the number of reported cases of imported *Plasmodium ovale* malaria in mainland France. In February 2017 two severe and complicated cases were diagnosed in a French University Hospital Center (UHC).

AIM To document the cases of *P. ovale* malaria hospitalized at a French UHC.

METHODS Retrospective cohort study including all patients with a final PCR diagnosis of malaria and hospitalized at a French UHC from March 2015 to February 2017.

RESULTS Over the period, 111 imported cases of malaria were hospitalized: 95 (86%) with *P. falciparum*, 10 (9%) with *P. ovale* and 2 co-infected with both species. Severity criteria were met by 28 patients: 25 (89%) with *P. falciparum* and 3 (11%) with *P. ovale*. The proportion of severe malaria was similar for *P. falciparum* and *P. ovale*: 26% and 30%, respectively.

All three cases of severe *P. ovale* malaria required intensive care. Severity criteria were shock, respiratory failure with shock, and subcapsular splenic hematoma. Two patients shared a similar history: the first symptoms occurred more than ten months after the last stay in the exposure country and both were treated by an adequate Doxycycline chemoprophylaxis. The third patient had last been exposed two months before hospitalization but without appropriate chemoprophylaxis. The delay of hospital care seeking was at least of seven days for all three patients, and a PCR diagnosis was reached only after a minimum of two days.

Artenimol + Piperaquine combination was the treatment of all *P. ovale* malaria cases, followed by Primaquine in the absence of a G6PD deficiency.

CONCLUSION *P. ovale* is known to cause malaria relapses despite proper antimalarial chemoprophylaxis. Delays in care seeking, *P. ovale* identification and treatment initiation may be responsible for an increased severity and more frequent complications.

Abstracts

A diagnosis of *P. ovale* should be considered early in a patient with a travel history to a West African country even more than 6 months after the last exposure. In case of a negative blood smear, a PCR with fast result should be performed.

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Zika virus infection – the experience of a reference laboratory for its surveillance in Catalonia

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BACKGROUND On February 2016, the WHO considered the current Zika virus (ZIKV) epidemic a public health emergency of international concern due to its causal relationship with microcephaly among newborns and with Guillain–Barre syndrome in adults.
AIM The aim of this study is to describe the demographic, clinical and microbiological data of patients screened and/or diagnosed for ZIKV infection in the Vall Hebron University Hospital (HUVH).
MATERIAL AND METHODS A descriptive analysis was carried at the Microbiology Department of HUVH, Barcelona. For this study, demographic (age, gender, country of destination, nationality, type of case, duration of travel, risk group); clinical and microbiological data were registered in a specific database from February to December 2016.

Serology for ZIKV (IIF technique, Euroimmun®) and Reverse-transcription polymerase chain reaction (RT-PCR) (Zika RealStar, Altona®) were performed in HUVH. Neutralization antibody test for ZIKV was performed if needed at the Spanish National Centre for Microbiology.

Diagnostic algorithm depended on the presence of symptoms and time elapsed from its onset to the clinical consultation. Asymptomatic patients were screened by serology. In symptomatic patients, microbiologic test performed depended on time elapsed: <5 days, RT-PCR in serum and urine; between 5 and 7 days, RT-PCR and serology; more 7 days only serology.

Detection of ZIKV RNA in any specimen and/or detection of ZIKV IgM in serum sample(s) and confirmation by neutralization test were considered as a confirmed case.
RESULTS Of the 1133 patients initially screened for ZIKV, 921 (81.3%) were women. Median ± interquartile range age was 32.3 ± 9.1 years. Central and South America was the most frequent to screened cases, with 70.8%, followed by Asia (9.5%) and Africa (1.5%). Most of them travelled to Dominican Republic (10.2%) and Ecuador (9.7%). Up to 95 patients travelled to more than two different ZIKV risk areas.

Of the 1133 patients screened, 639 were asymptomatic (56.4%). Pregnancy was the largest risk group between screened cases. Of the 676 pregnant women screened, 506 were asymptomatic (74.5%), not defined in 108 (16.0%) and 62 were symptomatic (9.2%).

Twenty-seven (2.4%) of the 1133 patients screened were diagnosed of ZIKV, 11 cases (40.7%) were pregnant women, and the rest (59.3%) didn't belong to any risk group. Twenty-five (92.6%) of the patients diagnosed were symptomatic. Diagnostic test that lead to the diagnosis were a positive IgM detection with a confirmative neutralization test in one case (3.7%) and a positive RT-PCR in organic fluid in 24 cases (88.9%). In two patients both techniques were positive.
CONCLUSIONS ZIKV infection has been a diagnosis challenge due to its causal relationship with microcephaly and for the risk of transmission out of endemic areas. Active surveillance of this infection is needed for the early detection of fetus alterations and autochthonous cases.

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First results of an HIV counselling and testing project in the irregular migrant population of Doctors of the World, Antwerp

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INTRODUCTION Irregular migrants are at increased risk of HIV.[1] There is an increased evidence of post-migration acquisition of HIV.[2] Prevention in countries of destination are of great importance.
AIM To increase access to prevention, testing and care we started offering HIV Counselling and Testing (HCT) in collaboration with the Institute of Tropical Medicine Antwerp at the 1st line healthcare centre of Doctors of the World Antwerp, Belgium. The majority of patients have no access to healthcare and >80% are irregular migrants. To increase knowledge on risk factors for HIV we gathered data on demographic and behaviour factors.
METHODS We started offering HCT through Opt-In in December 2015. A short introduction on HIV and testing is given in the waiting area. All patients are free to take up HIV testing. When giving their consent, they receive counselling, Alere HIV Combo RDT and referral for further STI screening if necessary. During 2016 we conducted anonymous questionnaires to patients receiving HCT. We used Microsoft Access and Excel for data entry and analysis.
RESULTS Up to submission of this abstract 385 patients received HCT. 1 patient tested positive for HIV. During 2016, 269 patients received a questionnaire. 59% were male, 61% female. Median age was 36. 261 (97%) patients originated from outside of Western Europe (32% Sub-Saharan Africa, 27% North-Africa/Middle-East, 25% Asia, 9% Eastern Europe, 5% Latin-America). 41% were residing in Belgium >5 years. 42% had no fixed housing. 89% had no access to healthcare. 56% never received HIV testing. Previous testing varied between regions (14% Asia up to 80% SSA). 14% reported an STI in the past. During the previous year 49% had 1, 30% ≥ 2 sexual partners. Of these patients 18% reported using a condom consistently. 4% were MSM. 13% reported receiving money or gifts in exchange of sexual intercourse. The proportion of no fixed housing was higher in this group (61% vs. 42% ($P = 0.03$ Chi-square test)). 3% reported sniffing or injecting drugs in the past.
CONCLUSION 385 patients received HCT. Important risk factors were no access to healthcare, no fixed housing, no previous HIV test and transactional sexual contacts.

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Abstracts

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Cystic echinococcosis in refugees from Syria and Iraq

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INTRODUCTION Screening of refugees for infectious diseases usually covers highly infectious diseases such as tuberculosis and in some programs infections due to intestinal parasites and HBV infection. Screening for cystic echinococcosis (CE) is usually not foreseen in such programs.
AIM To see whether CE is worth screening for in refugees.
METHODS Some occasional symptomatic cases of CE were presented to our service in order to obtain advice. Therefore, we started serological screening for CE in refugees from the middle East and Afghanistan.
RESULTS Four cases of CE are presented: one Syrian male patient was referred by the German Heart Centre Berlin because of an endomycardial, a pulmonary and a heptic echinococcal cyst, a woman from Iraq was presented because of multiple hepatic cysts. Two cases of an asymptomatic liver cyst were detected by systematic screening of adolescent refugees from the Middle east and Afghanistan.
DISCUSSION Screening for CE should be part of health programs in refugees because CE is frequently asymptomatic and is relatively easy to treat in the initial state without dissemination or before complications occur.

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Myhealth: models to engage migrants and refugees in their health, through community empowerment

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INTRODUCTION Access to quality health care is often limited for at risk populations, such as vulnerable migrants and refugees (VMR), and even more for women and unaccompanied minors. The difficulties accessing the healthcare systems arise from different causes: linguistic barriers, different cultural understandings of health and its care, lack of familiarity with and healthcare systems, social exclusion, undocumented situation that impede access healthcare unless if not an emergency situation, bureaucracy and economic difficulties to settle in the new country and address changes, etc.
AIM MyHealth Project (GA Number: 738091) is a European Funded Project under 3rd Health Programme (2014–2020). Starting in March 2017 this project, with 11 partners in 7 countries, will last three years. Its main aim is to improve the healthcare access of vulnerable immigrants and refugees (VMR), with special focus on women and unaccompanied minors, newly arrived to Europe, by developing and implementing models based on the knowhow of a European multidisciplinary network. This project started on April 2017 and the end date will be on April 2020.

There are different innovations points in the project. To develop a complete interactive map, with main health issues, main actors and stakeholders, reference sites dealing with VMR legal and the ICT tools available. To define more clearly the current health problems of vulnerable migrants treated in our health centers. To define and develop health intervention strategies in Mental Health/ Communicable and non-communicable diseases, based on the community health approach. To develop and ICT based platform with Health applications. To implement the defined strategies and models over the hospital participating in the consortium. To ensure training and involvement of all the key actors in the Health system value chain.
CONCLUSION At the end of project, we will have:

Main issues and appropriate screening and treatment strategies for VRM in Mental Health, infectious diseases and non-communicable diseases.
Versatile ICT based platform on VRM health, including the interactive map with health legal and organisational details, general information, contact, and health apps.

Key findings will be obtained at the end of the first year.

4P1

Economic and disease and burden of dengue from the perspective of the patients and their families

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INTRODUCTION Dengue is one of the re-emerging diseases with the highest propagation in the world. Little data available on the disease and economic burden from dengue for patients and their families.
OBJECTIVE To describe the disease and economic burden for dengue patients and their families in Santiago de Cuba.
METHOD As a policy, all suspected dengue patients are hospitalized in Cuba. We carried out the study in confirmed adult dengue cases in Grillo hospital, Santiago de Cuba, during dengue outbreak, between January and October 2015. A questionnaire was applied to 92 patients and their relatives. We calculated the DALYs lost per million inhabitants, the average loss of quality of life and the average non medical direct costs and indirect cost per patient.
RESULTS The DALYs lost per million inhabitants was 351 DALYs (IC95% 61–634). The global loss of quality of life (0–100 scale) was 67.9% at the worst moment of the illness. The self perceived period to recuperation was on average 13.1 days. On average each patient visited 1.3 times ambulatory services prior to the hospitalization. The Primary Health Center was the ambulatory service most visited. Patient stayed at hospital 3.96 nights on average. No patient was classified as severe dengue. Patients do not incur medical cost in Cuba, but direct medical cost assumed by the government amount on average to 144.60US$. The average non medical costs (out-pocket expenditure) by patients and families amounted 7.95US$ (i.e. 36% of the average monthly salary in Santiago). 44.7% and the 32.0% were expended in food and transportation, respectively. The average indirect costs was calculated in 4.10US$. These expenses were mainly financed using savings, donations of relatives and friends.

Abstracts

CONCLUSION Moderate overall amount of DALYs lost contrast with substantial loss of quality of life during individual illness episodes. The non-medical direct and indirect cost for patient and families, due to dengue disease, was low. The medical direct costs burden assumed by the government is 12 times this cost.

4P2

Yellow fever in Brazil: report of 2 cases

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INTRODUCTION In 2017, seven imported arboviruses have been transmitted in Brazil by the African mosquito *Aedes aegypti*. The serotypes of Dengue virus 1, 2, 3 and 4, Chikungunya virus, Zika virus and additionally yellow fever virus (YFV) could be transmitted by this mosquito. YFV (Flaviviridae, Flavivirus) and *Aedes aegypti*, both arrived from Africa or Caribbean into Brazil with the trade of slaves and commodities brought by ships. YFV caused urban outbreaks in the 17th, 19th and 20th centuries, in large Brazilian coastal and coffee areas. At some point, in a fantastic way, the virus jumped from the cycle involving humans and *Aedes aegypti* to a wild cycle involving non-human American primates and *Haemagogus* mosquitoes from the forest canopies. YFV is currently maintained as a primate zoonosis in the Amazon rainforest, the Pantanal and the Central Plateau. However, sometimes, YFV has been found producing epizootics on monkeys that migrate through river gallery forests and reach sites close to highly populated regions in the South and Southeast regions of Brazil and there this virus produces human disease outbreaks. Since the second semester of 2016, the southeastern region has been suffering a large epizootic of primates that leaded to the largest human outbreak of YF in the last 60 years. A number of 1230 human cases were reported, including 197 fatal cases, mostly cases occurred in January 2017.
AIM Present 2 fatal cases of yellow fever and warn on the need to vaccinate in order to avoid the urbanization of this disease in Brazil.
METHODS Clinical data, complementary exams, and necropsy data are shown also including epidemiological data.
RESULTS Both patients were male adult patients not previously immunized to YF, that approximately 5 days after the onset of symptoms, developed jaundice-hemorrhagic syndromes and fast evolved into hepatic, renal, and respiratory failure.
CONCLUSION These cases highlight the outbreak of a severe disease transmitted in rural areas but with a potential risk to become urbanized if YFV is transmitted by *Aedes aegypti*. Theoretically, urban YFV cycles are possible in Brazilian large cities, including those not far from the present outbreak, Belo Horizonte, Vitoria and Rio de Janeiro, all of them infested by *Aedes aegypti*. To prevent this fearsome threat is important to massively vaccinate urban populations with the 17DD yellow fever vaccine. In these large cities, probably, less than 50% of the population is vaccinated while at least 80% immunized are formally required to block urban transmission and prevent large outbreaks of YF.

4P3

Micro costing of an *Aedes aegypti* control programme

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INTRODUCTION Dengue is one of the re-emerging diseases with the highest propagation in the world. Despite the increase of economic studies on the cost of control of its main vector *Aedes aegypti*, there is insufficient micro-cost data available, to compare expenditures according type of geographic area, season, control activity to allow economic modeling and cost prediction.
OBJECTIVE To micro-cost an intensive *Aedes aegypty* control program by month and type of area.
METHOD The cuban *Aedes aegypti* control programme carries out three main activities: inspection of premises for detecting and eliminating immature mosquito stages and larviciding, indoor fogging and outdoor spatial spraying. During 2015 we collected in Santiago de Cuba data on the resources consumed per month in urban (n = 10), semi-urban (3) and rural (3) areas. We used forms and spreadsheets specially designed for the purpose. We valued recourses at 2015 prices. Costs were classified by activities and further as recurrent and capital. We calculated average costs per 1000 premises, per 1000 premised treated (revised, sprayed) and per house block sprayed. We ran a GEE population average model to quantify the influence of the geographic area, entomological infestation and coverage of activities on cost.
RESULTS The overall House index and Breteau index was 0.70 and 0.84 respectively. The average cost for *Aedes* control per month per 1000 premises was US$ 1 379.09 (IC95% 1295.79–1462.30) for urban, US$698.36 (IC95% 607.44–798.39) for semi-urban and 688.45 (IC95% 586.79–817.62) for rural areas. The cost per 1000 premises revised/sprayed was US$848.90/US $784.43, US$1 023.67/US$305.93 and US$373.52/US$324.19 for urban, semi urban and rural areas, respectively. Spatial spraying costed per house block was US$1.75, 0.81US$ and US $0.24 for urban, semi urban and rural areas, respectively. In the multivariate model the geographic zone ($P < 0.02$), indoor spraying coverage ($P < 0.026$) and spatial spraying coverage ($P < 0.03$), but not month and entomological infestation by itself were independent determinants of total cost. The cost peaked at the end of November, a month after the peak in dengue incidence.
CONCLUSION In order to maintaining relative low entomological indices the *Aedes aegypti* control programme incur high costs. Costs depend on the geography and on coverage of the activities. The increase resource use should be planned to take place before the usual seasonal dengue peak.

Abstracts

4P4

Towards knowledge translation of community empowerment strategies in dengue prevention: a fresh look at a Cuban experience

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INTRODUCTION Evidence directly linking community participation to health outcomes is insufficient. Participatory approaches as well as factors influencing them vary significantly according to the context. To translate effective community empowerment strategies into practice, empirical research must provide a better understanding of essential processes, but also on underlying mechanisms and plausible outcomes in a given context.
AIM Systematize and conceptualize processes and mechanisms leading to outcomes of an effective empowerment strategy for dengue prevention in La Lisa, Havana, Cuba to identify potential context-mechanism-outcome configurations (CMOs) to be further confirmed.
METHODS Temporal analysis was applied to reanalyse qualitative and quantitative empirical data on the implementation of the strategy. Additional information was obtained through systematization workshops conducted with various stakeholders and key informants. Data analysis was inductive.
RESULTS Temporal mapping the sequence of actions implemented by actors working at different levels; the chain of processes, outputs and outcomes as well as identifying the role of contextual factors, provided a different view of the implementation of the strategy and improved on process descriptors of each of its four components: capacity-building, organization & management, surveillance and community work. Surveillance was necessary but not sufficient for empowerment in dengue vector control. Community work was an intermediate outcome leading to problem resolution and vector reduction. Our hypothesis that organization & management and capacity-building were essential in changing power relationships between vector control stakeholders working at the same or different levels was confirmed. For these two latter processes, implicit underlying mechanisms identified were: intrinsic and extrinsic motivation of individual and organizational actors, team spirit, perceived efficacy of social interactions, transformational leadership and experience-based and collective development of capacities and social awareness. The implementation context was characterized by centralized management and multilevel implementation of vector control activities, a highly organized civil society and top-down participatory local government structures in a conducive political environment towards empowerment, among others.
CONCLUSION Organization & management and capacity-building processes and their underlying mechanisms were essential for this empowerment strategy to be effective in vector control in Cuba. These mechanisms need to be confirmed through empirical research in other settings with different contextual characteristics.

4P5

Insecticide-treated curtains and residual spraying for dengue control: disappointing effects on disease incidence in a cluster randomized controlled trial in Santiago de Cuba

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INTRODUCTION While vector control interventions are considered the cornerstone of dengue control programmes, the evidence supporting their use remains weak.
AIM To evaluate the effectiveness of long lasting Insecticide Treated Curtain (ITC) deployment and Residual Insecticide treatment (RIT) for reducing dengue incidence and *Aedes* infestation.
METHODS A cluster randomized controlled trial was set-up between April 2011 and October 2012, 63 clusters of around 250 houses each were selected in Santiago de Cuba and randomly allocated to 3 study areas (21 clusters arm). ITC were distributed in and intra- and peri-domiciliary RIT was periodically applied in the other one. Routine control programme activities (inspection of houses for source reduction, larviciding of water-holding containers, selective adulticiding, health education, promotion and enforcing mosquito control legislation) were conducted in the control and intervention arms over the entire period. The primary outcome was incidence of clinical dengue cases; the secondary outcome was *Aedes* infestation (house index). We evaluated the effect on both outcome measures by fitting a generalized linear regression model with a negative binomial link function to the data grouped by month and cluster.
RESULTS All clusters received the treatment and were included in the analysis. Overall, there was no protective effect of ITC or RIT for intervention, with compared to control clusters dengue incidence RR of 0.96 (95% CI 0.72–1.28) and 1.43 (95% CI 1.08–1.90), and house index RR of 1.25 (95% CI 1.03–1.50) and 1.16 (95% CI 0.96–1.40) respectively. The monthly dengue incidence rate at cluster level was best explained by falling in an epidemic period (IRR 5.50 (95% CI 4.14–7.31)), the incidence rate in houseblocks bordering the cluster (IRR 1.03 (95% CI 1.02–1.04)) and the incidence rate pre-intervention (IRR 1.02 (95% CI 1.00–1.04) treatment arm had no (significant) effect. *Aedes* indices monthly were reduced significantly (RR 0.54 (95% CI 0.32–0.89) in the first month after insecticide applications, but this effect faded between applications and did not influence dengue incidence.
CONCLUSION Adding RIT or ITC to the already intensive routine *Aedes* control programme in Cuba has no impact on the incidence of clinical dengue cases and does not substantially further reduce already moderate to low entomological infestation levels.

Abstracts

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Spatial heterogeneity and persistence of dengue incidence in the north central region of Venezuela

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INTRODUCTION Dengue is the leading cause of human morbidity due to arboviral disease worldwide. In Venezuela, it remains an important cause of illness and public health burden, becoming the most widespread mosquito-borne disease in the country over the past years. Here, dengue is caused by all four distinct serotypes (DENV-1, 2, 3, and 4) and transmitted by the domestic mosquito *Aedes aegypti*. Previous studies in Venezuela have shown that certain areas (e.g., at neighborhood or house level) are more prone to maintain higher dengue transmission and for longer periods than others; with this heterogeneity reducing the efficacy of disease control strategies. Although the north central region of the country is highly endemic for dengue; until now, few attempts have been made to characterize this disease in space and time.
AIM Here, we identified space and space-time clusters of high and persistent monthly dengue incidence at parish level over a period of 7 years in two of the most populated regions of northern Venezuela.
METHODS Local spatial statistics (Kulldorff scan statistics, Getis-Ord Gi* and Anselin's Local Moran I) were used to detect clusters of disease.
RESULTS The most significant space and space-time clusters ($P < 0.05$) were primarily concentrated in the main metropolitan areas of each region. Additionally, dengue persistence (number of consecutive weeks with cases) was positively associated with greater population density. Nevertheless, we also detected significant spatial clustering of dengue ($P < 0.05$) in less populated areas from the central coast of Venezuela. The latter zones are usually neglected by the control and surveillance national program. These unexpected findings are relevant since this coastal and touristic region is frequently visited by people coming from all over the country and may serve as a geographic reservoir or source of new dengue infections dispersing to the main metropolitan areas.
CONCLUSIONS Our results provide useful information to support public health programs in their efforts to control and predict dengue spread allowing better allocation of resources.

4P7

Community intervention against dengue in Ouagadougou: theory and implementation fidelity

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INTRODUCTION While malaria control is at the heart of health actions in Burkina Faso, the recent Dengue epidemic, implies new interventions. No intervention to combat Dengue and its vector (Aedes) has never been organized in Burkina Faso.
AIM This paper presents the design, planning and implementation processes of an innovative community-based intervention to fight against Dengue in Ouagadougou.
METHODS Observation, analysis of documents related to the intervention and semi-structured interviews with stakeholders were conducted. Collected data were organized and analyzed using QDA Miner. The theory of intervention was devised in a participatory way. Implementation fidelity and adaptation in the original design were assessed.
RESULTS The theory of the intervention, rooted on reported good practices of community-based interventions, was developed and discussed with key stakeholders. It included four components: mobilization and organization, operational planning, community action and monitoring/evaluation. The interaction of these components would improve population′s knowledge on dengue and enhance community capacity for vector control and, consequently, it would reduce the burden of the disease. The implementation was followed-up and documented. The selection of activities and operational planning were made on the basis of scientific evidences and with the community. The list of activities selected was considered acceptable, appropriate and potentially effective. The majority of the planned activities were conducted. Adaptations concerned implementation and monitoring of activities. The implementation of the intervention was carried out according to its original theory.
CONCLUSION Despite some difficulties could be anticipated or not, this innovative experience showed the feasibility of developing community-based interventions for vector-borne diseases in Africa.

4P8

Clinical and biological characteristics of Yellow fever suspect patients in Nsona-Mpangu Hospital, NSona-Mpangu Health Zone, DRCongo

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CONTEXT Yellow fever (YF) is an emerging Arbovirus infection ravaging the intertropical regions in Africa and America. Recently YF outbreaks occurred in Angola, Brazil and DRC

causing hundreds of deaths in each. Clinical manifestations of YF are often confused with other endemic infectious diseases such as Malaria, typhoid fever which are most commonly found in DRC. In public health, it is useful to set up case definition for infectious diseases in order to have accuracy in the diagnosis, treatment, surveillance and transfer of infected people.
AIM To describe the clinical symptoms and biological manifestations associated with YF suspect patients.
METHODS From January to April 2016, we conducted a cross-sectional study in suspected YF patients transferred from Angola to General Hospital of Nsona-Mpangu in Kongo central (DRC). Relevant information on clinical symptoms and biological results has been collected from patient's medical records to create a valuable database.
RESULTS We recruited 44 YF suspect patients. The mean age was 30.5 years (3–70 years). The main clinical signs observed were: jaundice in 72.7% (32/44), asthenia in 61.4% (27/44), fever in 54.5% (24/44) but also of the behavior disorders in 11.4% (5/44) and bleeding in 9.1% (4/44). YF IgM was detected in 40.9% (18/44) of participants, hemoglobin lower than 10 g/l was found in 60.6% (20/33). A glycaemia rate higher than 200 mg/dl was found in 27.6% (8/29) of participants.
CONCLUSION This study showed a various clinical symptoms associated with biological disorders in YF patient which can be include in YF case definition in outbreak setting.

4P9

Tuberculosis treatment outcomes among TB/HIV co-infected cases treated under directly observed treatment of short course in Nekemte, Western Ethiopia

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INTRODUCTION Tuberculosis (TB) and Human immunodeficiency virus (HIV) co-epidemics remain a major public health challenge, particularly in low income countries. Treatment outcome is an important indicator of Tuberculosis control programs as the World Health Organization suggested. However, this was not well documented in the study area.
OBJECTIVE To assess the tuberculosis treatment outcome of tuberculosis and human immunodeficiency co-infection patients attending DOTs services selected health institutions in Nekemte Town Western Ethiopia.
METHODOLOGY A 5 year (2009–2013) register based retrospective cohort study was conducted from April to May 2014 in six institutions providing DOTS program at Nekemte, Western Ethiopia. Bivariate and multivariate logistic regression analyses were used to assess the association between treatment outcomes and predictor variables.
RESULT A total of 201 tuberculosis and human immunodeficiency co-infected patients were involved in the study: 15.9% were cured, 44.8% were treatment completed, 17.4% were died during follow-up, 10.0% were defaulted, and 11.4% transferred out to another health institutions. The overall treatment success rates in the last five year was 60.7% and the associated predictors were ART status, year of treatment, and sputum examination follow up status at second and fifth month.
CONCLUSION The treatment success rate was unsatisfactory inspite of showing progressive improved across the study period. Hence, actions targeting (sputum follow up and time to start ART for tuberculosis and human immunodeficiency co-infection patient) on these predictors are necessary to improve the treatment success rate.

4P10

Prevalence of pulmonary tuberculosis among prison inmates: a cross-sectional survey at the Correctional and Detention Facility of Abidjan, Côte d'Ivoire

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BACKGROUND In Cote d'Ivoire, a TB prison program has been developed since 1999. This program includes offering TB screening to prisoners who show up with TB symptoms at the infirmary. Our objective was to estimate the prevalence of pulmonary TB among inmates at the Correctional and Detention Facility of Abidjan, the largest prison of Cote d'Ivoire, 16 years after this TB program was implemented.
METHODS Between March and September 2015, inmates, were screened for pulmonary TB using systematic direct smear microscopy, culture and chest X-ray. All participants were also proposed HIV testing. TB was defined as either confirmed (positive culture), probable (positive microscopy and/or chest X-ray findings suggestive of TB) or possible (signs or symptoms suggestive of TB, no X-Ray or microbiological evidence). Factors associated with confirmed tuberculosis were analysed using multivariable logistic regression.
RESULTS Among the 943 inmates screened, 88 (9.3%) met the TB case definition, including 19 (2.0%) with confirmed TB, 40 (4.2%) with probable TB and 29 (3.1%) with possible TB. Of the 19 isolated TB strains, 10 (53%) were TB drug resistant, including 7 (37%) with multi-resistance. Of the 10 patients with TB resistant strain, only one had a past history of TB treatment. HIV prevalence was 3.1% overall, and 9.6%among TB cases. Factors associated with confirmed TB were age ≥30 years (Odds Ratio 3.8; 95% CI 1.1–13.3), prolonged cough (Odds Ratio 3.6; 95% CI 1.3–9.5) and fever (Odds Ratio 2.7; 95% CI 1.0–7.5).
CONCLUSIONS In the country largest prison, pulmonary TB is still nine (confirmed) to 42 times (confirmed, probable or possible) as frequent as in the Cote d'Ivoire general population, despite a long-time running symptom-based program of TB detection. Decreasing TB prevalence and limiting the risk of MDR may require the implementation of annual in-cell TB screening campaigns that systematically target all prison inmates.
COUNTRY OF RESEARCH: Key Population: Prisoners/ incarcerated populations, Not applicable
Submitted to HIV/Viral
Hepatitis Pre-Conference: Yes
HIV and tuberculosis are of specially high prevalence in prison. This is notably the case in low income countries and seems a grate challenge for the future with emergence of resistance to antiretroviral therapies and to antituberculosis drugs.
Ethical research declaration: Yes

Abstracts

4P11

Twenty years studying latent tuberculosis infection in Cuban health Care workers: implications toward TB elimination

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INTRODUCTION Knowledge about *Mycobacterium tuberculosis* transmission in specific risk groups is useful in planning interventions to eliminate the tuberculosis disease in the country. Providing health care to TB patients has been shown to be an occupational risk.
AIM To determine the prevalence of Latent Tuberculosis Infection (LTBI) and the tuberculin conversion rate, as well as the risk factors associated in health care workers (HCW).
METHODS A total of 3161 HCW of 2 tertiary hospitals, 4 secondary hospitals and 5 primary health care centers (PHC) were evaluated from 1996 to 2016 in two provinces: Havana and Santiago de Cuba. Using stratified sampling, the required number of individuals from each occupational category was selected for every institution, proportional to their percentage in the total staff population. A Tuberculin Skin Test (TST) along with an exposure questionnaire was administered. A second TST one year later was applied to those previously negative. Bivariate and multivariate analyses were performed to seek possible influences of predictor variables on the presence of infection.
RESULTS The overall LTBI infection rate was 27.5%, the highest in tertiary hospitals (43.5%) and the lowest in PHC (15.3%). In secondary hospitals it was 24.3%. The overall conversion rate was 7.0%; the highest in the National Reference Pneumology Hospital (35.3%) and the lowest in the policlinic Fonseca (1%). Risk factors as being nurse personnel and >5 years working in the institution were associated to LTBI in tertiary hospitals. The contact with TB patients and >20 years working in the institution were associated to secondary hospitals. In PHC the factors associated were >10 years working in the institution, contact with TB patients, and labors as nurses, managers, health technicians and support staff.
CONCLUSION There is transmission of TB infection to HCW that depends on the exposition level. Adequate infection control measures must be implemented in each institution according to the recommendations stipulated in the National TB Control Program.

4P12

Determinants of mortality among MDRTB patients: a cross-sectional study

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INTRODUCTION Multidrug resistant tuberculosis (MDRTB) is a result of an infection with the *Mycobacteria tuberculosis*, which is resistant to key anti-tuberculosis drugs; Rifampicin and Isoniazid. It is a growing public health concern, with an estimation of 3.5% of new tuberculosis (TB) cases and 20.5% for those previously treated for TB to be MDRTB. World Health Organization (WHO) estimates that about 5% of all TB cases to be MDRTB, of which more than 40% died in 2014. Factors related to MDRTB mortality in Tanzania have not been explored.
AIM This study aims to determine the demographic, clinical, radiographic and laboratory factors at admission among MDRTB patients associated with mortality.
METHODS This was a cross-sectional study with 193 participants, who had been admitted at Kibongoto Hospital from 1st January 2012 to 30th June 2014. Pearson chi-square test was used to determine the association between mortality and independent factors. Fisher's exact test was used where the data was less than 5 in a single cell. Student *t*-test was used for continuous variables having a normal distribution. Wilcoxon rank-sum test was used for continuous skewed data.
RESULTS Cough was the commonest finding among these MDRTB patients, 179 (92.75%), followed with chest x-rays consolidation, 156 patients (80.83%) and history of previous TB treatment, 151 patients (78.24%). Mortality was significantly associated with cigarrete smoking (OR 5.44, 95% CI 1.09–27.19; $P = 0.039$), HIV positive status (OR 3.45, 95% CI 1.02–11.64; $P = 0.046$) and low CD4 counts (OR 0.99, 95% CI 0.98–0.999; $P = 0.048$).
CONCLUSION National TB programs should incorporate interventions to promote HIV screening for all MDRTB/RRTB patients and early initiation of ARTs. MDRTB patients and the general population should be educated on the potential consequences of cigarrete smoking, and encouraged to stop smoking.

4P13

Current profile of new HIV infections among adults in Northern Benin in 2016

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OBJECTIVE To describe the current epidemiological, clinical and immunological profile of newly detected HIV – positive patients in Northern Benin by 2016.
METHODS This was a prospective study conducted from 02 May to 31 October 2016 on three main sites of HIV care in the department of Borgou. All new cases of HIV infection have been systematically recruited. Initial epidemiological, clinical and immunological data were collected using a questionnaire. These data were analyzed using the Epi Info 7 software.
RESULTS A total of 185 adults newly detected HIV positive were included in this study. The mean age was 36.2 ± 10.9 years and the sex ratio was 0.6. One hundred and thirty-five patients (73.0%) were between 25 and 50 years old. In terms of the profession, 132 patients (71.3%) were engaged in liberal activities. The majority was scolarised (113 or 61.1%) and resided in urban areas (146 or 79.0%). One hundred and sixteen patients lived in a couple (62.7%) with an average monthly income estimated at 70 US Dollars. Clinically, 123 patients (66.5%) were in WHO stage III. The body mass index was over 18.5 kg/m^2 in 124 patients (67.0%). The median number of TCD4 lymphocytes was 254.5 cells/μl with extremes of 5 and 1031 cells/μl and 25 patients (13.5%) had CD4 counts >500 cells/μl. HIV1 was predominant (97.8%). Most patients (152, 82.2%) had been screened for clinical suspicion.

CONCLUSION HIV infection in Benin remains the prerogative of young, female, educated and poor people. Screening is delayed and hence the need to develop innovative strategies for early detection of HIV in Benin.

4P14

Exploratory results of intensification of the use of the GeneXpert® MTB/RIF as support in the tracking the TB and TB-RR in Kinshasa

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INTRODUCTION The DRC is one of the 30 countries that supports more of 80% of the world load of the TB, TB-VIH and TB-MR in the world. Every year the country notifies close to 120 000 cases of TB. Kinshasa, the capital, notifies every year more than 20% of the patients recorded in the country. However according to the evaluations of the WHO, more than 50% of patients are not notified every year by the DRC.
AIM To value the use of the GeneXpert ®MTB/RIF (Xpert) and the microscopy in the detection of the *Mycobacterium tuberculosis*, in Kinshasa, while determining the proportion of the cases TB resistant rifampicin (TB-RR) or no TB-RR among the presumed TB and the cases controls.
METHODS Of November to December 2016, we led a prospective and transverse survey in the 10 bigger CHTT (centers of health of tracking and treatment) of the city of Kinshasa that notify about 400 cases of TB every year. The sputum samples of presumed TB and of the cases controls no TB-RR have been collected and have been analysed while using the Xpert test.
RESULTS During the first month, 249/684 (36.4%) sputum samples had come back positive in the Xpert, of which 112 also had a positive Ziehl (sensitivity compared with Xpert 45%); Eleven (8%) of the cases presumed TB negative Ziehl against 5 (4.4%) of the cases positive Ziehl presented a resistance to the rifampicin.
CONCLUSION In Kinshasa, Xpert is more than capable to double the tracking of the tuberculosis and RR cases.

4P15

Detection of Rifampicine resistance mutations in the 81 bp RRDR of rpoBGene in *Mycobacterium tuberculosis* using Xpert MTB/RIF in Kinshasa, DRC: a retrospective study

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INTRODUCTION The RDC is one of the 30 countries that pays the heavy tribute of the TB with 120 508 cases notified in 2015; and currently, the MDR-TB represents a major challenge with an impact of 13 cases for 100 000 inhabitants according to the report of the WHO (2015). Since 2010, the WHO recommended that the GeneXpert® MTB/RIF (Xpert) is included like initial test of diagnosis of the TB and the precocious detection of the TB-RR.
AIM This survey aims to value the performance of the Xpert in the diagnosis of the TB and TB-RR and to determine the frequency of the probes implied in the detection of the mutations on the gene rpoB in Kinshasa.
METHODS It is about a retrospective survey led within the National Laboratory of Reference of the Mycobacteria (LNRM) of Kinshasa, in DRC. The data of the Xpert tests done from January 01, 2016 to December 31, 2016 have been collected then exported on Microsoft Excel 2010, treated and analyzed.
RESULTS Of the 1481 Xpert tests done, 1450 (97%) succeeded with 41% of *Mycobacterium tuberculosis* detected of which 73 (12%) were TB-RR. The probes associated to the detection of the mutations on the gene rpoB presented themselves as follows: E (46/73), D (14/73), B (9/73), A (4/73) and no resistance to the rifampicin was associated to the C probe. Any sample had presented a combination of probe in the detection of the resistance to the rifampicin.
CONCLUSION The Xpert test has been executed with success within the LNRM of the city of Kinshasa and permitted to detect to 63.1% the E probe as the one detecting the more of mutations on the gene rpoB.

4P16

Directly Observed Treatment Short-course (DOTS) for tuberculosis control program in Gambella regional state, Ethiopia: ten years experience

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INTRODUCTION Tuberculosis is still one of the major causes of infectious diseases in the world which accounted for 2.5% of the global burden of disease, and 25% of all avoidable deaths in developing countries.
AIM The aims of the study was to assess impact of DOTS strategy on smear-positive pulmonary tuberculosis case finding and their treatment outcome in Gambella Regional State, Ethiopia from 2003 up to 2012 and from 2002 up to 2011, respectively.
METHODS A descriptive health facility-based retrospective study was conducted. Data were collected and reported in quarterly basis using WHO reporting format for TB case finding and treatment outcome from all DOTS implementing health facilities in all zones of the region to Federal Ministry of Health.
RESULTS A total of 10 024 TB cases (all forms) had been registered between the periods from 2003 up to 2012. Of them, 4100 (40.9%) were smear-positive pulmonary TB, 3164 (31.6%) were smear-negative pulmonary TB and 2760 (27.5%) had extra-pulmonary TB. Case detection rate (CDR)[1] of smear-positive pulmonary TB had increased from 31.7% to 46.5% from the total TB cases and treatment success rate (TSR) increased from 13% to 92% with average mean value of being 40.9% (SD = 0.1) and 55.7% (SD = 0.28), respectively for the specified year periods. Moreover, the average values of treatment defaulter and treatment failure rates were 4.2% and 0.3%, respectively.

Abstracts

CONCLUSIONS It is possible to achieve the recommended WHO target of 70% of case detection rate[1] for smear-positive pulmonary TB and other forms of TB, and 85% of treatment success rate[2] as it was already been fulfilled the targets for treatments more than 85% from 2009 up to 2011 in the region. However, it requires strong efforts to enhance case detection rate of 40.9% for smear-positive pulmonary TB including other forms of TB through implementing alternative case finding strategies.

4P17
TB SEQUEL: pathogenesis and risk factors of long-term pulmonary sequelae defining the individual outcome and public health impact of TB disease

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INTRODUCTION Tuberculosis (TB) is a global health emergency with little known about the long-term sequelae. Accumulating evidence indicates that pulmonary function is already markedly impaired at the time of TB diagnosis and permanent lung injury due to TB is frequent and substantial. There is however very limited data on the full spectrum of these complications, especially in resource-constrained settings. To fill the existing knowledge gap, the TB Sequel Network was established, which represents a consortium of eight partners in Africa and Europe. TB Sequel Network is currently performing a robust epidemiological longitudinal study to describe the magnitude and spectrum of adverse outcomes and risk factors of pulmonary TB.
AIM The current TB Sequel project aims to systematically assess and describe lung outcomes in African patients; understand clinical, microbiologic and host-immune factors affecting the long-term sequelae of pulmonary TB; determine occurrence of reversible and irreversible costs and socioeconomic consequences for patients; and facilitate novel interventions to restore and preserve overall health, quality of life and well-being in patients with pulmonary TB.
METHODS This project includes three work packages: Research, Capacity Development and Networking. The core of the Research package is a prospective cohort of up to 1600 patients across 4 participating countries (Mozambique, South Africa, Tanzania and The Gambia) enrolled at the time of TB diagnosis and followed up for at least 2 years. The overall goal of the cohort is to describe and analyse the basis of the long-term clinical consequences of pulmonary TB, with a particular focus on lung injury. The data and samples collected from this cohort will support and enable other research activities within the TB Sequel Network and further research collaborations. Networking and Capacity Development packages are designed to ensure effective translation of research findings into policies as well as improve infrastructure and training of medical and research staff at the participating African institutions.

[1]CDR: Percentage of smear-positive TB cases detected among the total number of TB cases estimated to occur.

[2]TSR: A sum of TB cases who completed treatment and who declared cured.

*_On behalf of consortium members_: Ivanova O., Sutherland J., Jani I., Charalambous S., Schaible U.E., von Both U., Khosa C., Evans D., Rassool M., Sabi I., Geldmacher C., Chachage M., Mekota A.M., Velen K., Sathar F., Merker M., Rieß F., Zekoll F., Sitoe N., Owolabi O., Nhassengo P., Hoffmann V., Abdou S., Uamusse E., and other clinical and research staff involved.

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Multidrug resistant tuberculosis in Ethiopian settings and its association with previous history of anti-tuberculosis treatment: a systematic review and meta-analysis

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INTRODUCTION Efforts to control the global burden of tuberculosis (TB) have been jeopardized by the rapid evolution of multi-drug resistant *Mycobacterium tuberculosis* (MTB), which is resistant to at least isoniazid and rifampicin. Previous studies have documented variable prevalences of multidrug-resistant tuberculosis (MDR-TB) and its risk factors in Ethiopia.
AIM This meta-analysis is aimed, firstly, to determine the pooled prevalence of MDR-TB among newly diagnosed and previously treated TB cases, and secondly, to measure the association between MDR-TB and a history of previous anti-TB drugs treatment.
METHODS PubMed, Embase and Google Scholar databases were searched. Studies that reported a prevalence of MDR-TB among new and previously treated TB patients were selected. Studies or surveys conducted at national or sub-national level, with reported MDR-TB prevalence or sufficient data to calculate prevalence were considered for the analysis. Two authors searched and reviewed the studies for eligibility and extracted the data in pre-defined forms. Forest plots of all prevalence estimates were performed and summary estimates were also calculated using random effects models. Associations between previous TB treatment and MDR-MTB infection were examined through subgroup analyses stratified by new and previously treated patients.
RESULTS We identified 16 suitable studies and found an overall prevalence of MDR-TB among newly diagnosed and previously treated TB patients to be 2% (95% CI 1%–2%) and 15% (95% CI 12%–17%), respectively. The observed difference was statistically significant ($P < 0.001$) and there was an odds ratio of 8.1 (95% CI 7.5–8.7) for previously treated TB patients to develop a MDR-MTB infection compared to newly diagnosed cases. For the past 10 years (2006 to 2014) the overall MDR-TB prevalence showed a stable time trend.
CONCLUSIONS The burden of MDR-TB remains high in Ethiopian settings, especially in previously treated TB cases. Previous TB treatment was the most powerful predictor for MDR-MTB infection. Strict compliance with anti-TB regimens and improving case detection rate are the necessary steps to tackle the problem in Ethiopia.

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The effect of HAART on tuberculosis incidence among HIV infected patients in Bale Zone Hospitals

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INTRODUCTION Tuberculosis is a leading cause of morbidity and mortality, and the most common presenting illness among people living HIV/AIDS. A little is known about the effect of HAART on tuberculosis incidence in HIV-infected adults.
AIM To determine effect of HAART on tuberculosis incidence and TB free survival among HIV positive adult patients.
METHODS A retrospective cohort study design was used on 632 HIV-positive adults with age 15 years old and above enrolled to ART clinic in three hospitals of Bale zone over a 10-year period. Incidence rate of tuberculosis and TB free survival were calculated and compared for Pre-HAART and HAART cohorts. Patients on Pre-HAART were considered as unexposed and who were receiving HAART was considered as exposed. Data were collected from patient's pre-HAART and HAART follow up log books and other clinical records. Completed questionnaires were entered using EpiData version 3.1 and analysed using STATA 11.
RESULTS A total of 632 patients were followed for a median of 50.0 months with IQR = 35–79 months in HAART and median of 12.0 months with IQR = 6.0–30.8 in pre-HAART cohort. TB incidence rate was 3.7 per 100 PYO and 8.1 per 100 PYO, in HAART and HAART naive cohort, respectively. Overall probabilities of not developing TB in the HAART cohort was significantly higher in HAART naive cohort (log rank = 20.3, $P = 0.000$). Being on HAART (AHR = 0.30), being long period on HAART (AHR = 0.97) and having BMI = 20.02–33.60 (AHR = 0.27) were predictors of decreased TB incidence. Being female (AHR = 2.28), being separated (AHR = 6.74) and older age (AHR = 1.05) were predictors of increased risk of TB at multivariable analysis.
CONCLUSION Tuberculosis incidence rate is significantly higher in HAART naive than HAART group and the overall TB free survival in HAART cohort was also significantly higher than HAART naive cohort. Having this information, on time initiation of HAART has a paramount effect in reduction of HIV related tuberculosis.

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Gender differences in tuberculosis in adults in a rural area in Africa

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INTRODUCTION Tuberculosis (TB) is one of the main health problems in the world and especially in countries with low resources, poor hygiene status and higher HIV prevalence.
AIM The objective of this study is to compare the gender in TB in an adult population attended in a rural center of Ethiopia.
METHODS Episodes of tuberculosis treated at the general rural hospital of Gambo (Ethiopia) for 18 years are studied retrospectively.
RESULTS During the study period, 2328 episodes of TB were diagnosed, of which 1128 (48.1%) were in women. The mean age of women was 29.5 ± 12.5 similar to that of men 30.3 ± 15.7. The weight in kilograms of women was lower than that of men (42.7 ± 8.8 vs. 48.9 ± 9.8, $P < 0.001$). The HIV rapid test was performed in 1205 people, with a seroprevalence in women of 4.5%, slightly lower than in men (5.8%). Most of the cases were new episodes, representing 94.2%, being similar in women (54.9%) than men (51.5%). Smear-positive pulmonary TB was less frequent in women than in men (34.6% vs. 39.7%, $P = 0.01$), smear-negative pulmonary TB was similar in men than in women (31.3% compared to 31.4%) and extrapulmonary TB was more frequent in women than in men (34.1% vs. 29.0%, $P = 0.009$). Among all extrapulmonary forms of TB, it is worth mentioning the higher frequency of TB adenitis in women than in men (20.4% vs. 15.7%, $P = 0.004$). Regarding the course of the disease, the complete treatment and cure of TB was 70.1% in women and 68.9% in men. When evaluating mortality, it was slightly lower in women (4.6%) than in men (6.3%) ($P = 0.08$).
CONCLUSION TB in our study affects women as often as men. In women, extrapulmonary form and especially TB adenitis are more frequent; however, the smear-positive pulmonary TB form is less frequent. The outcome of treatment is similar in both sexes.
REFERENCE(S)
1. Author A., Author B., Author C.D. Title of the scientific work. *Title of the Journal* year; number; page-page.

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Impact of prompt MDR-TB treatment initiation: significant reduction of MDR-TB mortality rate in Rwanda

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INTRODUCTION A significant decline was observed in delays to initiate MDR-TB treatment from a median of 127 days in 2005 to 86 days in 2009, and 26 days in 2015 due to subsequent implementation of Hain MTBDRplus and Xpert MTB/RIF tests. We hypothesized that this decreased delays after the phased implementation of molecular tests had an impact on the MDR-TB mortality rate among these patients.
AIM To analyze trends of MDR-TB mortality rate before and after implementing the molecular diagnostic tests.
METHODS Mortality rates were calculated in three window periods: first period (2005–2009) before implementing molecular tools, second period, (2009–2012) after implementing Hain MTBDRplus and third period, (2012–2015) after implementing Xpert MTB/RIF. Patients had been allocated to the 20 months MDR-TB regimen. Using nptrend test, we analyzed the trend of MDR-TB mortality rate in the three periods. Regression analysis was used to assess the correlation between the delays and the mortality rates.
RESULTS Among 709 MDR-TB patients registered 675 (95%) had complete treatment outcome data in their medical files. The

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prevalence of HIV infection was stable in the three periods (41% in the first and second periods and 40% in the third one. The mortality rate in the first, second and third periods were 25% (95% CI, 19–31), 17% (95% CI, 12–23), and 11% (95% CI, 6–18) respectively. The analysis of trend showed a significant decline in mortality rate among these patients, *P*-value = 0.008, and the regression analysis showed a strong correlation between the periods and mortality (*P*-value < 0.001). Of the 107 died MDR-TB patients, 45 (42%) died before starting MDR-TB treatment of whom 31 (69%) and 14 (31%) were registered in the first and second periods respectively. No death before starting MDR-TB treatment was recorded in the third period.
CONCLUSION The prompt initiation of MDR-TB treatment due to the implementation of molecular diagnostics played a role in the decline of the mortality rate among MDT-TB patients. Further analysis of trends that include other factors such as the recent introduction of shorter MDR-TB treatment is needed to guide the programmatic management of MDR-TB in high burden settings.

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Enhancement of TB research: a regional approach with the West African regional network for TB control (warn-TB)

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INTRODUCTION Despite all efforts, tuberculosis (TB) remains the first infectious cause of death. Intensified research is necessary to identify and implement innovative cost-effective approaches for preventing, diagnosing and treating TB, as expressed in the End-TB strategy. At country level the conduct of more operational/implementation research (OR/IR) could make a difference for controlling the TB epidemic, but the national TB programmes (NTP) are rarely equipped to do so and are more focussed on the implementation of TB control activities than the research to improve their cost-effectiveness.
AIMS The Special Programme for Research and Training in Tropical Diseases (TDR) is supporting an initiative to stimulate a regional approach towards enhancing and strengthening TB research, which is being piloted in 16 countries of the West-African subregion.
METHODS A regional, collaborative, step-wise approach to support West-African countries was adopted. The following steps were defined:

1 Establishing a network of the NTPs of the West-African subregion with the involvement of all major partners and funders involved in TB control and research in the subregion.
2 Supporting the network to identify OR/IR priorities and research capacity strengthening needs.
3 Supporting the development of national TB research plans
4 Supporting the countries of this network towards:
   a Building their research capacities according to the above-mentioned plans;
   b Implementing relevant country-specific and region-wide OR/IR projects;
   c Favouring subregional collaborations and support;
   d Translating research findings into policy.

RESULTS AND CONCLUSION In June 2015, the West African Regional Network for TB control (WARN-TB) composed of the NTPs of the 16 West African countries was established. This network has 2 co-chairs (from Ghana and Guinea) and an executive secretariat hosted by the NTP of Benin. Through this presentation we will share our 2-year experience and discuss the strengths and challenges of such subregional approach for enhancing country-led TB research addressing national TB priorities. This innovative approach could be extended to other regions, and lends itself to being expanded to other disease control programmes.

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Integrated approaches for intensifying tuberculosis active case finding: lessons learned from pilot projects in West Africa

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INTRODUCTION Despite ongoing efforts, TB case detection is estimated to be around 60% in sub-Saharan Africa. Intensified case finding (ICF) is necessary to better control the epidemic and to achieve the milestones for TB cases reduction set by the End-TB strategy. In the general population, ICF strategies based on the 'TBreach' model or targeting 'at-risk' populations have been piloted, but are sometimes too expensive to be sustainable in the long-term when implemented by vertical National TB programmes (NTPs).Integrating health activities should increase cost-effectiveness and favour sustainability, but it implies service integration and collaboration across vertical, independent programmes. Paradoxically, at community or primary healthcare service level, the integration of the activities does take place, as it is often the same person who is in charge of implementing the activities of all the national programmes.
AIM The Special Programme for Research and Training in Tropical Diseases (TDR), as part of its activities with the West African Regional Network for TB control (WARN-TB), supported NTPs willing to pilot innovative integrated strategy that could intensify TB case finding.
METHODS An example of integrated activities for ICF between the national TB, malaria and nutrition programmes in Ghana and Senegal will be presented. The objective of these two pilot studies was to assess the feasibility, acceptability, efficacy and cost of ICF among children by integrating systematic clinical TB screening within door-to-door seasonal malaria chemoprevention (SMC) activities.
RESULTS No TB cases were diagnosed in Senegal (11 799 children screened). But in Ghana, in 1 week, 30 TB cases in children were confirmed out of 227 955 screened and 20 additional adult TB cases were diagnosed. A total of 17 and 141 children respectively severely and moderated malnourished were detected in Senegal and referred.
CONCLUSIONS At the national level, opportunities for integrating national programme activities exist but efforts to bring them into fruition are rarely undertaken. The integration of SMC, TB and malnutrition screening, as piloted in Ghana and Senegal, are examples of successful integrated activities. Political willingness of the national programmes to collaborate is needed for defining and scaling-up cost-effective, integrated strategies that would benefit populations and programmes.

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Renal dysfunction in HIV-positive patients on tenofovir-based therapy: a case control study

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INTRODUCTION HIV is the epidemic of our times, having claimed more than 39 million lives, with 1.1 million deaths in 2015. Due to better drugs, PLHA are living longer and fulfilling lives; and the present focus is on managing the various lifestyle complications that originate due to increased survival subsequent to chronic nature of the disease with prolonged drug exposure.

Tenofovir (TDF) is one of the first line NRTIs for combination-ART; chiefly due to a better safety profile with the least toxicity among the available drugs. It also lends itself to single dosing, thereby ensuring adherence. A few studies have studied renal toxicity associated with TDF; to the best of our knowledge, there is no published Indian data in this context on various parameters involved in worsening of renal function. The present study was planned to study the toxicity of TDF in HIV-positive patients on TDF-based ART.

AIM To study tenofovir toxicity in HIV-positive patients on tenofovir- based ART.

METHODS A case-control study was conducted at a tertiary care hospital in western India. It included 60 cases and 66 controls. The cases were defined as HIV-positive patients receiving TDF-based ART; and the HIV-positive patients receiving non-TDF-based ART served as controls.

RESULTS Urine Protein Creatinine Ratio (UPCR) was used as measure of TDF toxicity. The analysis revealed that the risk of increased UPCR was 7 times greater among HIV infected patients treated with TDF-based ART as compared to controls, odds ratio being 7.0 (CI 1.1–50.1). Multivariate logistic regression analysis revealed that rise in UPCR was almost significantly associated with TDF based therapy, adjusted for other factors. Further, low creatinine clearance, age more than 40 years, and duration of TDF therapy (> 60 months) also showed significant and independent effect on UPCR.

CONCLUSION It can be concluded, that any patient on TDF-based regimen be monitored for renal dysfunction more closely after 5 years of therapy. In this respect, measurement of UPCR appears to be one of the better modalities to ascertain TDF-induced renal dysfunction. Also, this close monitoring for nephrotoxicity is more relevant in the older patients on TDF.

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Risk factors associated with TB co-infection in HIV/AIDS patients taking antiretroviral therapy (ART) in one of the public hospitals in Ethiopia

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INTRODUCTION The global impact of the converging dual epidemics of tuberculosis (TB) and human immunodeficiency virus (HIV) are major public health challenges of our time. Tuberculosis is the most common opportunistic infection and leading cause of death in HIV-infected patients (Swaminathan and Narendran 2008: 527). Tuberculosis and HIV combined are responsible for the deaths of over 4 million people annually. The World Health Organization (WHO) reports that from 9.2 million new cases of TB in 2006, 7.7% were HIV infected and of the 1.7 million deaths from TB in 2008, almost one third were people co-infected with HIV or AIDS (WHO, 2009: 2). In 2009, 380,000 people died of HIV associated Tuberculosis. It is the most common presenting illness among people living with HIV including those who are taking antiretroviral therapy (ART). At least one third of the 33.3 million people living with HIV worldwide are infected with Tuberculosis. (WHO 2011: 1–3).

AIM The purpose of this study is to assess risk factors associated with TB coinfection in HIV/AIDS patients taking antiretroviral therapy (ART).

METHODS An observational, analytic, case-control and quantitative study was conducted on a randomly selected 367 HIV and AIDS patients of whom 92 of them were TB co-infected. Data collection was done by using self-structured questionnaire.

RESULTS In this study, educational status (OR = 2.61; 95% CI: 1.13, 5.22), waste disposal system (OR = 2.75; 95% CI: 1.61, 4.69), monthly income (OR = 2.09; 95% CI: 1.20, 3.64), contact history with a patient of active tuberculosis or presence of a family member with active tuberculosis (OR = 15.31; 95% CI: 5.28, 44.37), ART drug adherence (OR = 24.84; 95% CI: 7.32, 84.22), knowledge on tuberculosis prevention (OR = 6.07; 95% CI: 1.04, 35.37) and history of exposure to substance (OR = 36.80; 95% CI: 12.88, 105.13) were factors independently associated with the occurrence of active tuberculosis among HIV and Aids patients taking ART.

CONCLUSION The findings highlight the need for on-going educational, informational and other interventions to address the risk factors of tuberculosis in HIV and Aids patients in order to decrease the rate of TB co-infection.

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Health resource management for TB in post-war Okinawa, Japan

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INTRODUCTION Tuberculosis (TB) was one of the health issues highly prevalent in the aftermath of the Second World War in Okinawa. TB mortality and incident rates were respectively 65.7 and 489 in per 100 000 population. However, both rates decreased over time to reach 6.8 and 121.9 respectively by 1972, when Okinawa reverted to Japan from the United States Civil Administration of the Ryukyu Islands.

AIM The purpose of this study is firstly to analyze how human resource, physical capital, and capital were mobilized as inputs for TB detection and treatment in post-war Okinawa from 1945 to 1972, and secondly to figure out what aspects of health resources contributed to TB incident, prevalence and mortality rate.

METHODS The current research employs a mixture of approaches drawing on the review of diversified sources of information including qualitative in-depth interviews with key stakeholders, quantitative data from statistics reports, reviews of grey literature and Newspapers, in order to analyze and document factors that have contributed to the control of TB in post-war Okinawa.

RESULTS First, the study found that human resources for health such as doctors, nurses, and PHNs were closely linked and organized to work for TB education, detection, treatment, and rehabilitation, and significant association between PHNs

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and TB patient full recovered in human resource. Second, there was cooperation between hospitals and public health centers (PHCs) for TB education, detection, treatment and rehabilitation, and also support by PHCs for public health nurses (PHNs) in physical capital. Third, expenditure for TB education, detection and treatment were mobilized and allocated regularly by the government of the Ryukyu Islands with external funds in capital. Finally, we also found the probable factors that are 'Reaching out to people', 'support and cooperation', and 'domestic funding' to maximize the effectiveness of health resources.
CONCLUSION Health resource was allocated in a way that allowed effective control of TB in post war Okinawa through TB education, detection, treatment, and rehabilitation from 1945 to 1972. While PHNs played a frontline role for TB control in the community, doctors and nurses effectively operated at hospital levels for inpatient care.

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Perception of people living with HIV/AIDS (PLWHA) on the attitude of health care workers towards PLWHA in Calabar Metropolis, Cross River State, Nigeria

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INTRODUCTION Stigma and Discrimination against people living with HIV remains widespread in Nigeria. The attitude of health care workers towards people living with HIV/AIDS is a major determinant of the utilization of HIV services in formal health institutions.
AIM This study seeks to determine the attitude of health care worker towards PLWHA in Dr. Lawrence Henshaw Memorial Hospital (DLHMH), Calabar, Cross River State, Nigeria.
METHODS A cross-sectional descriptive study design was adopted and used. A well-designed 22-item semi-structured questionnaire was administered to 96 PLWHA using the simple random sampling technique. This study was carried out from December to January, 2017. Data generated were analyzed using Statistical Package for Social Sciences (SPSS version 22.0) and results were presented in simple percentages and tables. Chi-square was used to test for the association between categorical variables at alpha level of 0.05.
RESULTS The results of this study showed that most respondents 62 (64.6%) had good knowledge of HIV/AIDS while 34 (35.4%) recorded poor knowledge. Of the 96 study participants, 78 (81.3%) perceived positive attitude of health care workers towards PLWHA, while 18 (18.7%) perceived negative attitude mainly in issues of confidentiality of HIV status and usage of double gloves for non-invasive examination by health care workers and as a result they travel to a distant health center to access HIV care and treatment. Also, 17 (17.7%) respondents reported to have avoided seeking for treatment due to the negative attitude of health care workers. Sex ($\chi^2 = 8.51$; $P = 0.003$) and knowledge of HIV/AIDS ($\chi^2 = 33.75$; $P = 0.000$) were found to influence the perception of people living with HIV/AIDS towards the attitude of health care workers.
CONCLUSION Deploying strategies to reduce HIV related stigma and discrimination existing in health care settings could effectively mitigate HIV related new infection, transmission and deaths.

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Performance of community tracing system of people affected by *Tuberculosis* during Ebola epidemic in Conakry, Guinea

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INTRODUCTION The Ebola epidemic provoked fear and mistrust in the community. As the health system had difficulties to control Ebola epidemic, the health programs like the National Tuberculosis Program (NTP) had to guarantee the continuity of healthcare.
AIM Uphold continuum of TB-healthcare during Ebola epidemic.
METHODS From January 2014 to December 2016 this cohort study included all people affected by TB under treatment in Conakry that missed at least one appointment at the health facility. Five community health workers (CHW) were selected according to: at least secondary education, being respected by the community, previous collaboration with NTP and availability. Performance was defined as more than 70% known result of traced people affected by TB.

The community tracing system included: (i). Phone calls and domiciliary visits by CHW. (ii) Sensitization sessions of people affected by Tuberculosis during waiting time at health facilities. (iii) Weekly coordination meetings between health staff and CHW. (iv) Financial incentives to health staff and CHW.
RESULTS Five CHW traced 1843 people under Tuberculosis treatment from 25 health facilities, 572 (31%) in 2014, 682 (37%) in 2015 and 589 (32%) in 2016. 613 (33%) were female. The age mean was 32 years (Interquartile range 23–40). 793 (43%) came from Matam District. 1211 (66%) had smear-positive TB. 457 (25%) were HIV positive. 120 (7%) were not contacted by phone (wrong telephone number or no telephone). Tracing results showed that 289(15%) died, 326 (18%) did not restarted the treatment and 1228 (67%) restarted treatment.

For 1592 (86%) the reasons of absence were: 25 (2%) access (affordability for transport and distance to health facility), 570 (36%) health staff availability, 49 (3%) refusal, 488 (26%) social (parties, burials, school and work) and 170 (9%) travel (national and international). Social reasons and health staff availability were two and six times more associated to not restarting treatment compared to the other factors (OR = 2, CI = 1.9–3, P = <0.01 and OR = 6, CI = 4–8, P = <0.01 respectively).
CONCLUSIONS Community tracing in Conakry showed a high performance of tracing people affect by Tuberculosis during Ebola epidemic. Social factors and health staff availability were more associated to the probability to withdraw treatment.

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Biomedical and social support to vulnerable people affected by *Tuberculosis* in Guatemala: an effective Governmental and Non-Governmental partnership implementation

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INTRODUCTION Guatemala has a moderate Tuberculosis (TB) burden with an incidence of 25/100 000 population, where 6% are HIV-coinfected. Poverty, migration, comorbidities and security hamper the quality of care. A partnership between the National Tuberculosis Program (NTP), the municipalities and Damien Foundation (Belgian Non-Governmental Organization) implemented a biomedical social support in vulnerable population to improve quality of care and promote social reinsertion.
AIM Improve quality of TB care in vulnerable population.
METHODS This cohort study included people affected by TB from January 2014 to December 2016. The selection criteria included: High TB-burden regions (four of 22), purchasing power parity (PPP) <1.90 $ (United States Dollar)/day, comorbidity (HIV/diabetes), poor housing, multidrug-resistant TB (MDR) and funds availability. A medical doctor or nurse and social-worker visited patients at home. Representatives from the NTP, municipalities where the patient lived, and Damien Foundation selected patients for nutritional support and/or housing improvement and/or income generating activity (IGA) support. People selected for IGA had a training organized by an entrepreneurship institute. For housing improvement the municipalities supported workforce.
RESULTS 1075 (32%) from 3411 people affected by TB were included. 1054 (98%) had drug-susceptible (DS)-TB, 160 (15%) had diabetes, 21 (2%) were MDR and 81 (8%) were HIV-coinfected. All benefited from nutritional support, 48 (4%) housing improvement and 90 (8%) IGA. 82% of IGA were successful (still-running) after one year of follow-up. Success rate in DS-TB patients were 88% compared to 85% in not supported patients $P = <0.001$).
CONCLUSIONS A partnership between the NTP, Damien Foundation and the municipalities provided an effective biomedical-social support to vulnerable population affected by TB. The high success rate contributed to prompt recovery of patients. In addition, patients that benefited with IGA were successful after one year of follow-up. We believe that this experience could be extended to other regions of Guatemala, in order to contribute to the sustainable development goals 1 and 3 to end poverty and infectious diseases.

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Successful integrated biomedical and social support to vulnerable people affected by *Tuberculosis* in Nicaragua

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INTRODUCTION Nicaragua is a middle-income country with moderate Tuberculosis (TB) burden with an estimated incidence of 51/100 000 population. Poverty in rural and urban areas increase the risk of contracting TB and unfavourable treatment outcomes. The National Tuberculosis Program (NTP) and Damien Foundation (Belgian Non-Governmental Organization) implemented an integrated biomedical social support in vulnerable population to enhance favourable treatment outcomes and promote social reinsertion.
AIM Improve quality of TB care in vulnerable population.
METHODS From January 2014 to December 2016 this cohort study included people affected by TB with the following criteria: High TB burden regions (seven of 17), poverty defined as purchasing power parity (PPP) of <1.90 $ (United States Dollar)/day, comorbidity (HIV), extreme age (patients under five and/or ≥60 years old), poor ventilated housing, disability with dependency, multidrug-resistant TB (MDR) and availability of funds. A team including a medical doctor or nurse and social-worker visited patients at home. Selected patients benefited from nutritional supplements and/or housing improvement and/or income generating activity (IGA) support.
RESULTS 1496 (46%) from 3224 people affected by TB were included. 1476 (99%) had drug-susceptible (DS)-TB, 98 (7%) were children, 20 (1%) were MDR and 66 (5%) were HIV-coinfected. All benefited from nutritional support, 68 (2%) housing improvement and 90 (3%) IGA. 73% of IGA were successful (still running) after 1 year of follow-up. Success rate in DS-TB patients were 91% compared to 86% in not supported patients $P = <0.001$).
CONCLUSIONS An integrated biomedical-social support to poor people affected by TB was effective achieving 91% of success rate. Moreover, IGA were highly successful after one year of implementation enhancing social reinsertion and economical independency. This experience could be extended to other regions of Nicaragua to contribute to the sustainable development goals 1 and 3 that aim ending poverty and infectious diseases.

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Attitude of health care workers towards people living with HIV/AIDS (health care workers perspective) in Calabar Metropolis, Cross River State, Nigeria

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INTRODUCTION Stigma and Discrimination against people living with HIV/AIDS (PLWHA) remains a critical barrier to achieving the UNAIDS 90-90-90 treatment targets in Nigeria. Health care provider's attitude towards PLWHA has been shown to be an important factor influencing uptake of HIV services in health facilities. Stigma and discrimination has made the fight against HIV/AIDS at the community, national and global level intractable.
AIM The study seeks to determine the attitude of health care worker towards PLWHA in Dr. Lawrence Henshaw Memorial Hospital, Calabar, Cross River State, Nigeria.
METHODS This is a cross-sectional study using semi-structured questionnaire administered to 37 randomly selected health care workers. This study was carried out from December to January, 2017. Data generated were analyzed using SPSS version 22.0 and results were presented in percentages and tables. Chi-square was used to test for the association between categorical variables at alpha level of 0.05.
RESULTS Most respondents 28 (75.7%) had good knowledge of HIV/AIDS while 9 (24.3%) recorded poor knowledge. Out of the 37 respondents, 35 (94.6%) exhibited positive attitude

towards people living with HIV, while 2 (5.4%) showed negative attitude mainly in issues of confidentiality, wearing double gloves while attending to HIV patients and testing for HIV without informed consent from the patient. It was observed that knowledge of HIV/AIDS ($\chi^2 = 4.60$; $P = 0.004$) was statistically significantly associated with attitude of health care workers, while age ($\chi^2 = 0.86$; $P = 0.455$), sex ($\chi^2 = 2.12$; $P = 0.632$) and number of years of practice ($\chi^2 = 0.62$; $P = 0.727$), cadre of health care workers ($\chi^2 = 3.89$; $P = 0.221$) and unit of practice ($\chi^2 = 0.33$; $P = 0.152$) were not statistically significant. Increasing awareness and education on HIV/AIDS 19 (51.4%), providing a legal framework to protect people living with HIV/AIDS 8 (21.6%) and training and re-training of health care workers 8 (21.6%) were suggestions provided by the respondents to mitigate stigma and discrimination against PLWHA.

CONCLUSION Re-orientation, training and re-training of health professionals providing HIV prevention, care and treatment services would effectively address of HIV related stigma and discrimination in health care settings and increase up take of HIV services.

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Impact of BCG vaccination on global survival of children up to 1 year in rural Burkina Faso

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INTRODUCTION Several studies worldwide have described the non-specific beneficial effects of BCG vaccination on child survival. In Burkina Faso this aspect has been little explored to date. We report the effects of BCG vaccination on infant mortality in the PROMISE-EBF prospective cohort in rural Burkina Faso.

AIM To evaluate the impact of BCG vaccination on the overall survival of children at 1 year in a prospective cohort in rural Burkina Faso.

METHODS We conducted a secondary analysis of data from the PROMISE-EBF prospective cohorts originally a cohort of 866 children born alive between May 2006 and May 2007 in 24 villages of Banfora (Burkina Faso), followed until 2009 through home visits at 1, 3, 6, 12, 24 weeks and one (1) year of life.

RESULTS Children not immunized with BCG ($P < 0.01$) were 11 times more likely to die (RR = 10.9, 95% CI: 5.9–20.2) compared to those who had been vaccinated. The average age of vaccination with BCG was 44 days and the proportion of no BCG scar formation was 7%. BCG vaccination coverage in this cohort was 70.6%.

CONCLUSION Between 2006 and 2009, in a context of a low proportion of children vaccinated with BCG at birth and a low proportion of no BCG scar formation among vaccinated children in the PROMISE-EBF cohort in Banfora (Burkina Faso), BCG vaccination was associated with low infant mortality and therefore improved overall survival of children at 1 year.

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Assessment of tuberculosis under-reporting through inventory studies in 3 European Union Member States

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INTRODUCTION The World Health Organization End TB strategy has targeted a 90% reduction of tuberculosis (TB) incidence from 2015 to 2035. The annual number of TB cases reported are assumed to reflect TB incidence, which may be incorrect due to underreporting. To assess the level of underreporting, inventory studies examining different registers containing TB patient data, combined with capture-recapture modelling to estimate TB incidence are a widely accepted methodology.

AIM To quantify TB underreporting and to estimate TB incidence in three European Union (EU) and European Economic Area (EEA) Member States (MS).

METHODS Between June–September 2016 rapid and in-depth feasibility studies were conducted in 31 and 14 EU/EEA MS, respectively, to asses in which six countries TB inventory studies and capture-recapture modelling are most likely to be successfully carried out. In the period June to August 2017 multiple TB registers of minimal interdependence in three of the six countries, will be deterministically linked through a unique identifier or combination of proxy identifiers. Quantifying underreporting to each country's national TB program (NTP) will be done by dividing the number of registered TB cases by the total number of cases observed in at least one of the registers. Where possible, multiple-source log-linear capture-recapture analysis will be performed.

RESULTS The feasibility studies revealed common issues between many interviewed MS, namely the high level of dependence between different TB registers due to routine data sharing between different sectors of the health system, particularly between the NTP and the national reference laboratory. Laboratory data is for most countries impossible to separate from the notification data with which it is subsequently linked. Croatia, Denmark, Finland, the Netherlands, Portugal and Slovenia were selected.

CONCLUSION Completeness of NTP registers and estimated TB incidence will be available and presented for the studies in Denmark, the Netherlands, and Portugal. The study results will provide information on surveillance data completeness and quality, an estimate of TB incidence, and outline strengths and challenges in the national surveillance system of these three countries.

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Household contact tuberculosis investigation under re-engineered primary health care in the Free State Province, South Africa

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INTRODUCTION While there has been notable progress towards tuberculosis (TB) reduction in South Africa, mortality rates are not declining fast enough to achieve global TB control targets. A key programme challenge remains the prompt diagnosis and initiation of infectious patients on treatment. Policy recommends active case finding with particular focus on systematic investigation of household contacts. TB programmes rely on appropriate interaction between primary health care (PHC) facilities and communities to achieve early diagnosis and treatment. This is facilitated by the re-engineering of PHC entailing a mainstay of community health workers (CHWs) linking communities to PHC facilities.
AIM This paper portrays systematic household contact TB investigation (SHCI) in a highly burdened district of the Free State, in order to inform TB policy and practice and, more broadly, health systems strengthening in the province.
METHODS Data was gathered through cross-sectional surveys with nurses (n = 41) and CHWs (n = 47). Demographic information and information on general TB and SHCI training, SHCI services, and perceived barriers to and facilitators of SHCI were collected and described.
RESULTS Almost three-quarters (74.5%) of the CHWs had post-high school education. The majority of both TB nurses (92.7%) and CHWs (72.3%) had received training in general aspects of TB. However, only one-third of TB nurses (32.5%), and just over one-quarter of CHWs (27.7%) had received SHCI-specific training. Consequently, SHCI was not conducted at a substantial proportion (29.3%) of PHC facilities. Monitoring of SHCI took place at only 36.9% of the PHC facilities. Clients providing incorrect home addresses and contact information to PHC facilities were major barriers to SHCI implementation. Thereupon, the most-mentioned facilitator was adequate physical resourcing of CHWs such as provision of transport to clients' homes.
CONCLUSION Findings highlight challenges regarding SHCI implementation in the Free State. The need to improve service providers' SHCI training is imperative. CHWs should also be appropriately resourced and supported to conduct SHCI. The TB programme should promote SHCI at both PHC facility and community levels. It is also essential to appropriately monitor SHCI for successful implementation. Reassuring TB patients to provide correct household addresses and contact information will likely improve service provision.

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Elimination of tuberculosis in Cuba: chimera or social reality for the XXI century

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INTRODUCTION Cuba was included within the low-incidence countries aiming tuberculosis (TB) elimination.
AIM To examine the main features supporting our elimination idea.
METHODS Document review of surveillance records of the Programme of the Ministry of Public Health and Human Develop Report 2014 (UNPD). Selected indicators of both, TB Epidemiology and social-economic determinants were analyzed.
RESULTS TB cases notification 2015 (all) was 697 ($6.8/10^5$ hab.) 546 ($9.7/10^5$ hab.) males, 154 ($2.7/10^5$ hab.) female; 16 (2.3%) were <15 years old and 161 (23.1%) were 15 to 34 years old.

TB mortality = $0.4/10^5$ hab., treatment success = 82%; TB/HIV≈10%; MDR-TB cases = 4 (non-XDR). Concerning social determinants, the Cuba's Human Development Index (2013) was 0.815, very high (Life expectancy at birth 79.3 years; mean of schooling 10.2: Gross Domestic Products (GCP) per capita 19 641. Gender Inequalities Adjusted Index 0.350. Parliamentary women 48.9%; Population ≥25 years old at last secondary education (2005–2012): female 73.9%, male 80.0%; Breastfeed babies (0–5 months) 48.6%, mortality <1 years old: $4/10^3$ live births. Prenatal coverage 100%; medical doctors/10 000 population 67.2; total health expenses 5.3%; persons >15 years alphabetized 98.8% between 15–24 years 100%. Primary, secondary and tertiary education registration was 99%, 90% and 67% respectively.
CONCLUSION Epidemiological situation of TB is favourable supported by the core social determinants towards the expected elimination goals, but requires strengthening a new action plan.

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Research towards improved tuberculosis control in the free state, South Africa – a narrative review

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INTRODUCTION The response to tuberculosis (TB) in South Africa, and in the Free State – one of nine provinces – includes substantial research efforts towards improving public control of the disease.
AIM To synthesize the conclusions and recommendations of peer-reviewed articles reporting human TB research conducted in the Free State from 2004–2017 to inform the management of the TB programme in the province.
METHODS Twenty-eight articles published during 2004–2017 were identified through systematic search of Academic Search Complete and Ultimate, CAB Abstracts, MEDLINE, PubMed and SABINET using the keywords 'tuberculosis'/'TB' and 'Free State'. The conclusions and recommendations of the articles are narratively reviewed focusing on implications for the provincial TB programme.
RESULTS Fifteen articles were first-authored by health systems researchers, two by sociologists, three by microbiologists, two by public health specialists, and one each by authors from the following disciplines: geography; medicine; global, public and community health; and programme management. The sociology articles emphasised that TB is as much a social as a biological disease and supported the use of developed scales as means to

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measure levels of TB-related stigma among the health care workforce. Provincial-level record reviews provided clear indications of delivery system, programme, clinical, geographical, and socio-demographical risk factors for TB treatment default and mortality. Subsequent microbiological studies have confirmed the existence of diverse molecular genotypes of *Mycobacterium tuberculosis* circulating in the province, endorsing the current emphasis on rapid diagnosis of new cases. The articles authored by public and global health and health systems researchers report that while research activity may have increased utilisation of occupational TB/HIV services by health care workers, TB infection control (IC) measures to protect both health care workers and patients are in dire need of improvement; as is implementation of WHO IC measures in clinics and hospitals generally.
CONCLUSION TB research in the Free State has long been both diverse and useful in alerting – and informing – provincial policy-makers and public health services managers and workers at various levels and in different settings to – and about – the risks of TB and negative treatment outcomes, and on intervention strategies to address these.

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Protective effectiveness of seasonal malaria chemoprevention

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INTRODUCTION Seasonal malaria chemoprevention (SMC) is recommended in the Sahel: monthly courses of sulfadoxine-pyrimethamine and amodiaquine (SPAQ) are administered to children aged 3–59 months during the high transmission rainy season. Clinical trials showed a decrease in malaria incidence of up to 75%. Despite high SMC program coverage, malaria continues to overwhelm health structures in Magaria District of Niger.
AIM To estimate the protective effectiveness of SMC (PE_{SMC}) in field conditions.
METHODS We conducted a prospective case-control study, stratified by SMC distribution method (directly-observed first doses and non-directly-observed first doses) in Magaria. Cases of clinical malaria (fever + positive pLDH RDT) were enrolled. Three age-matched healthy controls were enrolled in the case's village of origin on the same day. Caregivers were asked about receipt of SMC, access to health care, demographics, diet and socio-economic status. Thick and thin smears were prepared and blood was collected to measure plasma levels of amodiaquine. We estimated that enrolled 590 cases and 1770 controls would provide 90% power to describe PE_{SMC} of 50% with 5% precision. Conditional logistic regression was used to compare cases and controls; PE_{SMC} was estimated as (1-OR) × 100%.
RESULTS 577 cases and 1700 controls were enrolled between 1 August and 2 December 2016. Among children with a card proving receipt of SMC, PE_{SMC} against clinical malaria was 85.1% [95% CI: 78.7–89.6]. When also considering children with verbally-reported receipt of SMC, PE_{SMC} was 50.2% [27.6–65.7]. PE_{SMC} was significantly higher in the first-dose DOT zone than in the first-dose non-DOT zone, both when considering card-proven and card-or-orally-reported receipt of SMC: (with card: 96.8% [93.1–98.5] vs 59.1% [34.5–74.4]; with card or verbal report: 88.6% [77.7–94.2] vs 20.5% [−30.5 to 51.5]). Similar trends were seen for PE_{SMC} against microscopy-confirmed malaria. Point estimates of PE_{SMC} remained above 70% for 4 weeks after each SMC distribution.
CONCLUSION Important differences in PE_{SMC} were seen with different distribution strategies. Analysis of plasma amodiaquine levels is ongoing and will provide important information about adherence to treatment.

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Prevalence of parasitemia in an area receiving SMC

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INTRODUCTION Seasonal malaria chemoprevention (SMC), monthly courses of sulfadoxine-pyrimethamine and amodiaquine (SPAQ) for children aged 3–59 months during the rainy season, is recommended by the WHO in the Sahel. In some areas, SMC has been expanded to include children up to 10 years old. We performed two malaria prevalence surveys to evaluate the burden of parasitemia in an expanded SMC target group.
AIM To estimate the prevalence of parasitemia during two different transmission seasons in among those 3–59 month, 5–9 year, and ≥10 year.
METHODS Two household-based surveys, using cluster-based sampling, were performed (October and December 2016) in Magaria District, Niger. Target sample size was 396 households in October and 266 households in December, because of expected lower prevalence of parasitemia in December. Households were selected with probability proportional to population size. One household member was selected randomly for participation. Thick and thin smears were prepared, and slides were read by two microscopists.
RESULTS Prevalence of parasitemia was 43% [95% CI: 39–48] in October and 40% [37–44] in December. In both surveys, prevalence was higher among 5–9 years than among 3–59 months: 66% [58–74] vs. 52% [45–59], $P = 0.005$, in October; 64% [56–71] vs. 48% [41–55], $P = 0.002$, in December. Among ≥10 years, prevalence was 24% [19–29] and 21% [17–26], respectively. Gametocytemia was present in 19% [15–24] of children <10 in October and 13% [9–17] in December, with no difference between age groups ($P = 0.81$ in October, $P = 0.83$ in December). Parasite burden was higher in 3–59 months than in 5–9 years (geometric mean 4663 [3123–6962] vs 1404 [989–1995] ($P = 0.001$) in October; and 1545 [1061–2250] vs 614 [453–832] ($P = 0.001$) in December).
CONCLUSION Prevalence of parasitemia among 3–59 months was elevated despite SMC. Children aged 5–9 years in this area have a high prevalence of parasitemia and gametocytemia, though their overall parasite burden is lower than in younger children. They would potentially benefit from receiving SMC.

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Coverage rate of the optimal dose of intermittent preventive treatment with sulfadoxine-pyrimethamine during pregnancy in the rural district of Houndé, Burkina Faso

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INTRODUCTION Intermittent preventive treatment with sulfadoxine-pyrimethamine during pregnancy (IPTp-SP) is a key component of malaria control strategy in Burkina Faso. However, data concerning its use in rural areas of the country are scarce.
AIM The aim of our study was to assess the coverage rate and predictors of the optimal dose of IPTp-SP in the rural district of Houndé.
METHODS A cross-sectional study including 200 postpartum women was carried out from 1st to 30th November 2013 in 5 rural primary health centres of the rural district of Houndé. Women' sociodemographic data, their level of knowledge on IPTp-SP use during pregnancy as well as data related to the uptake of IPTp-SP were collected using a structured questionnaire. Predictors of optimal dose IPTp-SP (at least 2 doses) receipt were explored using logistic regression.
RESULTS The mean age of women was 26.2 ± 6.3 years. The coverage rate of IPTp-SP optimal dose was 42% (84/200) and 61.5% (104/169) of women did not take IPTp-SP under the directly observed therapy (DOT) strategy. Overall, 72% of women (144/200) had a bad level of knowledge on IPTp-SP use during pregnancy. Good level of knowledge on IPTp-SP use during pregnancy (OR adjusted = 14.89; 95% CI: [6.09–36.40]) and uptake of IPTp-SP at the health centre (OR adjusted = 2.84; 95% IC: [1.34–6.04]) were predictors significantly associated with IPTp-SP optimal dose receipt.
CONCLUSION The coverage rate of the optimal dose of IPTp-SP reported in this study is lower than the goal of 80% targeted by the statement of Abuja in 2000. Our findings highlight the need for both supervision of IPTp-SP uptake at the health centres and reinforcement of focused IPTp-SP education for pregnant women during their antennal clinic visits.

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Risk factors for persisting malaria among the Jarai ethnic minority along the Vietnam-Cambodia border

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INTRODUCTION The Central highland region of Vietnam has the highest share of malaria incidence and prevalence with most of cases occurred among impoverished ethnic minorities and this situation challenged the malaria control program.
OBJECTIVE To determine relative risk factors of malaria infection among the Jarai ethnic minority in Duc Co district, Gia Lai province to develop appropriate interventions for malaria control in the forested Vietnam-Cambodia border region.
METHODS A multi-method study including a malariometric cross-sectional survey and qualitative data focused on ethnography were conducted in four Jarai villages in the Vietnam-Cambodia border area between May 2010 and July 2011.
RESULTS 92.2% of households practiced slash and burn farming, 58.5% frequently spent overnights at their fields in the forest while 17.7% slept in the deep forest. Structured observation showed that bed net ownership was 85.1% at the village homes and 44.3% at the fields. 28.6% did not know that malaria could be cured, 76.0% sought medical service at the commune health center in their previous fever episode. Male respondents were at higher risk of malaria infection than female (OR = 1.8 CI 1.19; 2.75) due to their activities in slash and burn agriculture and forest work such as logging. Exposure to malaria infection was significantly higher among respondents who crossed the border into Cambodia in the past month to visit relatives (OR = 1.8 CI 1.2; 2.7) and those did not sleep under a net at their fields (OR = 2.8 CI 1.3; 3.1).
CONCLUSION The study confirms that low perception of malaria risk and treatment coupled with sleeping in the forest and limited bet net use contributed to high exposure to malaria among the Jarai ethnic minority and the need to address residual malaria transmission in this population.
*Authors equally contributed to the manuscript.

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Characteristics of malaria infection among the Jarai ethnic minority in central Vietnam

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INTRODUCTION Residual malaria transmission in impoverished ethnic minorities who practice slash-and-burn subsistence agriculture in the forested area near the Vietnam-Cambodia border requires an investigation on the epidemiological situation to inform public health interventions to malaria control.
OBJECTIVE To assess the epidemiological characteristics of malaria infection among the Jarai ethnic minority population.
METHODS A cross-sectional malariometric survey was conducted in four border villages in Duc Co District, Giai Lai Province in July 2011. Data on socio-demographic characteristics, clinical symptoms, treatment seeking behaviour and splenomegaly were collected through blood slides from 1465 respondents. Malaria infection cases were firstly determined by using RDT. Slide reading was done at NIMPE 2 weeks later.
RESULTS Malaria prevalence rate in the four study villages was 8.0%. 65.8% of cases were infected by *Plasmodium falciparum*, 28.2% were by *Plasmodium vivax* and 6.0% had mixed infections of two mentioned parasites. 87.2% of malaria cases were asymptomatic, only 0.1% had splenomegaly. Males had a higher risk of malaria infection than females (OR = 2.39, 95% CI 1.28; 4.47) and households with low income had significantly higher exposure to malaria infection as compared to those with average and high income (OR = 1.87, 95% CI 1.57; 6.61). The risk of exposing to malaria infection among patients that delayed their clinic visit was significant higher than those did not (OR = 2.0, 95% CI 1.2; 2.98).

Conclusion: High prevalence of malaria infection among four villages of Jarai ethnic minority in the Vietnam-Cambodia area was confirmed. Improvement of malaria prevention measures and health seeking behavior among their population is necessary. Further research on social and human behaviour to complement epidemiological knowledge is needed.
*Authors equally contributed to the manuscript.

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Fine scale mapping of malaria infection clusters by using routinely collected health facility data in urban Dar es Salaam, Tanzania

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INTRODUCTION Standard active survey methods for assessing malaria infection burden have limitations regarding the spatial resolution they can achieve.
AIM This study investigated whether passively collected routine health facility data can be used for mapping spatial heterogeneities in malaria transmission at the level of local government housing cluster administrative units in Dar es Salaam, Tanzania.
METHODS From June 2012 to Jan 2013, residential locations of patients tested for malaria at a public health facility were traced based on their local leaders' names and geo-referencing the point locations of these leaders' houses. Geographic information systems (GIS) were used to visualize the spatial distribution of malaria infection rates. Spatial scan statistics were deployed to detect spatial clustering of high infection rates.
RESULTS Among 2407 patients tested for malaria, 46.6% (1121) could be traced to their 411 different residential housing clusters. One small spatially aggregated cluster of neighbourhoods with high prevalence was identified. While the home residence housing cluster leader was unambiguously identified for 73.8% (240/325) of malaria-positive patients, only 42.3% (881/2082) of those with negative test results were successfully traced.
CONCLUSION It was concluded that recording simple points of reference during routine health facility visits can be used for mapping malaria infection burden on very fine geographic scales, potentially offering a feasible approach to rational geographic targeting of malaria control interventions. However, in order to tap the full potential of this approach, it would be necessary to optimize patient tracing success and eliminate biases by blinding personnel to test results.

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Housing improvement intervention reduce indoor malaria transmission in spite of pyrethroid resistant malaria vector

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BACKGROUND House is the major site for malaria infection where most human-vector contact takes place. Houses screening interventions might reduce the risk of malaria infection by limiting house entry of vectors.
AIMS This study assessed the effect of doors and windows screening intervention on indoor malaria transmission, and its durability, and community acceptance in Arba Minch town, southwestern Ethiopia.
METHODS A two-armed, household based, randomized control trial with ancillary qualitative study was conducted. Both entomological and epidemiological data were used to evaluate the impact of screening doors and windows on indoor density, sporozoite and entomological inoculation rates (EIR) of vectors and malaria incidence. Pre-intervention sampling was done in 92 randomly selected houses twice per month for six months from July–December 2015 using CDC light traps. We randomized the 92 houses into control and intervention groups. We screened the doors and windows of 46 houses by wire-mesh. Post-intervention mosquito collection was conducted biweekly from February–April 2016 in both groups. All the household occupants were followed for 6 months for malaria infection. The frequency of damage to different structure of screening was measured in two rounds. In-depth interviews were conducted to assess the community acceptance of the intervention.
RESULTS Screening doors and windows reduced the indoor density of malaria vector by 48% (mean ratio of intervention to control = 0.85/1.65) ($P = 0.001$). *Plasmodium falciparum* CSP rate was 1.6% (3/190) in intervention houses, while it was 2.7% (10/372) in control houses. Hence, the protective efficacy of intervention was 41%, but it was not statistically significant ($P = 0.6$). The EIR of *An. arabiensis* was 1.91 in intervention houses, whereas it was 6.45 in control houses and hence reduced the infectious bites of by 70%. A total of 477 participants, 50.1% ($n = 239$) inhabitants of screened houses and 49.9% ($n = 238$) inhabitants of unscreened houses, were followed for 6 months. Of 45 microscopically confirmed clinical malaria cases, 80% ($n = 36$) were *P. falciparum* and the rest 20% ($n = 9$) were *P. vivax*. The incidence of *P. falciparum* malaria was low [Incidence Rate Ratio (IRR): 0.39, 95% CI: 0.19–0.80, $P = 0.01$] in intervention groups compared to control. The protective efficacy of screening doors and windows from *P. falciparum* was 61% (95% CI: 18–83, $P = 0.007$). 97.9% of screened windows and 63.8% of screened doors were intact after 11 months of installation. Almost all participants of interviewed were willing to continue using the screened doors and windows.
CONCLUSIONS Screening doors and windows has substantial reduced the indoor malaria transmission where the principal vector is resistant to pyrethroid insecticide, and long lasting insecticidal nets are the only intervention. The existing malaria control interventions hence can be supplemented with doors and windows screening intervention with wire-mesh for further reduction and ultimately to eliminate malaria.

‡Contribute equally.

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Community perception and acceptance of environmental larviciding against malaria with BTI formulations in Burkina Faso: a mixed-methods study

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INTRODUCTION Malaria control is based on early treatment of cases and on vector control. The current measures for malaria vector control in Africa are mainly based on long-lasting insecticide treated nets (LLINs) and to a much smaller extent on indoor residual spraying (IRS). While bed net use is widely implemented and its efficacy intensively researched, spraying against mosquito larvae with biological larvicides such as *Bacillus thuringiensis israelensis* (*Bti*) is an innovative but barely implemented tool in sub-Saharan Africa.
AIM In this study we research people's perception and acceptability of *Bti* based larval source management as an additional tool to assess project success. Therefore different larviciding scenarios were tested against each other in a rural health district in Burkina Faso.
METHODS A cross sectional study was undertaken using a total of 634 administered questionnaires. This data was complemented by focus group discussions (FGDs) and key informant interviews (KII). Data was collected in a total of 36 rural villages and in seven town quarters of the semi-urban town of Nouna in Burkina Faso.
RESULTS Our findings show high perceived success amongst rural populations in reducing the number of malaria vector mosquitoes and malaria cases using biological larviciding. We describe awareness of malaria risk factors, the perception and acceptability of performed biological larviciding amongst community members, as well as the communities' willingness of participation and contribution in a future program. Overall, community members showed a strong interest, acceptability and willingness of participation within the 3-year biological larviciding program.
CONCLUSION To our knowledge this is the largest operational trial on *Bti* based larviciding that has been implemented in a rural African environment. Results show that biological larviciding could be a promising additional option to fight malaria even in a rural, sub-Saharan African context.

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Environmental characteristics and evolution of malaria hotspots in a rural area, Burkina Faso

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BACKGROUND With limited resources and spatio-temporal heterogeneity of malaria in the developing country, it is still difficult to assess environmental characteristics of endemic area, in order to set up targeted campaigns against malaria at an accurated scale.
AIMS Our goals were to detect malaria hotspots in rural area and assess the associated environmental characteristics, which could explain the occurrence and evolution of these hotspots.
METHODS Data for 5 years on malaria cases and environmental factors were collected from five health facilities of the Nanoro demographic surveillance area; located the centre-west region of Burkina Faso. A cross correlation was used to quantify the temporal association with malaria weekly incidence and environmental factors. Local spatial autocorrelation analysis was performed by transmission period using Kulldorff elliptic spatial scan statistic. Multivariate analysis adjusted by environmental factors was implemented to assess the main environmental determinants on malaria hotspots using a Generalized Estimating Equation (GEE) approach.
RESULT Weekly rainfall and temperatures were positively ($P < 0.05$) associated with weekly malaria incidence with a lag of 9 and 14 weeks respectively. Spatial analysis showed a spatial autocorrelation of malaria cases and significant hotspots which are relatively stable in term of location, and associated with low economic characteristics (OR 1.21; 95% CI [1.03–1.40]).
CONCLUSION At a fine scale, our findings support a relative spatio-temporal stability of malaria risk and the role of environmental factors. Therefore, integration of these factors into existing control measures would be beneficial to develop sustainable strategies and struggles adapted to the local context.

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Sulfadoxine-pyrimethamine versus Cotrimoxazole in pregnant women: effect on birth weight-findings from a randomized, open-label, non-inferiority trial in Zambia

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INTRODUCTION In sub-Saharan Africa, malaria in pregnancy (MiP) is a major public health problem causing significant maternal and infant morbidity and mortality[1]. *Plasmodium falciparum* infections during pregnancy rarely result in fever and therefore remain undetected and untreated. In areas with high malaria transmission, MiP is a known risk factor for maternal anemia, low birth weight (LBW) and perinatal and infant death[2]. Low birth weight associated with MiP is estimated to result in 100 000 infant deaths in Africa each year[3]
AIM To establish that in HIV negative pregnant women, cotrimoxazole prophylaxis is non-inferior to sulfadoxine-pyrimethamine prophylaxis with respect to birth-weight at delivery or within 24 hr of delivery. Non-inferiority margin was 100 g.
METHODS We conducted a non-inferiority trial and randomly assigned HIV negative pregnant women of gestational age between 16 and 28 weeks, with no symptoms of malaria, to receive either 2 tablets of cotrimoxazole (CTX) (400 mg sulphamethoxazole and 80 mg trimethoprim) daily or sulfadoxine-pyrimethamine (SP-IPTp) (1500 mg of sulfadoxine

and 75 mg of pyrimethamine) as per standard IPT schedule during pregnancy. Women were followed up monthly until delivery. Birth weights of the babies were taken within 24 hr of delivery.
RESULTS Birth outcomes were documented in 306 (81%) women in the daily CTX group and 307 (82%) in the SP-IPTp group. The mean birth weights were 3016 g (95% CI: 2961–3071) and 3034 g (95% CI: 2977–3090) in the daily CTX and the SP-IPTp groups respectively. There was no significant difference in the prevalence of low birth weight infants [RR: 1.1; 95% CI: 0.66–1.22; $P = 0.57$] between the daily CTX and SP-IPTp group. The upper limits of the one-sided 97.5% CI of the mean birth weight difference between the two groups were 79.78 grams and 78.96 g in the Intention to Treat (ITT) and Per Protocol (PP) groups, respectively.
CONCLUSION The one sided 97.5% confidence interval for the difference in mean birth-weight lies entirely below 100 (non-inferiority margin) and therefore daily co-trimoxazole is non inferior to sulfadoxine-pyrimethamine given as IPT
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Risk factor assessment for malaria among forest-goers in a pre-elimination setting–Phu Yen province, Vietnam

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INTRODUCTION Moving from controlling to eliminating malaria requires understanding and targeting interventions at populations at high-risk. In Vietnam, forest-goers are often not reached by health services and they are highly mobile, which makes them difficult to test and treat for malaria as well as track and follow up with routine measures. If undiagnosed, forest goers can maintain parasite reservoirs and contribute to ongoing transmission.
AIM The study was conducted to identify malaria risk factors associated with forest-goers.
METHODS We conducted a case-control study. A case was defined as any resident of 15 villages in three communes with malaria, as confirmed by rapid diagnostic test (RDT) or microscopy and who had slept overnight in the forest. Controls were healthy neighbors of cases and negative for malaria by RDT. Participants were interviewed face-to-face using a standard questionnaire. We used logistic regression to calculate odds ratios (ORs) and 95% confidence intervals (CI) for risk factors after adjusting for socio-demographic characteristics.
RESULTS In 2015, we found 81 cases, of which 66.7% were positive for *Plasmodium falciparum*, 29.6% for *Plasmodium vivax*, and 3.7% had a mixed infection. The majority of cases were male (88%) with a mean age of 34.2 years. In comparison with 94 neighborhood controls, cases were less likely to use treated nets (3.2; 95% CI: 1.3, 8.0), but more likely to sleep in a hut without walls (OR = 5.1; 95% CI: 1.6, 16), work after dark (OR = 2.7; 95% CI: 1.3, 5.6), bathe in a stream after dark (OR = 2.6; 95% CI: 1.1, 6.0), and collect water after dark (OR = 2.0; 95% CI: 1.1, 3.8).
CONCLUSION Risk factors for malaria among forest-goers in Vietnam are similar to risk factors for malaria in other areas. As Vietnam moves toward malaria elimination, targeted education and malaria prevention strategies are needed for this hard-to-reach group.

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Targeted-reactive case detection at sleeping sites to interrupt malaria transmission in Vietnam II: reported and observed malaria prevention, treatment and risk behaviors

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INTRODUCTION Reactive case detection (RACD) has limited impact and high costs in low endemicity areas where malaria cases sleep outside of their homes. In Vietnam, over 60% of malaria cases sleep in forests or on farms. We applied a targeted-RACD approach to collect information from participants at their sleeping sites.
AIM To identify risk behaviors associated with malaria cases in a low malaria transmission setting.
METHODS An analytical cross-sectional study was conducted in three mountainous communes in Phu Yen province, 2016. An index case was defined as someone who routinely slept in the forest or farm and tested positive for malaria using rapid diagnostic test or microscopy at a community health facility, between 2014 and 2016. A list of 110 index cases was obtained from three commune health centers. Index cases came from 71 huts (referred to as 'index hut'). We found 109 neighbor huts, located within 500 m of the index hut. Participants were interviewed face-to-face using a standardized questionnaire and a tool for direct observation. Logistic regression models were used to calculate prevalence odds ratios (PORs) and 95% confidence interval (CI) for risk factors, after adjusting for socio-demographic characteristics.
RESULTS The respondents lived in 180 huts: 21 huts had two or more malaria cases per hut, 50 had one case, and 109 had no cases. Neighbor huts were significantly closer to their official homes than the index huts—they were 3.10 times more likely to be within a 30 min motorbike ride (95% CI 1.87–5.13). Significantly more index huts than neighbour huts had more than three occupants (POR = 4.63; 95% CI 2.74–7.81), and

were surrounded by more than 3 huts (POR = 2.48; 95% CI 1.28–2.79). Access to a cell phone network was significantly higher among the neighbour huts (POR = 6.33; 95% CI 3.11–12.90). Direct observation showed the insignificant presence of treated nets (13.8% vs 5.6% among the index huts), but treated net ownership was considered low among both huts.
CONCLUSION Targeted education and malaria prevention strategies can be developed to address the specific risk factors identified for those primarily sleeping in farms and forests.

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Net use and preference among those who slept in a forest or farm in the context of malaria multidrug resistance and elimination

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BACKGROUND Strengthening vector control measures amongst mobile and migrant populations (MMPs) in the context of malaria multidrug resistance and elimination is crucial.
AIM We aimed to assess net use and preference among those who slept in a forest or farm.
METHODS Among 20% of 4668 randomly selected households in 18 villages in Phu Yen Province, there were >5 malaria cases/1000 population. Of this population, 301 people who slept in forests or farms participated in study of mosquito net preferences. Data were collected using the app Kathmandu Living Labs (KLL) Collect® application on smartphones and uploaded in real-time into ONA®. Logistic regression models were used to calculate prevalence odds ratios (PORs) and 95% confidence interval (CI) to assess differences among those who slept in forests and farms, after adjusting for socio-demographic characteristics.
RESULTS Of 301 respondents, 258 slept in the forest and 43 on farms. More respondents liked to bring hammock-nets (277, 92%) rather than bed-nets (74, 25%). In particular they preferred thick hammock-nets with zippers (52%). More respondents sleeping in forest (18, 67%) regularly used RAI hammocks than those slept on farms (4, 36%). For hard LLIN net, no respondents like it. Compared to 43 respondents slept on farms, respondents sleeping in forest were more likely to want hammock-nets than to carry both bed-nets and hammock-nets (aPOR = 4.63; 95% CI 2.33–9.21). In addition respondents sleeping in the forest preferred the hammock-net with separate flip over (called the RAI hammock-net, POR = 20.0; 95% CI 2.20–181.55), but were less likely to receive a RAI hammock-net (aPOR = 0.34; 95% CI 0.15–0.75).
CONCLUSIONS We recommend to scale up the distribution of bed-nets or hammock-nets to 100% coverage in areas of high-risk populations in multidrug resistance including ACT resistance. This could include distributing forest-packages to forest goers, including hammock-nets, repellent and information on the benefits of wearing protective clothing and using bed-nets and repellents consistently and engaging the private sector to establish malaria focal points within workplaces associated with malaria risk. Additional implementation research is needed to the uptake of net use by MMPs.

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Community participation as part of formative research to design innovative malaria elimination strategies in The Gambia

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INTRODUCTION In areas of low malaria transmission, asymptomatic malaria parasite carriers are hypothesised to be clustered around clinical malaria cases at the household level. A randomised control trial on Reactive Household-based Self-administered Treatment (RHOST) for malaria elimination is currently being evaluated in the Gambia. The trial treats not only the patient but all asymptomatic individuals residing in the patient's household in order to reduce the human reservoir of infection and possibly interrupt transmission. As the effectiveness of disease control strategies depends on community uptake, community participation strategies were used during the trial. To improve the effectiveness of the intervention, community-derived solutions were identified, analysed, implemented, and evaluated.
AIM To generate community participation strategies and community-driven solutions as part of a Formative Research (FR) approach in a malaria clinical trial.
METHODS Based on mixed-methods research, a systematised FR process was developed for adapting the RHOST intervention to the local context. First, community participatory workshops with key informants were held to develop specific aspects of the implementation strategy. Second, key informant meetings and sensitisation activities were conducted to engage communities in the project.
RESULTS Community-driven solutions were integrated into the trial intervention based on the FR approach. As such, Village Health Workers were employed as key actors in bridging the communities and the project. Animal-symbols proposed by communities were used to identify dihydroartemisinin-piperaquine dosages in relation to weight. Ideas emerging from communities were analysed and used to produce and deliver key health messages. The community participation process resulted in increased community uptake of the project as assessed during monitoring activities.
CONCLUSION Actively involving communities increases ownership and builds trust between communities and research projects. Such trust can be crucial in generating and implementing community-accepted strategies and in detecting obstacles for the timely improvement of the intervention.

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Malaria incidence in the area of seasonal malaria chemoprevention

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INTRODUCTION Seasonal malaria chemoprevention (SMC) consists of intermittent administration of sulphadoxine-pyrimethamine (SP) and amodiaquine (AQ) to children living in areas with highly seasonal malaria transmission. Since 2013, over 100 000 children 3–59 months old in Magaria district, Niger received SMC through four annual distribution rounds at

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28-day intervals. Demonstrating impact of SMC using programmatic data proved challenging. Therefore, 4 sentinel sites were set-up in periphery health structures of Magaria to monitor malaria incidence and protective effectiveness of SMC. A census of all children less than 5 years was conducted before start of SMC in 2014 and 2015.
AIM To estimate the incidence of medically-attended malaria in children who received SMC compared to those who did not.
METHODS Individual-level data were collected on all children <5 years old presenting with a fever at periphery health centres in four sentinel sites in Magaria district during the 4 months of SMC in 2014, 2015 and 2016. Cross-sectional cluster-based surveys were conducted after the end of each SMC season to estimate the coverage of each SMC round that year. In 2015 and 2016 the data collection was expanded to inquire about fever-related health seeking behaviour.
RESULTS Coverage of each SMC round varied between 70% and 94%, with the lowest coverage during the last SMC round of each year. 31% and 77% of children with fever sought treatment in target health structures of sentinel sites in 2015 and 2016 with no significant difference between children receiving and not receiving SMC. Lower health-seeking behaviour in 2015 was linked to the patient fee that was cancelled in 2016. Malaria incidence per 1000 children receiving SMC was estimated at 195, 137 and 278 respectively for the monitoring period of 5 months between the years 2014 and 2016 compared to 509, 297 and 487 per 1000 children not getting SMC.
CONCLUSION Considerably lower malaria incidence in children receiving SMC compared to those not receiving SMC is reassuring about the continuous effectiveness of SMC in this context. Yearly variations of malaria incidence should be interpreted with caution due to changing health-seeking behaviour.

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Targeted-reactive case detection at sleeping sites to interrupt malaria transmission in Vietnam I. Risk behaviors associated with malaria cases sleeping in a farm or forest

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INTRODUCTION Reactive case detection (RACD) has limited impact and high costs to identify malaria cases in low endemicity areas where the cases sleep outside their place of residence. In Vietnam, over 60% of malaria cases sleep either in forests or on farms. We piloted a targeted-RACD approach to collect information from participants at their sleeping sites.
AIM To identify risk behaviors associated with malaria cases in a low malaria transmission setting.
METHODS An analytical cross-sectional study was conducted in three mountainous communes in Phu Yen province in 2016. An index case was defined as someone who routinely slept in the forest or farm and tested positive for malaria using rapid diagnostic test or microscopy. A list of index cases was obtained from three commune health centers. All index cases and neighbours from huts within 500 m, were interviewed face-to-face at their sleeping sites. Logistic regression models were used to calculate prevalence odds ratios (PORs) and 95% confidence interval (CI) for risk factors after adjusting for socio-demographic characteristics.
RESULTS Of 110 index cases, 82% were males with a mean age of 36.6 years; illiteracy proportion was 23%. Among 93 participants who slept in the forest, index cases were less likely to use treated bed nets (adjusted-POR = 0.10; 95% CI 0.02–0.58), and more likely not to use any net when sleeping (POR = 2.95; 95% CI 1.26–6.92). Index cases were also more likely than neighbors to sleep in huts without walls or outdoors (POR = 44.0; 95% CI 13.0–148), and to work after dark (adjusted POR = 6.33; 95% CI 1.92–20.9). A significantly higher proportion of forest-based index cases worked in natural resource occupations (hunting, trapping; POR = 11. 7; 95% CI 4.37–31.2), than did neighbors. Among 204 respondents who slept on a farm, the proportion using treated nets and no nets were not significantly different between index cases and neighbors. A significantly higher proportion of index cases were involved in planting or logging on farms (POR = 2.74; 95% CI 1.27–5.91), than were neighbors.
CONCLUSION Targeted education and malaria prevention strategies can be developed to address the specific risk factors identified for forest and farm workers, particularly for illiterate group.

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A malaria indicator survey in a malaria elimination area of Phu Yen province, coastal Vietnam

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BACKGROUND The indicators for malaria prevention reflect the most important interventions for achieving malaria elimination in low endemic areas.
AIM We aimed to assess malaria prevention indicators in an elimination setting against Vietnam's malaria elimination strategic targets.
METHODS We conducted a malaria indicator survey. Census data from 2015 revealed a total of 4668 households among 18 villages in Phu Yen Province. These data were used to select 20% of the households. GPS coordinates were captured where each interview was conducted. Data were collected using a smartphone application (KLL Collect®) and uploaded in real-time into an online database (ONA®). Logistic regression models were used to calculate prevalence odds ratios (PORs) and 95% confidence interval (CI) to assess differences among those who slept in forests and on farms.
RESULTS A total of 4411 people were interviewed, of which 1074 were respondents and 3137 were their members. Among 1074 respondents, 472 slept in forest and 92 slept on a farm, 132 slept both sites, and 378 slept at their villages within last 12 months. Age, gender, literacy, occupation and ethnicity were significantly different among those who slept in forest versus at other sites ($P < 0.001$). Malaria infections were higher among

those who reported having slept in the forest (147 [57%]) versus those who slept on a farm (18 [42%]). Ownership and use of all net types among forest-goers was significantly lower than those who reported having slept on a farm or in their village. Huts without walls in the forest were significantly prominent at forest goers' sleeping site (POR = 10.3; 95% CI 4.67–22.7). All respondents who slept in a forest requested standby malaria drugs and one-third of them self-treated without blood testing. The proportion of respondents who knew about malaria prevention was 34% (82) without a subjective measure.
CONCLUSION Data about intervention coverage at the actual transmission site and net preference needs to be routinely captured. Targeting preventive interventions where transmission occurs is critical. If malaria elimination is to be archived, malaria control activities should be scaled up in forest and forest-fringe communities.

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The Kwahu-south malaria situation: towards tailor-made interventions

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INTRODUCTION Malaria is on the decline in Ghana; a result of effective interventions including vector control, early and improved diagnostics, effective prevention and treatment. However, these are blanket interventions implemented across the country regardless of malaria transmission heterogeneity. Recently, human immune-deficiency virus (HIV) and sickle cell disease (SCD) have been shown to influence malaria in geographic areas where all three overlap.
AIM The aim of this study was to determine the malaria vector and parasite profile of a highland area in Ghana in the context of malaria decline, and also to determine the influence of HIV and SCD in this setting.
METHODS Study was conducted in Kwahu-South District in the Eastern region of Ghana. Mosquitoes were caught using the human landing catch method (HLC) and identified with PCR. Circumsporozoite antigens of *Plasmodium* spp. were determined from salivary glands of mosquitoes using ELISA. First Response® Malaria Ag *P. falciparum* (HRP2) malaria rapid diagnostic test kit (RDT) was used to test finger-prick capillary blood of participants. Participants were categorized into symptomatic groups based on whether they had malaria symptoms (axillary temperature ≥ 37.5°C with/without vomiting, nausea, general malaise, headaches, body aches) or not. Haemoglobin genotypes of participants were determined with Hb electrophoresis. Samples were screened for HIV with INSTANTCHEK HIV-1+2 rapid diagnostic test kits by EY Laboratories.
RESULTS *Anopheles gambiae s.s.* S form was the most common vector (91.4%), others were *Anopheles pharoensis* and *Anopheles funestus* (4.3%). Mosquitoes had kdr-w mutation with majority (95.2%) being homozygous resistant (RR) for the knock-down resistance gene; which makes them resistant to pyrethroids, used in insecticide treated nets. Malaria prevalence was 142/714 (19.9%); 124/142 *P. falciparum* (87.3%) and 18/142 *P. malariae* (12.7%). Most asymptomatic infections [11/40 (27.5%)] were aged 11–15 years. Multivariate regression analysis did not show any significant correlation between HIV and malaria, neither was it observed between SCD and malaria.
CONCLUSION Malaria control efforts in Kwahu-South need to focus on children aged 11–15 years because they contribute the most to parasite reservoir transmission. There may be the need to consider non-pyrethroid chemicals for ITNs or alternative approach to vector control strategies.

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Knowledge, perceptions and practices of community health workers regarding the use of long-lasting insecticide-treated nets for malaria control in Burundi

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INTRODUCTION In spite of its reduced incidence in sub-Saharan Africa, malaria remains a public health issue in Burundi representing the first cause of morbidity and mortality. In Burundi, long-lasting insecticide-treated nets (LLIN) are the main malaria control measure with 60% coverage in 2012. LLIN are distributed to communities by health workers (paramedical personnel) responsible for awareness and education of local populations. Data, regarding the quality and learning of the messages delivered by these workers, is scarce.
AIM Assess the knowledge, perceptions and practices of community health workers with respect to long-lasting insecticide-treated nets in the Kayanza province in Burundi.
METHODS A descriptive and analytic transverse survey was carried out from August 1 to August 17, 2016, among the health workers responsible for the LLIN distribution. We included all subjects participating directly, or indirectly, to the distribution of LLIN, during the investigator's visit. Data were collected using a standardized questionnaire regarding the sociodemographic characteristics of the personnel, their knowledge, perceptions and practices about LLIN. Data were entered on the CSPro 6.3 software and analyzed with the STATA 11 software.
RESULTS We included 142 service providers (males and females), with a mean age of 34.6 years (25–61). More than 60% received training on LLIN management. Terms and conditions of LLIN maintenance were not mastered by all personnel [washing (15%), drying (32%) and cleaning products (11%)]. The majority (90%) used LLIN to protect themselves from malaria at home but the household coverage rate was lower than 50%. Age, sex and training level did not impact the use of LLIN by family members. In order to improve the distribution of LLIN, the providers proposed to deliver effective awareness campaigns (70%) and prevent shortages (61%).
CONCLUSION Despite a satisfactory level of knowledge, perceptions and practices of community health workers regarding vector control measures are not perfect.

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Prevalence of *mdr1* and *k13* polymorphisms in *Plasmodium falciparum* after a decade of using artemisinin-based combination therapy in mainland Tanzania

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INTRODUCTION Following deployment of artemisinin based combination therapy (ACTs), the World health Organisation recommends implementation of regular therapeutic efficacy studies (TES) to monitor the performance of these antimalarials. In 2016, a TES was conducted at 4 sentinel sites (Kibaha, Mkuzi, Mlimba and Ujiji) in Tanzania.
AIMS To assess the efficacy and safety of artemether-lumefantrine (AL) for treatment of uncomplicated malaria.
METHODS This single-arm prospective study evaluated AL for treatment of uncomplicated malaria in children aged six months to 10 years. Follow-up was done for 28 days with scheduled and unscheduled visits (if symptoms reoccurred) for clinical and laboratory assessments.
RESULTS A total of 344 patients were enrolled in the study and 332 completed follow-up or had a pre-defined study outcome. Of these, 67(20.2%) demonstrated asexual parasitaemia after day 3 and none had early treatment failure. After PCR correction to distinguish recrudescent from new infections, only one patient from Mkuzi had late clinical failure with a recrudescent infection on day 28, yielding a corrected adequate clinical and parasitological response of >99%. Sequencing of *k13* gene was successful for 395 samples (327 and 68 samples from day zero and recurrent infections, respectively) and 6 samples had non-synonymous mutations: I416V, E433D, R471R, and A578S each in 1 sample; Q613E in 2 samples. However, none of these *k13* mutations have been associated with artemisinin resistance. For *Pfmdr1* gene, 409 samples were successfully sequenced (334 and 75 samples from day zero and recurrent infections, respectively) and 178 (44.1%) samples possessed non-synonymous mutations: 2 with N86Y, 1 with N86I, 168 with Y184F, 1 with Y184N, 2 with S1050F, 1 with D1111N, and 3 with D1246Y. All 184samples (149 from patients with recurrent parasitemia and 35 additional day zero samples) analysed for *Pfmdr1* copy number had a single copy of the gene. The one patient with recrudescent infection had wild type *k13* and *Pfmdr1* genes in both the initial and recrudescent samples.
CONCLUSION We observed no *k13* mutations associated with artemisinin resistance and high efficacy of AL. Continued monitoring of molecular markers of resistance to ACTs is critical in supporting TESs and providing evidence-based malaria treatment policies.

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Repeated Artemisinin-based combination treatment and dynamics of *Plasmodium falciparum* strains in Uganda and the Democratic Republic of the Congo

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INTRODUCTION Most malaria trials are conducted with a single treatment course, which does not reflect the real life situation, as subsequent malaria attacks may happen in a relatively short period of time, requiring repeated treatments.
AIM Assess the impact of repeated malaria attacks on *Plasmodium falciparum* strains.
METHODS A cascade-cohort study was conducted from May 2012 to April 2014 at Lisungi Health Center in Kinshasa, Democratic Republic of the Congo (DRC); and Kazo Health Center in Mbarara, Uganda (NCT01374581). Children aged 12 to 59 months diagnosed with uncomplicated malaria were treated and followed-up until they were malaria parasite-free during the indicated follow-up period. Three molecular markers (GLURP, MSP1 and MSP2) were used for genotyping and assessment of the multiplicity of infection. From a treatment course to another, children classified as adequate clinical and parasitological response, and those not eligible for the next study phase were excluded.
RESULTS Overall, 2118 children received the first treatment course. Majority (80.9%) of those who experienced recurrent malaria and received the second treatment course, harbored a new infection, while 19.1% were infected with the same strains as the initial episode. In the latter subgroup, 41.4% were eligible to the third treatment course after occurrence of the third malaria episode. Among them, 31.7% still had recrudescent strains. Subsequent recrudescences were cleared after a fourth treatment course. One child needed up to eight treatment courses. Uneven distribution of mono- and polyclonal infections was observed through the time within the study sites and between them ($P < 0.05$ for all comparisons). In Uganda polyclonal infections were predominant in the initial study phases (>55.6% until the second treatment course) whereas monoclonal infections became more predominant from the third treatment: 55–80%. In contrast to Uganda, in DRC polyclonal infections accounted for 76–88.1% in all treatment courses.
CONCLUSION This analysis indicates a small group of children at higher risk for subsequent malaria attacks. They likely contribute heavily on the community-level, to the burden of the disease. Focusing prevention strategies in that group may have optimal impact on reducing the burden of the disease. The persistent recrudescences may contribute to the selection of resistant strains.

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Assessment of glucose-6-phosphate dehydrogenase (G6PD) deficiency in *Plasmodium vivax* malaria endemic setting in Mauritania

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INTRODUCTION Primaquine may cause acute haemolytic anaemia in individuals with glucose-6-phosphate dehydrogenase (G6PD) deficiency.
AIM The aim of this study was to determine the prevalence of G6PD deficiency before introducing primaquine to eliminate *Plasmodium vivax* in Mauritania.
METHODS Venous blood samples from 443 blood donors at the National Transfusion Center in Nouakchott were screened using CareStart® G6PD rapid diagnostic test (AccessBio).
RESULTS The overall prevalence of G6PD deficiency was 11.3% (50/443). A significant difference was observed between men (n = 49) and women (n = 1). Individuals belonging to Soninke black ethnic group were the most affected with a prevalence of 21.4%, followed by Peuls (14.6%), black Moors (14.4%), and white Moors (5.9%). Similar proportions of G6PD-deficient individuals were found in healthy blood donors from the regions bordering the Senegal River (40%) and southeastern regions bordering Mali (38%). Among G6PD-deficient donors, 26% had a history of malaria.
CONCLUSION The observed G6PD prevalences agree with those reported in West and North Africa, depending on the ethnic groups. The use of a rapid diagnostic tool for G6PD screening is indispensable before prescribing primaquine.

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Defining the unit of intervention for targeted treatment of asymptomatic malaria carriers: a transdisciplinarity approach

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INTRODUCTION Despite evidence of clustering of asymptomatic infections around malaria clinical cases, new approaches to target asymptomatic carriers are needed. A novel malaria elimination strategy, consisting of Reactive Household based Self-administered Treatment is currently being evaluated in a randomised control trial in The Gambia. The intervention consists of treating not only the passively-detected patient but providing the patient, or caregiver, with sufficient treatment to be administered to 'household' members, targeting clustered asymptomatic carriers.
AIM To describe the transdisciplinary process leading to the definition of the socio-spatial epidemiological unit of intervention in a malaria elimination trial.
METHODS A transdisciplinary study, combining anthropology and epidemiology triangulated research findings from ethnography (in-depth interviews, participant observation), community participatory strategies and informal epidemiological field reports to pilot the feasibility and community acceptance of using household 'sleeping areas' as treatment units for the epidemiological intervention.
RESULTS At community level, most households (operationally defined as all those who eat from the same cooking pot) are integrated into compounds (i.e. patrilineally defined socio-spatial units that collaborate socio-economically). At the household level, shared sleeping spaces indicate complex sleeping arrangements as the inter/intra household movements of relatives/long-term visitors leads to substantial variation in sleeping locations. These sleeping patterns inevitably relate to the potential infection clustering and affects the number of people targeted for treatment. Additionally, community members showed clear preference for receiving treatment at compound level over household 'sleeping areas' as frequent social interaction between compound members was perceived as increasing the risk for malaria infection. Based on these findings, the unit of intervention was redefined as compound for the subsequent implementation phase of the trial.
CONCLUSION Integrating emergent theory designs such as ethnography as part of transdisciplinary study designs, can improve epidemiological outcomes and address epidemiological concerns as they emerge.

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Of intermittent preventive treatment in infants: experience of the Democratic Republic of Congo

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INTRODUCTION The WHO recommend Intermittent Preventive Treatment in infancy with SP (IPTi-SP) given through the expanded program on immunization (EPI) in areas with moderate to high malaria transmission in sub-Saharan Africa.
AIM This study aimed to assess the feasibility of the IPTi in two areas of Democratic Republic of Congo (DRC).
METHODS A quantitative cross-sectional mixed with a qualitative study assessed the prevalence and the determinants of fever and malaria infection, immunization coverage, SP resistance markers, as well as the community perception of SP-IPTi. The study was conducted from 1st November to 31th December 2014 at two malaria surveillance sites located in Kinshasa and Kongo-central.
RESULTS A total of 639 households with children aged from 2 to 11 months were surveyed. The mean age was 6.46 months (SD ± 2.84), the overall prevalence of P. falciparum infection detected by microscopy, was 1.6% (95% CI: 0.60–2.53). Fever in the past 2 weeks was reported by 35.5% (95% CI: 31.8–39.2) of children. The prevalence of fever was 5.6% (95% CI: 3.8–7.4) during the survey. Ninety six percent (96.7%; 95% CI: 95.02–97.9) of children slept under bed nets the night prior to the survey. The immunization coverage was 11.8% (95% CI:

6.2–17.4). The prevalence of Pfdhps 540 mutation was 12.3% (95% CI: 4.7–19.9). Perceptions towards IPTi were generally positive among communities and health workers, although for some health workers IPTi-SP could deplete health facilities due to its expected impact on the prevalence fever.
CONCLUSION Although the prevalence of SP resistance markers allows the use of SP for IPTi-SP, the EPI could not be an effective delivering system of IPTi-SP, due to the very low immunization coverage observed, even though this immunization coverage could be increased by IPT-SP. Moreover the low prevalence of fever and malaria infection observed, compared to that reported by the NMCP of DRC or suggested by modelling studies, may compromise the assessment of the expected effect of IPTi. Therefore, these results emphasize the need for each country or area to assess the feasibility of IPTi-SP, at a local level, regardless of information suggested by modelling studies or data from settings sharing similar characteristics.

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Role of community participation in malaria elimination interventions

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INTRODUCTION Since the Alma Ata declaration community engagement has been recognized as an important element of public health, Most of Studies of malaria have paid little attention to the role which socio cultural factors can play and some have noted that malaria programmes did not fully utilize the benefits of community engagement.
AIM To explore and determine factors which influence compliance behavior towards malaria elimination in BandarAbbas, a malaria endemic area of Iran.
METHODS A combination of methodological approaches was employed in this study. (i) A structured questionnaire was constructed and used to obtain quantitative data form thebasic data of the study. (ii) A number of key informants in the community were interviewed to provide qualitative data on the sociocultural aspects. A total of 10 key informants was interviewedof the population. Thematic analysiswere conducted.
RESULTS Malaria elimination intervention should become much more proactive in generating community support for the goal of elimination. Improved Intervention Through Increased Community Participation and offer an approach for behavioural. Prevention and a model for improving community involvement offera model for improving community involvement.
CONCLUSION From the current study i t is suggested that the social structure of the community should be considered in as far as this can f facilitate malaria interventions.

The study illustrates the value of community empowermentin the management of health and illness particularly malaria.It suggests the incorporation of community specialists in the national health services.These specialists will facilitate to bridge the cultural gap between modern and traditional practices.
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Factors limiting the effectiveness of standardized malaria control strategies in forested highlands of Vietnam: a qualitative study

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INTRODUCTION Despite radical improvements in malaria control in Vietnam in the past decades, malaria persists among impoverished ethnic minorities in south-central Vietnam where the same strategies that lead to its reduction and elimination elsewhere in the country were applied such as the provision of free of charge bet nets, diagnosis and treatment.
AIM To assess socio-cultural and health systems factors limiting the effectiveness of malaria preventive measures among the Ra-glai ethnic minority in South-Central Vietnam.
METHODS An ethnographic study was conducted in nine villages in Bac Ai district of Ninh Thuan province. Qualitative data were collected through in-depth interviews, informal conversations and participation observation. Key informants were theoretically and gradually selected. Retroductive data analysis was concurrent to data collection and carried out using Nvivo 11.
RESULTS A combination of factors contributes to limiting effective malaria control in this minority setting. Firstly, the constant contact with the forest exposes the Ra-glai to the main early biting and outdoor-resting sylvatic vector *An. dirus*, limiting the effectiveness of bed nets and indoor residual spraying. Slash-and-burn subsistence agriculture exacerbates this exposure as farmers live at plot huts at their fields where the risk of infection is higher than in their administrative villages. Secondly, health messages on malaria prevention were not adapted to a context characterized by the Ra-glai culture, a different language, illiteracy and different living conditions than the majority society, making part of the messages irrelevant to the local situation. Thirdly, the doctor-patient hierarchy consisting of limited communications between health professionals and patients due to language barriers and the perspectives on minority patients further enhances the difficulties during the health encounter. Waiting times and geographic distance in the context of high work burden during the malaria transmission season limit the use of the public health system. Private health practitioners and local shamans bridge this gap by providing services perceived as effective, friendly and accessible.
CONCLUSION This study provides the insights into barriers to the current malaria control strategies and the need to further assess how to improve interventions in minority settings, with different ecological and socio-cultural characteristics than the majority society.

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Efficacy and user acceptability of transfluthrin-treated sisal and hessian decorations for protecting against mosquito bites in outdoor bars

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BACKGROUND A number of mosquito vectors bite and rest outdoors, which contributes to sustained residual malaria transmission in endemic areas. Spatial repellents are thought to create a protective 'bubble' within which mosquito bites are reduced and may be ideal for outdoor use. This study builds on previous studies that proved efficacy of transfluthrin-treated hessian strips against outdoor biting mosquitoes. The goal of this study was to modify strips into practical, attractive and acceptable transfluthrin treated sisal and hessian emanators that confer protection against potential infectious bites before people use bed nets especially in the early evening and outdoors. This study was conducted in Kilombero Valley, Ulanga District, south-eastern Tanzania.
RESULTS The protective efficacy of hand-crafted transfluthrin-treated sisal decorative baskets and hessian wall decorations against early evening outdoor biting malaria vectors was measured by human landing catches (HLC) in outdoor bars during peak outdoor mosquito biting activity (19:00 to 23:00 h). Treated baskets and wall decorations reduced bites of *Anopheles arabiensis* mosquitoes by 89% (Relative Rate, RR = 0.11, 95% confidence interval, CI: 0.09–0.15, $P < 0.001$) and 86% (RR = 0.14, 95% CI: 0.11–0.18, $P < 0.001$), respectively. In addition, they significantly reduced exposure to outdoor bites of *Culex* spp. by 66% (RR = 0.34, 95% CI: 0.22–0.52, $P < 0.001$) and 56% (RR = 0.44, 95% CI: 0.29–0.66, $P < 0.001$), respectively.
CONCLUSION Locally hand-crafted transfluthrin-treated sisal decorative baskets and hessian wall decorations are readily acceptable and confer protection against outdoor biting malaria vectors in the early evening and outdoors: when people are resting on the verandas, porches or in outdoor social places such as bars and restaurants. Additional research can help support the use of such items as complementary interventions to expand protection to communities currently experiencing outdoor transmission of mosquito-borne pathogens.

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Dynamics of *Plasmodium vivax* infections during a 2-year monthly follow up in the Peruvian Amazon

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INTRODUCTION *Plasmodium vivax* malaria is the most widespread of human malarias worldwide with one third of the global population at risk of being infected. Until now, control and eradication efforts against *P. vivax* have been delayed due to its particular biological features like the reactivation of hypnozoites and the early gametocytes apparition in bloodstream. Further knowledge on the parasite dynamics at individual and population level is key to design more efficient malaria control programs.
AIM We aim to elucidate the dynamics at individual and population level of *P. vivax* infections detected in a 2-year monthly follow up cohort in the Peruvian Amazon.
METHODS During March 2008 to February 2011 we have followed up 302 participants from 29 communities in and around Iquitos city and along the Iquitos-Nauta road (Loreto region, Peru). Blood samples were obtained on the recruitment day (CQ + PQ was administered) and afterwards weekly within the first month and monthly up to month 24. All samples were diagnosed by light microscopy and afterwards by PCR-based molecular diagnosis. All positive samples to *P. vivax* were later genotyped using a panel of 14 neutral microsatellites. A longitudinal genetic-relatedness analysis was performed to assess and compare the dynamics at individual and population level.
RESULTS Preliminary data suggest that the parasite dynamics is determined by the community-level genetic diversity of the parasite and gene flow among communities. Participants from relatively isolated communities were predominantly exposed to genetically related genotypes compared to communities close to the urban city. The full analysis including pairwise genetic relatedness comparison among infections at individual and population level will be presented and discussed.
CONCLUSION Unravelling the dynamics of *P. vivax* infection is urgently needed to be able to properly assess treatments against *P. vivax*, to test future vaccines and to design more efficacious malaria control programs.

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Characterization of the human malaria reservoir throughout the dry season in a forested area of central Vietnam: a pilot study

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INTRODUCTION In Central Vietnam, previous studies have emphasized the high occurrence of asymptomatic and submicroscopic infections among local minorities at higher risk of exposure.
AIM Investigate the the human parasite reservoir during the dry season, which has been poorly characterized.
METHODS We conducted a 1 year prospective cohort study ($n = 429$) in three rural communities in Quang Nam province where malaria incidence has significantly decreased in the year prior to the study. Six malaria screenings were conducted between November 2014 to November 2015, including interviews and clinical examination of the study population, and 75.7% of the participants attended ≥4 screenings.
RESULTS Malaria infections were detected by microscopy and qPCR and exposure to *P. falciparum* (*Pf*) and *P. vivax* (*Pv*) was measured in the first and last survey for PfAMA1, PfGLURP R2, PvAMA1 and PvMSP1-19 by ELISA. Only four malaria

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infections (2 *Pf*, 2 *Pv*) were detected by qPCR and all in the same community. No fever cases were attributable to malaria. Preliminary analysis of serological responses show evidence of recent changes in exposure (within the study period) to *Pf* and *Pv* with spatial heterogeneity between the three communities, suggesting transmission is maintained at low levels and can be easily re-introduced in areas where transmission had decreased. Analysis of risk factors associated with antibody responses are ongoing.
CONCLUSION The possible causes as well as factors associated with heterogeneity in exposure are being evaluated and are relevant to current malaria control and elimination efforts. Based on the serology, there has been exposure to malaria while very few infections were detected at the surveys and there were very few reports of fever or other symptoms, indicating the limitations of parasitological and clinical surveillance. This study supports the usefulness of serological methods to monitor malaria transmission and exposure in areas of declining malaria.

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A nationwide school malaria parasitaemia survey for routine surveillance at district level in Mainland Tanzania

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INTRODUCTION The high heterogeneity of malaria transmission calls for the timely identification of populations and areas at greatest need for additional interventions at local levels. In this context, school surveys have gained increased attention for national surveillance, complementing malaria indicator surveys. To-date, only few nationwide at district-level representative data is available on the malaria burden in school aged children.
AIM We implemented a nationwide school survey to collect known risk factors of malaria prevalence and bednet use in primary school children in Mainland Tanzania.
METHODS Data were collected in three phases: (i) August to September 2014, (ii) May 2015 and (iii) October 2015, covering all 25 regions and 166 district councils. The schools and children were sampled using multistage proportional sampling accounting for population density and altitude at district level. Children were tested for malaria parasites using rapid diagnostic tests and were interviewed about household information, parent's education, bednet indicators as well as recent history of fever.
RESULTS In total 49 113 children from 357 schools were interviewed and tested for malaria with a data collection period of 10–14 days and local district teams supervised by regional and national teams. The observed malaria prevalence (21.6%) was found to be higher than the prevalence reported in the Tanzania HIV and AIDS Malaria Indicator Survey (THMIS 2011/12) of 9.5% and the latest Tanzania Demographic and Health and Malaria Indicator Survey (TDHS-MIS 2015/16) (14.8%) and were moderately correlated ($r_s = 0.76$). The malaria prevalence ranged from <0.1%–53% among the regions and from 0%–76.4% among the districts. The variation of the malaria prevalence between schools was greatest in high prevalence regions and marked by few outlying schools in low prevalence regions. The pattern across Tanzania was similar to the pattern observed in the THMIS and TDHS-MIS surveys.
CONCLUSION School surveys are a practical, cost effective and time efficient approach for routine monitoring of the malaria prevalence at sub-regional level. Together with malaria indicator surveys, prevalence data can be used to support the risk-stratification and efficient resource allocation for malaria control strategies.

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Increasing the time between incident malaria episodes in Ugandan children: repeated application of IRS

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INTRODUCTION Malaria is the leading cause of morbidity and mortality in Uganda, with some of the highest levels of malaria transmission intensity in the world. Indoor residual spraying of insecticide (IRS) is one control intervention that is used in targeted areas in Uganda.
AIM The goal of the study was to estimate the time between incident malaria episodes in individual children before and after several rounds of IRS application.
METHODS A dynamic cohort of children was enrolled in Nagongera, Uganda starting in 2011. Household were randomly selection from enumeration surveys and all eligible children aged 0.5–10 years were enrolled from 107 households. Cohort study participants received all medical care free of charge at a designated study clinic open every day. Malaria was diagnosed using passive surveillance and defined as a fever and the detection of parasites by microscopy. The first 3 rounds of IRS (December 2014–February 2015, June–July 2015, and November–December 2015) utilized a carbamate (bendiocarb) and a fourth round (June–July 2016) utilized an organophosphate (pirimphos-methyl). The analysis included data through December 2016 and involved using a multiple Poisson regression, with dummy variables to represent the IRS rounds, to estimate the mean time between episodes of incident malaria.
RESULTS There were 376 children enrolled. In total, there were 2857 cases of incident malaria. The mean number of malaria episodes per child was 9, with a range of 1 to 32. In the pre-IRS treatment period, there was an average of 100 days between malaria infections for each child. After IRS round 1, IRS round 2, IRS round 3, and IRS round 4, the average time between infections was 159 days, 224 days, 438 days, and 507 days, respectively.
CONCLUSION There was a consistent increase in time between malaria episodes post-IRS applications, with the largest increase in time occurring after rounds 3 and 4 of IRS. This suggests that IRS is effective at reducing the burden of malaria episodes these children experienced by increasing the time between each episode. Future work will include estimating the longevity of effect post-IRS application to determine the optimal timing for IRS application.

Abstracts

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Historical review of malaria control in Morocco: disease and vectors

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By basing itself essentially on the data of literature, this work redraws the historic periods of malaria in Morocco since 1912 at this day. Indeed, Malaria has existed in Morocco for several centuries, and in 1912, the disease was already endemic in the country. A malaria control service was established in 1919, and important control activities have been able to control the disease in most urban agglomerations. Malaria was a serious worldwide public health problem since 1920. Between 1929 and 1941, malaria disease took an exceptional extension and intensity, the disease had reached its highest rate with approximately 360 000 cases in 1941.

Since 1960, the establishment of a basic infrastructure such as the creation of provincial malaria and entomology laboratories, training of microscopists and aviability of vector control methods were available to interrupt transmission of Malaria diseases and decreasing incidence to a 3 cases in 2000.

In 2004, the last case of locally acquired *P. vivax* infections was reported from in Morocco and the Kingdom was certified malaria free in 2010.

Currently, the diagnosed of cases in the endemic zones are imported cases. Meanwhile, intensification exchange with endemic African countries, the presence of *Anopheles* vector within Morocco would be a risk of reintroduction the malaria disease in our country.

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The burden of malaria infection among 0–6 month old African infants in settings with low to high intensity of malaria transmission

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INTRODUCTION Young infants are presumed to be relatively protected against malaria during the first 6 months of life and as a result have received little attention in terms of research and malaria treatment policy guidelines. However, the true burden of malaria in infants is not well characterized and may be underestimated, especially with the ongoing epidemiological shifts in the populations at risk of malaria.
AIM A better understanding of malaria risk in early infancy is therefore critical to provide evidence to drug developers and policy makers to better target this age group for research and drug development.
METHODS A cross sectional survey was conducted in three West African countries (Benin, Gambia and Guinea Conakry) with different malaria transmission intensity. Infants aged ≤6 months and two older children living in the same or nearby householdwere included. Malaria parasites were detected using RDT, microscopy and molecular methods, and anti-$MSP1_{19}$ antibodies were detected by ELISA.
RESULTS A total of 6761 children were included. The overall prevalence of malaria infection in infants was 8.2% (183/2219), with Guinea having a significantly higher prevalence than The Gambia and Benin. Mean parasite densities were lower in infants than in children 1–9 years old, and significantly different in Benin [227/μl (SD 3856) vs. 3424/μl (SD 26 258) ($P = 0.0009$)] and Guinea [1052/μl (SD 5362) vs. 4204/μl (SD 19,136) ($P < 0.0001$)]. Malaria infection in infants was not asymptomatic and was significantly associated with fever or history of fever (adjusted OR 1.65, 95% CI 1.15–2.37, $P = 0.007$), axillary temperature ≥37.5°C (adjusted OR 2.07, 95% CI 1.08–3.98, $P = 0.029$), and anaemia (adjusted OR 5.54, 95% CI 3.91–7.84, $P = 0.001$).
CONCLUSION The burden of malaria infection among young infants living in endemic countriesis significant and should be addressed by developing adequate paediatric drug formulations for this age group and by targeted preventive interventions.

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Health beliefs of school-age rural children in podoconiosis affected families: a qualitative study in Southern Ethiopia

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INTRODUCTION Though investigation of health beliefs among children is one of important condition for primary prevention of disease, little effort has been made to understand these in the context of podoconiosis.
AIM This study aimed to explore the health beliefs of rural children at high risk for the disease.
METHODS A cross sectional qualitative study was conducted in March 2016 in Wolaita Zone, Southern Ethiopia. Data were collected through in-depth individual interviews and focus group discussions, with a total of one hundred seventeen 9 to15-year-old children recruited from podoconiosis affected families.
RESULTS The study revealed various misconceptions regarding risk factors for podoconiosis. Most children believed barefoot exposure to dew, worms, snake bite, frog urine, other forms of poison, and contact with affected people to be major causes of the disease. Their knowledge about the role of heredity and that of long term barefoot exposure to irritant mineral particles was also poor. Though most participants correctly appraised their susceptibility to podoconiosis in relation to regular use of footwear and foot hygiene, others based their risk perceptions on factors they think beyond their control. They described several barriers to preventive behaviors, including uncomfortable footwear, shortage and poor adaptability of footwear for farm activities and sports, and shortage of soap for washing. Children also perceived low self-efficacy to practice preventive behaviors in spite of the barriers.
CONCLUSION Health education interventions may improve children's knowledge and risk perceptions, while family-based socioeconomic empowerment programs may help overcome practical challenges that children perceived as barriers and boost their confidence to engage sustainably in podoconiosis preventive behaviors.

Abstracts

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Population-wide administration of single dose rifampicin for leprosy prevention in isolated communities: a feasibility study in Indonesia

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INTRODUCTION Leprosy is an infectious disease caused by *Mycobacterium leprae*. Indonesia ranks third in the world in terms of leprosy burden. Chemoprophylaxis is effective in reducing the risk of developing leprosy among contacts. 'Blanket approach' is an operational strategy for leprosy post-exposure prophylaxis in which all members of an isolated community, high endemic for leprosy are screened and given a single dose of rifampicin (SDR) if negative for leprosy.
AIM To assess the feasibility and effect of a population-wide 'blanket' administration of SDR for leprosy prevention in isolated communities on an Indonesian remote island.
METHODS Three rounds of surveys were conducted in November 2014 (screening for all + SDR for all), 2015 (screening for all + SDR for earlier left ones) and 2016 (screening for all) in Lingat village of Selaru Island, Indonesia. The demographic and clinical data were used for a descriptive analysis of the intervention coverage and leprosy epidemiology.
RESULTS In the first two rounds of surveys, 1743 (92%; n = 1900) individuals were listed, 1671 (88%) screened, 1499 (79%) received SDR, and 213 (11%) were excluded based on the exclusion criteria. Of those screened, 43 (2.6%) were diagnosed with leprosy with a rate of 2263 per 100 000 population (n = 1900). Their mean age was 32 years, and 37% were female. The prevalence was highest in the age groups 15–24 and 25–49 years (4.7% and 4.6%). In total, 14 (33%) cases had MB and 29 (67%) PB leprosy. Two cases (5%) had grade 2 disability. In the third round, more than 1500 people were screened and 171 people remained untracked, whereas 10 new leprosy cases were detected (NCDR 50/10 000), with equal distribution, i.e. 5 PB & 5 MB.
CONCLUSION The study shows that the blanket approach of chemoprophylaxis is feasible and can be implemented in similar locations and sociocultural settings. There is no evidence yet regarding the number of rounds required to interrupt the leprosy epidemic and the desired time interval between rounds. Contingency plans need to be made to actively follow this village closely in the coming years and continue leprosy elimination efforts until no new cases are found any more.

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The development of an application for digital recording of DiTECT-HAT study participant data, including macroscopic and microscopic images

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INTRODUCTION Participants for the EDCTP DiTECT-HAT study (www.ditect-hat.eu) on diagnostic procedures in human African trypanosomiasis (HAT) are recruited in rural health centres in Côte d'Ivoire, the Democratic Republic of the Congo and the Republic of Guinea. Quality assurance is challenging because rapid diagnostic tests (RDT) used for screening need to be read within 25 min and because diagnostic confirmation relies on visualising live trypanosomes under the microscope. These preparations cannot be kept for rechecking. Our aim was to use digital technology both for recording case report forms (CRFs) in the field and for assuring quality of diagnostic procedures.
METHODS We developed an Android 5 compatible application for data entry at the field sites with a personal digital assistant tablet. The application also allows taking pictures of the RDTs with the tablet camera and recording 4 seconds videos with a versatile camera mounted on an ordinary microscope. Confidential participant data are encrypted and transferred via Wi-Fi connection to a network associated server (NAS). Pictures and videos are automatically uploaded separately and have a link to the corresponding record in their filenames. The combined cost of tablet and camera is approximately 600 EURO.
RESULTS AND DISCUSSION The application will be implemented from April 2017 onwards. Results will be presented during the conference. This kind of technology is readily available, is relatively cheap and could also be used for quality assurance in routine HAT case finding programs.
CONCLUSION Quality assurance of microscopy and other diagnostic procedures for HAT through digital applications is feasible and affordable.

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Diagnostic tools for human African trypanosomiasis elimination and clinical trials

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INTRODUCTION *Trypanosoma brucei gambiense* human African trypanosomiasis (HAT) is a neglected tropical disease targeted for elimination. Integration of diagnosis and case management into the general health system, monitoring of eliminated foci and development of safe and efficacious drugs, remain important challenges.
AIM To deliver new, cost-effective diagnostic algorithms for *gambiense*-HAT elimination.
METHODS For passive case detection, the performance and cost of rapid diagnostic tests (RDT) performed on clinical suspects in peripheral health centres is determined. On dried blood spots (DBS) of RDT positives, molecular and serological reference testing is conducted. Cost-effective diagnostic algorithms with high positive predictive values might open possibilities for treatment without the need for parasitological confirmation. For post-elimination monitoring, health workers performing house to house visits in low prevalence HAT foci collect DBS and send them to regional HAT reference centres for analysis. The feasibility and cost of diagnostic algorithms with RDTs, serological and/or molecular DBS tests are determined to establish an appropriate threshold to trigger active case finding and avoid HAT re-emergence. For early test-of-cure assessment in clinical trials, the accuracy of neopterin and RNA detection is studied. Earlier treatment outcome assessment will speed up

drug development for HAT, and improve management of relapses in routine.
RESULTS Training of health personnel has taken place in spring 2017, followed by study initiation in West and Central Africa. An update of activities and experiences of the project is presented. The latest project news can be followed on www.d itect-hat.eu.
CONCLUSIONS This EDCTP funded project will provide evidence to support policies for improved HAT diagnosis and patient management within a context of disease elimination, and will contribute to successful HAT elimination.

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Visceral leishmaniasis cases in the non-endemic districts: challenges to ongoing elimination programme in Nepal

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INTRODUCTION Visceral leishmaniasis (VL) is endemic in 12 districts in the south eastern plain of the *Terai* (lowlands) in Nepal. The country has achieved the elimination target at district level and sustained the situation for the past 4 years. Recently, changing epidemiological pattern has been observed with new foci are emerging and cases reported from the non-endemic areas are increasing. In early 2014 and 2015, we visited the villages of non-endemic districts, chosen on the basis of reported cases, in order to collect epidemiological, entomological and microbiological evidence for local transmission.
AIM Proof of local transmission of *Leishmania donovani*.
METHODS House-to-house inventory of VL history was done in the villages that report VL cases in six districts considered hitherto non-endemic for VL. Case-control study (1:4) was conducted, focusing individual questionnaire, professional activities and travel history. Sandflies were captured using CDC light traps and mouth aspiration in houses and cattle sheds. Blood sample was taken from individuals aged ≥2 year. The blood samples were tested by direct agglutination test for the presence of *Leishmania donovani* antibodies. PCR was used to detect *Leishmania* in blood samples and captured insects.
RESULTS The survey documented 46 VL cases retrospectively including one new active VL case, of which 21 (45.7%) occurred within the last 2 years. Of the 46 confirmed VL cases, seven were children (<14 year) without travel history to known VL endemic areas. We found that many residents had been infected without VL; 40/16 (9.6%). Age and sex matched case-control study showed that exposure to known VL endemic areas was not a risk factor for VL, but having a VL case in neighbourhood was. We captured sandflies *Phlebotomus argentipes*. *Leishmania donovani* was confirmed in asymptomatic individuals as well as in captured sandflies.
CONCLUSION Epidemiological, entomological and molecular evidences have demonstrated there is ongoing local transmission of *Leishmania donovani* in the studied villages of non-endemic district. The VL elimination initiative should therefore consider extending its surveillance and disease control measures to these areas in order to ensure VL elimination in Nepal.

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Epilepsy perceptions and experiences of different stakeholders prior to the implementation of an epilepsy treatment programme in an onchocerciasis endemic region in Ituri, Democratic Republic of the Congo (DRC)

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INTRODUCTION Recent surveys in villages in onchocerciasis endemic regions in the DRC (Bas Uéle, Tshopo and Ituri) showed a prevalence of epilepsy 5–10 times higher than in most other non-onchocerciasis endemic regions in Africa. These surveys revealed that the majority of the persons with epilepsy were not treated. In Africa epilepsy case management is challenging, particularly in onchocerciasis endemic regions where there is a lack of well-trained health care workers. The success of an epilepsy treatment program will depend on the knowledge, engagement and acceptability of all the stakeholders.
AIM Prior to the implementation of a system to treat persons with epilepsy in Ituri we investigated the knowledge, attitudes, and perceptions about epilepsy in two health zones.
METHODS 16 focus group discussions and 40 semi-structured interviews were conducted with persons with epilepsy and their family, community leaders, community health workers, traditional healers, and health professionals in 2 health zones: Logo and Rethy.
RESULTS In the 2 zones epilepsy was a well-known disease and most people were aware of the possibility to treat this condition with anti-epileptic drugs. There was a request for a specialized center for epilepsy management. It was suggested to inform the population about epilepsy using communication channels of the church, traditional chiefs and health professionals. Reported challenges to obtain epilepsy treatment and care included: only access to traditional treatment, incurability of the epilepsy, stigma and taboo, lack of information and community support for people with epilepsy, unavailability of anti-epileptic drugs at primary health facilities, financial barrier to obtain anti-epileptic treatment (by patients and health professionals) and lack of training of health professionals to treat epilepsy. Traditional healers considered epilepsy contagious, transmitted by insects, saliva and by touching a person of the same sex during seizures. They said 'during seizure a man should be assisted by woman, if another man does so, he will get epilepsy'.
CONCLUSION Epilepsy is a well-known disease in Ituri and there is a great need and demand for a decentralized comprehensive epilepsy treatment program with affordable anti-epileptic drugs. Such a program need to include a community program that will address stigma and misconceptions.

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Healthy homes for healthy living: home improvement to control vectorial transmission of chagas disease in Loja Province, Ecuador

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INTRODUCTION Healthy Homes for Healthy Living (HHHL) is a health promotion strategy aimed at interrupting vectorial transmission of Chagas disease (CD) through living environments designed to prevent presence of triatomines in homes of three rural communities in southern Ecuador. These living environments consider infrastructural factors in domestic and peridomestic areas, as well as practices associated with hygiene and uses of the space. Formative research on socio-cultural factors was conducted and subsequently used to inform appropriation of anti-triatomine homes.
AIM This research is aimed at exploring conditions under which health promotion strategies based on systemic interventions can lead to sustainable control of CD in southern Ecuador.
METHODS HHHL has worked to fully rebuild four homes and improve two more since 2013, with an equal number of partnerships established with local families. Anti-triatomine measures installed in all cases include screens in doors and windows, false ceilings, and walls plastering, as well as construction of fences, storage units, and animal shelters in the peridomestic areas. Ethnographic grounded theory was used as main methodological framework to approach the concrete experiences of association between the project and local families. In-depth interviews, participant observation, document analysis and participatory action research were used as data collection techniques.
RESULTS Although inhabitation of HHHL homes represents a substantial improvement in the quality of life of partner families, they experience a pressing need to work in association with their living environment. In this process, bugs and other animals find in the home an extension of their natural environment, which contributes to the deterioration of the home. Moreover, cohabitation between animals, bugs, and local families is deeply engrained in cultural dynamics that do not see this practice as a risk.
CONCLUSION HHHL has provided important elements to consider the impact of living environments as cause and consequence of disease. Health promotion efforts are fundamental in the facilitation of a systemic change that could effectively break CD transmission cycle. Although HHHL model is still in early stages of appropriation, deeper understanding of the multiple forms of exclusion experienced by local populations is required.

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Improved access to diagnostics for *rhodesiense* sleeping sickness around a conservation area in Malawi enables early detection of cases and reduced mortality

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INTRODUCTION *Trypanosoma brucei rhodesiense* sleeping sickness or human African trypanosomiasis (HAT) presents as an acute disease that develops rapidly, advancing into a neurological form that can only be treated with melarsoprol, an arsenic drug that has been reported to cause death to 5–10% of treated patients. The disease is a zoonosis that is transmitted from wild and domestic animals by tsetse flies. Malawi is endemic for *rhodesiense* HAT, especially among communities living around conservation areas. Since 2010, between 18 and 35 new HAT cases have been reported annually in the country, mainly around Vwaza Marsh Game Reserve, located in the north of Malawi. Until 2013, diagnosis of HAT in the region was only available at the Rumphi District Hospital, more than 60 km from the game reserve.
AIM To bring diagnostic services closer to populations that are at risk to increase chances of detecting cases in early stages of disease, when treatment is safer and more effective.
METHODS In 2013, the Ministry of Health of Malawi, in partnership with FIND, initiated a project to enhance detection of HAT cases around Vwaza Marsh. The capacity of 5 health facilities to confirm the disease in clinical suspects was strengthened by upgrading laboratories and training technicians. Facilities were supplied with equipment for parasitological diagnosis, including centrifuges and LED fluorescence microscopes. One facility was upgraded to perform LAMP, a field applicable molecular test for detecting parasite DNA.
RESULTS Between August 2014 and December 2016, 70 HAT cases were diagnosed with this new strategy. 37% of them were identified in parasitology facilities not previously equipped to diagnose HAT. At the time of diagnosis, patients presented with signs and symptoms that corresponded to less advanced disease, compared to the period before the project started. Only 2 patients out of the 34 HAT cases that were diagnosed in 2016 died, an almost 4-fold reduction in fatality rate compared to years before the project was initiated.
CONCLUSION Data obtained in this project indicates that availability of diagnostic services closer to where *T. b. rhodesiense* patients get infected enables earlier case detection, better prognosis and reduced mortality.

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Mobile technology improves management of a *Gambiense* human African trypanosomiasis (gHAT) elimination programme in Uganda

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INTRODUCTION In Uganda, only 4 *gambiense* human African trypanosomiasis (gHAT) cases were reported in 2016. gHAT could be eliminated by 2020. Diagnosis of gHAT is complex. Suspects identified using serological tests have to be confirmed by parasitology and the stage of disease determined before treatment. This requires a network of laboratories and an efficient referral system. The Ministry of Health in Uganda, in collaboration with FIND, has improved access to gHAT diagnosis by deploying rapid diagnostic tests (RDT) for HAT, and equipping strategically located laboratories in the endemic region. The goal during the 'last mile' of gHAT elimination in Uganda, is to ensure cases are diagnosed and treated quickly.
AIM To implement an mHealth tool (ISSEP-Mango) designed to improve the management of the gHAT control programme in Uganda.

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METHODS The ISSEP-Mango platform, which was implemented in Uganda in August 2016, has two main communication approaches: short message service (SMS) and mobile phone apps for smartphones to improve the management of (i) information and data and (ii) gHAT suspects and patients. ISSEP-Mango is implemented at health facilities using HAT RDTs, and laboratories where confirmatory diagnosis of gHAT is carried out. Information on RDT usage and stocks, RDT positive individuals and other laboratory results are sent to a cloud-hosted database by SMS or via an app. SMS are also sent to RDT positive individuals to increase referral rate to microscopy centers. The control programme managers use ISSEP-Mango to monitor activities.
RESULTS Since its implementation, 976 monthly reports on RDT usage have been submitted by the 146 facilities using HAT RDTs. The same facilities have reported 122 RDT positive individuals. 71 of them have been tested in one of the 12 microscopy centers and three new gHAT cases have been identified (data March 2017). This tool has improved the efficiency and communication of data, and empowered health workers.
CONCLUSION ISSEP-Mango allows interacting directly with local health workers and patients, ensuring that facilities do not run out of their stocks of RDTs and reminding patients to come back for follow-up. Improving the data collection and reporting is crucial to eliminate gHAT in Uganda.

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Costing of large scale strategies for active case finding of Human African Trypanosomiasis (HAT) in the Democratic Republic of the Congo

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INTRODUCTION Gambiense HAT (g-HAT) remains a major public health problem in Sub-Saharan Africa. The World Health Organization set a target to eliminate disease as a public health problem by 2020. An expansion of the current control and surveillance activities and sustained funding will be needed to achieve this goal. Today only limited (and outdated) information is available to estimate the related costs.
AIM To assess the costs of different approaches of active g-HAT case detection and to evaluate the importance of factors that influence these costs.
METHODS Currently the primary strategy to control sleeping sickness is mass active screening campaigns by 8-staff strong truck-based mobile teams. A project aiming to eliminate the disease in two health zones in the DRC increased the local screening capacity by introducing 'mini' teams. This costing study will compare both strategies from a healthcare provider perspective. A mixed methodology of costing is applied combining bottom-up micro-costing, for activities that account for a large share of the total costs, with less accurate methods such as gross-costing for the remaining expenses. We will conduct sensitivity analysis on key parameters which could affect the conclusions, such as the price of inputs, screening capacity of the teams and exchange rate, to examine the robustness of the results.
RESULTS The overall data collection period for the ongoing cost effectiveness study is from 01/01/2017 until 31/12/2017. Preliminary results will allow us to estimate an average cost per person screened and per person diagnosed for both screening strategies but also to identify contexts where the cost per person screened might be significantly different between the two strategies.
CONCLUSION Data collection is ongoing, preliminary results will be presented during the conference. These data will help estimating the costs of screening campaigns and will contribute to rational decision making in HAT control and elimination programs.

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Quality assurance of active screening for Human African Trypanosomiasis elimination in the Democratic Republic of the Congo

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INTRODUCTION The World Health Organization (WHO) set a target to eliminate Human African Trypanosomiasis (HAT) as a public health problem by 2020 and to stop transmission by 2030. To achieve these goals, the international community is supporting innovative approaches in the domain of case detection and management, vector control and data management. Quality data are essential to plan and monitor the elimination efforts adequately, therefore the elimination initiative requires quality assurance of all processes. The challenges to secure quality data and to build robust decision support systems go beyond the data collection mechanisms only. We report on an overall risk assessment approach that we launched to improve the general quality assurance system for HAT.
METHODS We developed a breakdown structure of all HAT control processes that may directly or indirectly be related to the key indicators for decision making. Various stakeholders will be involved in an interactive process to assess the risk of each of these activities and the corresponding quality indicators that should be adopted.
RESULTS A flow diagram interlinking all multidisciplinary HAT efforts identifies the different risks of each part of the chain in HAT activities as part of a quality assurance map. For each risk to quality, recommendations are made to improve operational activities and links are made with the key decision making variables.
DISCUSSION Data quality is a broad topic that requires a multi-disciplinary approach and interlinking with various stakeholders. A display that visualises the different activities driving towards HAT elimination together with a risk assessment of each essential step combined with key variables may help to create awareness, to better address current shortcomings and to improve decision support systems.

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The human African trypanosomiasis (HAT) platform

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INTRODUCTION HAT platform is a regional platform that focuses on strengthening clinical or operational research capacities in human African trypanosomiasis in the most affected endemic countries. For the last 11 years, the HAT platform has been conducting research based on needs in the field and using an approach adapted to realities on the ground. The HAT platform is composed of representatives of national sleeping sickness control programs and research institutions in its 9 member countries (DRC, Angola, Sudan, Guinea, Congo, Chad, Central African Republic, Uganda, and South Sudan), and foreign research groups such as DNDi, ITM, FIND, Swiss TPH, IRD, MSF, and University of Edinburg, with the World Health Organization as an observer. The HAT platform is also collaborating with other African research platforms such as the East African Trypanosomiasis Network (EANETT).
AIM We will present a summary of the advances made within the framework of the HAT platform in the development of diagnostic and therapeutic tools, with the development and update of target product profile for HAT treatments, discovery of rapid diagnostic tests and development of oral treatments for HAT.
METHODS We did a review of the last 11 years of our activities.
RESULTS Other achievements will be presented in this poster; including an important investment in different trainings (e.g. good clinical and laboratory practice, training of monitors and ethical committees of member countries), biannual scientific meetings and steering committees, newsletter publication, as well as current advances in clinical and operational trials conducted or in progress.
CONCLUSION This approach is adapted to the realities of the field and enables local partners, who are the end users of the results, to be important actors involved in clinical research conducted in full respect of good clinical practice and ethical standards. During these periods, most of the national sleeping sickness control programs have adopted the results of this research to adapt their national policies, with or without the support of the HAT platform.

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Kala-Azar outbreak management in Bangladesh: a new initiative in the Kala-Azar elimination program

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INTRODUCTION Visceral Leishmaniasis (VL) or Kala-azar victimizes Indian sub-continent including Bangladesh over the centuries since ever its first outbreak in 1824 in the territory of Jessore of Bangladesh. That particular outbreak turned into endemic and killed about 75 000 people. VL disappeared from Bangladesh as a collateral benefit of malaria eradication program in 1960s. However in the early eighties it started to reappear and peaked in 2006 and victimized more than 100 000 people. The national Kala-azar elimination program (NKEP) has launched in 2005 and achieved 96% of its target in 2014. The VL burden has come down dramatically as a result of both program interventions and natural trend of the disease. However, recently sporadic outbreaks of Kala-azar have been recorded in the different areas of Bangladesh which could be a potential threat for NKEP in Bangladesh.
AIM To develop a comprehensive national VL outbreak management strategy in relation to the NKEP in Bangladesh.
METHODS A working group was formed under the leadership of Director, Communicable Disease Control, DGHS. About 30 experts from different institutes were involved in this working group. Series of workshops, meetings and email communication had been done within the working group to develop the VL outbreak management guideline for Bangladesh.
RESULTS The guideline includes definition of Kala-azar outbreak, its aim and detail steps. It describes the composition of Kala-azar outbreak management teams and their responsibilities at different level of the health system to identify and investigate suspected outbreak(s). Adequate responses to a real outbreak are the pillars to prevent further transmission of the disease in the communities and hence save life and suffers of the people. Training for capacity build-up of outbreak management team at different levels on the newly developed guideline had been done in all target sub-districts with 97% participation rate.
CONCLUSION We hope that the guideline will be useful for all who is involved in management of Kala-azar outbreak in Bangladesh at all level of the public health system, private partners, other stakeholders as well as national and international policymakers. Capacity building of outbreak management team at all level was achieved successfully.

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Tracking the progress: visceral leishmaniasis elimination in Nepal

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INTRODUCTION Visceral leishmaniasis (VL) is a parasitic disease that is lethal unless treated timely. About 400 000 people are affected every year, with the three mainly affected regions being the Indian subcontinent, East Africa, and Brazil. In 2005 the governments of Nepal, India and Bangladesh, supported by WHO, signed a memorandum of understanding to eliminate visceral leishmaniasis as a public health problem from the Indian sub-continent, with a target set at <1 case of visceral leishmaniasis/10 000 population per year at a (sub-) district level by 2017. We examine the progress made in Nepal so far.
AIM To update on the current visceral leishmaniasis burden in Nepal and analyse the progress made towards elimination.
METHODS We analyse the historical disease trend of visceral leishmaniasis in Nepal based on reported programme data and population-based surveys that give insight in the incidence of infection. We give an overview of the efforts made over the last decade by the Nepalese government, WHO and other stakeholders to eliminate VL, and discuss obstacles, enabling factors and lessons learned.
RESULTS The number of visceral leishmaniasis cases in Nepal has reached a historically low point. For four consecutive years now, the elimination target has been reached in every endemic

district. However, over the last few years, cases are progressively being reported from previously non-endemic districts, and account for more than a third of the current case load by now (37.7% in 2016). We will present the main obstacles that have been encountered so far as well as the challenges that still lie ahead on the way to sustainable elimination.
CONCLUSION With the target incidence for visceral leishmaniasis being reached in Nepal for several years, the key question remains how sustainable this elimination really is. Has the progressive decline in disease burden over the last few years been fuelling misplaced optimism or is sustainable elimination truly within reach?

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Visceral leishmaniasis in the indigenous community in Bangladesh: a wake up call

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INTRODUCTION Visceral leishmaniasis (VL) is one of a major public health problem in Bangladesh with an estimated incidence 12 400–24 990 cases annually. There are quite a high number of indigenous population resides in the VL endemic areas in Bangladesh, however VL burden of those marginalized people are unknown.
AIM To investigate the prevalence and case fatality rate (CFR) of VL, and factors associated with VL in the indigenous population in Bangladesh.
METHODS A retrospective cross sectional study was conducted in a randomly selected Union (Rishikul) of Godagari sub-district of Rajshahi district, Bangladesh from August 2009 to December, 2011. Trained Field Research Assistant screened all households, recorded VL and suspected VL death in the past two years in the study areas. The suspected VL death was confirmed by three expert physicians independently using Verbal Autopsy procedure in ICD10 guideline. Household head with and without VL in the past 2 years were interviewed to determine their socioeconomic status; knowledge on VL and treatment seeking behaviour. The exact logistic regression model was used to find the independent factors associated with VL.
RESULTS Average age of the study population was 26.0 years (SD, 18.3) and 50.0% were females (N = 4342). VL prevalence was about 11 per 10 000 indigenous people. The VL prevalence among children (16/10 000) was significantly higher than the adults (7/10 000) (P = 0.009). VL CFR was about 17.0% (10/59), among them 70% (7/10) were died at home. The knowledge about VL was better for household head with VL than without VL; however, their practice of bed-net use and health care related to VL was poor. Irregular use of bed-net (OR = 3.85, 95% CI, 1.10–13.80) and higher ratio of family members per bed-net (OR = 1.85, 95% CI, 1.10–3.25) was found as significant risk factor of having VL in this community.
CONCLUSION Prevalence of VL among indigenous population in Bangladesh was about 10 times higher than the VL elimination target. VL deaths were found to be high and were underreported. National program needs to re-evaluate of VL burden among this marginalized population in Bangladesh and develop a specific strategy for successful VL elimination program within the set time frame.

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A cross sectional study of post Kala-Azar Dermal Lesihmaniasis (PKDL) with visceral leishmaniasis (VL) cases in Surja Kanta Kala-Azar Research Center (SKKRC), Bangladesh

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INTRODUCTION Surja Kanta Kala-azar Research Center (SKKRC), Mymensingh, Bangladesh is the only specialized center in the country for treatment of complicated cases with Visceral Leishmaniasis (VL) and Post Kala-azar Dermal Leishmaniasis (PKDL) and Visceral Leishmaniasis Relapse (VLR). As there are very few cases of PKDL with VL has been reported so far, the epidemiology and treatment of such cases are yet to be studied.
AIM To describe the epidemiology of PKDL with VL cases and their treatment options.
METHODS This is a cross sectional study. We used 5-year hospital registry of the SKKRC, between January, 2012 and March, 2017. We included in the analysis, new VL and new PKDL cases, diagnosed clinically according to the national guideline and relapse VL and PKDL cases were confirmed either by Giemsa stained microscopy of spleen aspirate and by skin microscopy or Real Time – Polymerase Chain Reaction (RT-PCR) respectively.
RESULTS Of total 13 hospitalization records of PKDL with VL cases, 4 cases (30.8%) were diagnosed PKDL with New VL cases whereas 9 cases were PKDL with VL relapse. Out of those 9 cases 6 were treated with Sodium Stibogluconate (SSG) for previous episodes of VL. Splenomegaly was found in all 13 cases. Four cases had previous history of PKDL but none of them had complete cure. Out of those four patients 2 received treatment with SSG and rest with Miltefosine and AmBisome + Miltefosine combination. Twelve cases (92.3%) had BMI below normal. All the PKDL and VL relapse cases were confirmed by parasite demonstration in skin and spleen aspirate respectively. Twelve patients were treated with Inj. Liposomal Amphotericin B (92.3%), 20 mg/kg-body weight in four divided doses and other with Cap. Miltefosine for 84 days in allometric doses.
CONCLUSION The concomitant manifestation of PKDL and VL is rare. There has also been reported cases of PKDL without any prior history of VL. Hence the clinicians should carefully examine and exclude the chances of having VL and PKDL at the same time. Treatment for such cases demands for higher drug dosage and thus proper diagnosis is essential to avoid under dosage of the drugs.

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Accelerating control of visceral leishmaniasis in Turkana county, Kenya, through improved access to diagnostics

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INTRODUCTION More than 5 million people live at risk of contracting visceral leishmaniasis (VL) in Kenya, which is ranked

among the top 14 high burden countries for the disease. The World Health Organization (WHO) has encouraged stakeholders to explore strategies to address VL in specific foci in eastern Africa. Turkana County (TC) reports the highest number of cases in Kenya and, due to the focal nature of the disease in this county, has been identified as one where elimination could be achieved by implementation of appropriate strategies.
AIM To accelerate control and eventual elimination of VL in Turkana County, Kenya by improving access to diagnosis and treatment of the disease.
METHODS Between September and December 2016 FIND, in collaboration with the TC and Kenyan Ministries of Health (MoH) and KEMRI, conducted training of medical officers and laboratory technicians, and characterized all health facilities from three endemic sub-counties (Loima, Turkana West and Turkana South).
RESULTS Sixty nine health facilities were characterized by collecting data on 108 variables for each of them, including among others, their geolocation, population served, structural details, type and number of staff, capacity for diagnosis and treatment of VL, as well as number of VL suspects tested and confirmed. Maps were generated according to the type of facility and staffing capacity, number and origin of VL suspects, capacity for VL diagnosis, etc. These maps were used to identify facilities that are strategically located to give best access to villages that report cases. These facilities were then equipped with RDTs or upgraded to perform microscopy, in order to facilitate access to diagnosis. Efforts to improve awareness on availability of VL diagnosis included production and distribution of information and sensitization materials in the health facilities and to patients, as well as radio spots in Kiswahili and local languages.
CONCLUSION The project has demonstrated how VL can be easily included in the diagnostic algorithms of health facilities to improve access and contribute to efforts by WHO to control and eventually eliminate the disease in eastern Africa. The project is being expanded to other endemic regions in Kenya.

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Epidemiology and burden of cutaneous leishmaniasis in sub-saharan Africa: evidence from a systematic review

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INTRODUCTION Cutaneous leishmaniasis (CL) is the most common form of leishmaniasis, with 0.7–1.2 million cases per year globally. However, the burden of CL in sub-Saharan Africa is poorly documented. We carried out this review to assess the state of knowledge of CL epidemiology and ascertain its unique features in this region.
METHODS We systematically searched PubMed, CABI Global health, Africa Index Medicus databases. There were no restrictions on language/publication date. Case series with <10 patients, species identification studies, reviews, non-human and non-CL focused studies were excluded. Findings were extracted and described. The review was conducted based on PRISMA guidelines, the protocol was registered in PROSPERO (42016036272).
RESULTS From 387 identified records, 53 met eligibility criteria and were included in the qualitative synthesis. CL epidemiology was reported from 13 of the 48 sub-Saharan African countries (3 eastern Africa, 9 western Africa and 1 from southern). More than half (29/53) were from western Africa, notably Senegal (6), Burkina Faso (5) and Mali (3). All studies were observational: 29 were descriptive case series (total 13 257 cases), 24 followed a cross-sectional design. 42/53 studies were carried out before the year 2000. The prevalence in hospital settings among suspected cases ranged between 0.1–14.2% and may not reflect the true burden. At community level, based on screening of lesions and/or scars, prevalence varied widely between studies. Outbreaks of thousands of cases occurred in Ethiopia, Ghana and Sudan ($n = 6$). Polymorphism of CL in HIV-infected people is a concern ($n = 6$): a 4.8% co-infection rate reported in Cameroon. Parasitological diagnosis is mentioned in 42/53 studies, but the parasite was either assumed or based on historical account. Regional differences exist in clinical manifestations. We found high variability across methodologies, leading to difficulties to compare data. Key data gaps in CL burden here include population-based CL prevalence/incidence, risk factors, economic cost, and surveillance.
CONCLUSION The evidence on CL epidemiology in sub-Saharan Africa is scanty. Though considered as a high burden neglected disease, the epidemiology is poorly identified. There is a need for population-based studies to better define the CL burden. Endemic countries should consider research and action to improve burden estimation and essential control measures including diagnosis and treatment capacity.

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The potential impact of visceral leishmaniasis vaccines: explorations with different deterministic age-structured transmission models

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INTRODUCTION Current interventions to control visceral leishmaniasis (VL) focus on diagnosis and treatment of cases and on vector control. At this point there is no human vaccine available. However, vaccine development has been ongoing for decades and the results of various studies strongly support the possibility for immunoprophylaxis of VL in the future, suggesting vaccines to be of great additional benefit for individuals at risk.
AIM This study explores the potential health impact of different hypothetical vaccines at population level using two age-structured mathematical models that capture the VL transmission dynamics between humans and sandflies.
METHODS The models differ regarding the main reservoir of infection; in symptomatic and asymptomatic individuals. We incorporate different types of vaccines that (i) lower the risk of infection, (ii) lower the risk of developing clinical VL, (iii) lower the risk of developing post-kala-azar dermal leishmaniasis (PKDL) and (iv) a vaccine after which susceptible individuals become immune. Other assumptions take into account different durations of the vaccines' effect and various population coverage levels.
RESULTS The vaccine protecting individuals from developing infection, reaches the largest decrease in VL incidence, with the model with the main reservoir of infection in asymptomatic individuals. In an endemic setting with annual pre-control incidence of 5 new VL cases per 10 000 population, the target of <1 VL case per 10 000 population per year can be achieved within 5 years. The vaccine that decreases the development of

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PKDL has the least impact, only causing a minor decrease in incidence after at least 10 years of an active vaccination programme. The same is true for the model with the main reservoir of infection in symptomatic individuals, however showing a slower decline in VL incidence. The vaccine target product profiles (TPP) are also identified for specific VL targets including the minimum required vaccine efficacy, duration of effect, coverage levels and which age groups best to include in a vaccine program would one become available.
CONCLUSIONS These new insights aid in guiding vaccine development and support policy makers with the development of potential future vaccination strategies for the elimination and control of VL.

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Cutaneous leishmaniasis control in Morocco: vertical analysis

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INTRODUCTION In Morocco, cutaneous leishmaniasis (CL) is an important public health problem. *Leishmania major* and *Leishmania tropica* are the two major species in this country. Despite all efforts, monitoring and control of the CL is still challenging. Overall strategy and program intervention may need to be reviewed.
AIM This study describes situation analysis of CL in Morocco and attempt to provide evidence for policy makers in order to contribute to the improvement of its control.
METHODS We used vertical analysis for assessing the different aspects of CL including the identification, description and systematic analysis of the disease. This analysis allowed us to develop an epidemiological model with possible interventions to allow for selecting priority interventions. Data on disease epidemiology was collected through document review, and publications. Qualitative data was gathered through interviews with personal involved in the National Programme of Leishmaniasis.
RESULTS In the last decades, there was a regressive evolution of *L. major* cases and persistent of *L. tropica* transmission. The main causes included related implementation gaps are staff shortage and insufficient budget, insufficient intersectorial collaboration and community participation. We developed an through vertical analysis the epidemiological model that emphasized key possible interventions: to our knowledge, no program evaluation of these interventions in Morocco was done, Global Evidence stessed the effectiveness of preventive interventions produced in integrate inter-sectorial strategy framwork (e.g use of insecticide-treated bednets, indoor residual spraying and rodents control) rather than treatments such as based thermotherapy, cryotherapy, photodynamic therapy, CO_2 laser and paromomycin. Therefore, integrated vector management control (IVMC) with community participation is recommended as effective strategy.
CONCLUSION Strengthening of the IVMC with community involvement are necessary conditions to improve the program of CL and prevent epidemic foci appearance.

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Persistence of *Mycobacterium ulcerans* disease (buruli ulcer) in the historical foci of Kongo Central Province, The Democratic Republic of Congo

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INTRODUCTION Since the end of 2004, the General Reference Hospital of the Institut Médical Evangélique Kimpese launched a Buruli ulcer (BU) control program sponsored by American Leprosy Missions. For nearly a decade, control activities remained confined to two health zones of the Territory of Songololo, Kimpese and Nsona-Mpangu which were confirmed as highly endemic BU foci of the Kongo Central province. From 2014 on, control activities were extended to six other health zones. Some of these zones were historic BU foci while others were health zones which recently reported a limited amount of BU cases.
AIM To assess whether historical BU foci in the Kongo Central Province are still active, and if so, to explore the disease epidemiology.
METHODS In each health zone, health professionals were trained on BU diagnosis and treatment in accordance with WHO recommendations. Awareness raising campaigns were organized in communities by trained village volunteers, based on a mass-media approach targeting the general public, followed by active case-finding and referral of suspected cases to the nearest health facilities.
RESULTS BU cases have been detected in all health zones involved, confirming the persistence of their endemicity. In total, from 2014 to 2016, 445 BU cases were diagnosed on clinical grounds of which 301 (68%) cases were laboratory confirmed. The majority of patients (76%) were reported from the two health zones of the Songololo Territory. The decentralization of patient management was consolidated by early case detection. Indeed, 78% of reported lesions were of category I and II, and treated in primary health structures.

The extent of BU endemic foci is broader in the Province of Kongo Central.
CONCLUSION Our study highlights the need for developing, in a context of resources precariousness, effective and efficient control strategies against BU while taking into account the co-endemicity with other neglected tropical skin diseases at a scale smaller than that of health area or village.

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Feasibility of integration of activities of human African trypanosomiasis control in basic health services in the Democratic Republic of the Congo: preliminary results from an action research

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INTRODUCTION Human African Trypanosomiasis is an important public health problem in the Democratic Republic of the Congo (DRC). The main control strategy is the detection and treatment of cases. With a decreasing number of cases, the passive detection which takes place within existing health services is gaining in importance. However, this integration into the basic health services in the DRC faces multiple challenges. Considering the ongoing reform of the health sector, it is necessary to optimize the modalities of this integration. We launched an operational research project to identify those optimal conditions in the DRC health system.
AIM To identify bottlenecks and favorable factors for integration; as well as key enablers in terms of training, supervision and logistical support strategies.
METHODS Action research inspired by Mercenier's reference model for health system research (1992), which proposes an adaptation of the planning cycle. It consists of two phases: a pre-operational planning phase during which an analysis of the situation leads to empirical decisions to improve this situation. The next phase, a phase of action, implements these empirical decisions. We launched this process in three purposefully chosen health districts in DRC, assessed the quality of the service offered in terms of outcomes, stakeholder satisfaction and continuity of care; and are now piloting the passive case detection and treatment by basic health services in the health district of Yasa Bonga.
RESULTS A first monitoring carried out in the health district of Yasa Bonga, showed an effectiveness of passive screening with nevertheless some difficulties of application of the screening algorithm in 13 Health centers out of the 24 targeted (54%). Major issues were observed in the continuum of care process, with gaps at the level of the confirmation tests.
CONCLUSION These preliminary results, although encouraging, point out the bottlenecks to address for a sustainable effectiveness of the passive screening strategy.

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Perception of the integration of activities of African human trypanosomiasis control into basic health services: a qualitative study

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INTRODUCTION Integration of African Trypanosomiasis activities in basic health services is a major challenge in a context of decreasing cases and a goal of HAT elimination.
AIM To document factors that can positively and negatively influence the integration process from the perspective of different stakeholders.
METHODS Twelve focus groups with communities in three deliberately chosen health zones and 32 interviews with health care providers, managers, policy makers and experts were conducted. Data were analyzed in NVivo via a process of thematic analysis.
RESULTS Integration of HAT diagnosis and treatment is positively perceived by the population as they appreciate the proximity of health services. Health care providers appreciated an integrated approach for its patient-centeredness, and saw it as contributing to achieving the elimination target. However, several barriers to integration were identified: the lack of specialized skills, equipment, incentives, and financial resources in these basic health services. Patients often use several health seeking itineraries which do not automatically lead them to the health centers where screening is available. One of the main barriers that restricts access to the centers is financial, as health care is not free in the first line centers. To overcome the various barriers, the participants suggested that integrated HAT control strategies should be subsidized, possibly with donor support.
CONCLUSION Although integration is welcomed, its implementation faces several challenges. Firstly, the quality of care to be provided. The integration process should take care of the skills training of caregivers, and of other human resource issues as staffing and staff incentives. To ensure coverage of those most in need, the financial barriers have to be addressed.

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Schistosomiasis and soil-transmitted helminths prevalence in school-aged children and opportunities for integration of control in health services in Kwilu province, Democratic Republic of the Congo

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INTRODUCTION Control of Schistosomiasis (SCH) and Soil-Transmitted Helminth (STH) infection rely on preventive chemotherapy. School-aged children are targeted because they are most at risk. The choice of control strategy depends on the prevalence, but data are currently scarce in the Democratic Republic of the Congo (DRC).

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AIM The objective was to provide baseline data on SCH and STH for the health districts of Mosango and Yasa Bonga in the province of Kwilu. The POC-CCA rapid diagnostic test was used and compared to the Kato-Katz. The capacity of the local health centres for diagnosis and treatment of SCH was assessed.
METHODS We conducted a cross-sectional random school-based survey and collected stool and urine samples for parasitological examination. The urine filtration method, POC-CCA test and duplicate Kato-Katz thick smears were used for the diagnosis of SCH and thick smears for STH. Evaluation of the existing health structure was done by observation and questionnaire.
RESULTS We enrolled 526 children with median age of 10 years (IQR: 9–10; 95%IC: 8.9–9.9). The prevalence of *S. mansoni* infection was 8.9% (95% CI: 3.5–13.2) in both districts while the POC-CCA test revealed an overall prevalence of 47.4% (95% CI: 38.4–57.6). There was no *S. haematiobium* infection. The combined STH infection prevalence was 58.1%. Hookworm infection was the most prevalent STH 52.9% (95% CI: 29.3–62.4), followed by *A. lumbricoides* 9.3% (95% CI: 5.8–15.5) and *T. trichiura* 2.1% (95% CI: 0.9–4.9). Mixed STH infections were observed as well as SCH-STH co-infection. Local health centres are mainly staffed by nurses who know SCH symptoms well, however, diagnostic tools and treatment were lacking.
CONCLUSION Although the POC-CCA test offers many practical advantages for the diagnosis of *S. mansoni*, it seems to overestimate its actual prevalence in low endemic areas. The Kato-Katz smear offers other advantages such as the estimation of the intensity of infection and the simultaneously detection of STH. As the prevalence-estimate is so dependent on the choice of test, this may lead to different control strategies. To reach the elimination targets, further initial mapping of both SCH and STH are needed. National coverage of preventive chemotherapy for helminth diseases should be increased in the DRC.

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Environmental monitoring of *Schistosoma mansoni* infection rate in *Biomphalaria sudanica* – results of the Ijinga Island Schistosomiasis elimination pilot study, Mwanza, North-western Tanzania

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INTRODUCTION Despite repeated mass drug administration (MDA) campaigns the prevalence of schistosomiasis in the population in Tanzania remains high. Praziquantel, the major drug to treat schistosomiasis, lacks efficacy against immature stages of the parasite. Unavoidable contact to water contaminated with human excreta contributes to a high reinfection rate. The interruption of the transmission cycle remains a demanding goal. To monitor the success of interventions, the infection rate of the intermediate host snails can be used. The specific intermediate hosts for *S. mansoni* and *S. haematobium* infections are *Biomphalaria* and *Bulinus*. *Biomphalaria* species are common at the shore of Lake Victoria and people living there have a high risk to become infected with *S. mansoni*.
AIM The major objective of this study was to examine the snail intermediate hosts of human schistosomiasis in the study area to identify suspected disease transmission hotspots.
METHODS Snails were collected from 16 sites along the lakeshore of the island. Species of snails were identified based on shell morphology. Infection rate of snails was determined with species specific real-time PCR. Vegetation cover was recorded and physico-chemical characteristics of the water were determined.
RESULTS Out of 5082 snails collected, 4888 (96.2%) were putatively identified as *Biomphalaria sudanica*, and 194 (3.8%) as *Bulinus globosus*. A random sample of 931 snails (788 Biomphalaria and 143 Bulinus) underwent molecular analyses for schistosoma infection. Overall, 288 (34.4%) of *Biomphalaria* and 2 (1.2%) of *Bulinus* were positive in real-time PCR for *S. mansoni* and *S. haematobium*, respectively. 14 sites contained snails which were observed to be infected with *S. mansoni* cercariae, three of them showed a prevalence for *S. mansoni* of more than 90%.
CONCLUSION The prevalence of snails infected with *S. mansoni* was very distinct between the collection sites. Most of the collection sites (11) were classed as high abundance. These areas can be considered as local hotspots for intestinal schistosomiasis transmission. The transmission patterns are closely related to the abundance and spatial distribution of vector snails. In transmission hotspots the focal use of molluscicides could be considered as a complement to praziquantel MDA in reducing transmission of schistosomiasis.

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Temporal trends in schistosomiasis in Burundi, from 2011 to 2015

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INTRODUCTION Intestinal schistosomiasis has been a public health problem for several decades in Burundi. Since 2008, annual mass drug administrations (MDA) of praziquantel have been rolled out targeting school age children, in 11 (out of 45) districts at high risk of schistosomiasis.
AIM To assess whether schistosomiasis cases reported by health facilities via the national health management information system could be used to verify the impact of MDA in those districts where annual treatment was performed.
METHODS From the aggregated data available by district from 2011 to 2015, number of schistosomiasis cases, diagnosed by direct smear of stools, was collected. Schistosomiasis trends were assessed by Poisson regression by comparing years 2012, 2013, 2014 and 2015, to year 2011. To verify whether changes in schistosomiasis trends over time were due to MDA of praziquantel and not to other potential factors, like environmental factors, a comparison with schistosomiasis trends in districts without MDA (1) and with malaria burden as a disease representing general morbidity in these 11 districts (2) was done.
RESULTS The number of schistosomiasis cases decreased significantly each year ($\beta_{2012} = -0.267$, $P = 0.000$; $\beta_{2013} = -0.356$, $P = 0.000$; $\beta_{2014} = -0.760$, $P = 0.000$;

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$\beta_{2015} = -1.172$, $P = 0.000$) in the 11 districts where MDA was performed. For schistosomiasis trends in districts where MDA was not delivered, there was a non-significant decrease over the time. For malaria, number of cases reported by health facilities via the same health management information, changed significantly, with a steady increase of this disease each year.
CONCLUSION Based on the number of confirmed cases reported by health facilities over the period 2011–2015, MDA have shown a significant effect on annual schistosomiasis trends. Hence, data from the health management information system on schistosomiasis, could be used to assess the effect of routine praziquantel administration on morbidity over time, and replace costly annual impact surveys routinely performed in the country. However, further operational research is needed to assess whether schistosomiasis reported by health facilities could still be used to assess impact of MDA in a low disease prevalence context.
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Preliminary assessment of the computer-based *Taenia solium* educational program 'The Vicious Worm' in rural primary school children in eastern Zambia

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INTRODUCTION The zoonotic tapeworm *Taenia solium* is endemic in Zambia, causing human and pig disease with high health and economic burdens. Health educational programs can significantly improve knowledge, attitudes and practices and decrease disease occurrence.
AIM To assess the computer-based *T. solium* educational program 'The Vicious Worm' on knowledge uptake in Zambian primary school children.
METHODS Half-day workshops were conducted for grade five and six children in three schools in eastern Zambia. A multiple-choice questionnaire assessed baseline *T. solium* knowledge. The Village section of 'The Vicious Worm' was then presented for approximately one hour, and the questionnaire was repeated to assess knowledge uptake.
RESULTS There were 99 participants (38% males, 62% females), aged 10–18 years old. General *T. solium* knowledge, including awareness of the disease states, and parasite diagnosis, treatment and prevention, was moderately high at baseline (average score 62%). Immediately after 'The Vicious Worm', participants' knowledge significantly increased ($P < 0.001$), particularly regarding transmission ($P < 0.001$) and prevention ($P = 0.004$). Some aspects, especially linkages between the human and pig diseases, and acquisition of neurocysticercosis, remained poorly understood.
CONCLUSION Preliminary assessment of 'The Vicious Worm' indicates it is highly effective for the short-term education of primary school children in Zambia. Despite difficulties with some abstract aspects of the *T. solium* life cycle, key messages for prevention of disease transmission were well understood. Follow-up studies will assess the longer-term impact of the program on knowledge uptake in the study neighbourhoods. Inclusion of 'The Vicious Worm' workshops should be considered in integrated cysticercosis control and/or eradication programs.

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Knowledge, attitude and perception about onchocerciasis and ivermectin in the onchocerciasis endemic health zone of rethy in Ituri, Democratic Republic of the Congo (DRC)

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INTRODUCTION Onchocerciasis is endemic in all provinces of the DRC and more than 26 million people are estimated to be at risk for onchocerciasis. Mass treatment with ivermectin was implemented in 2001. However, in Ituri in the Rethy health zone, due to insecurity, community distribution of treatment with ivermectin (CDTi) was only initiated in 2012. Optimal geographical and therapeutical coverage of CDTi is essential for the success of an onchocerciasis control program. To reach optimal efficacy it is important the community understands the benefit of the CDTi program and fully collaborates with it. In a recent case control study in Rethy investigating the link between epilepsy and onchocerciasis only 68.2% of eligible individuals reported to have taken ivermectin in 2014.
AIM To understand the knowledge, attitude and perception of the community concerning onchocerciasis and the CDTi program.
METHODS 8 focus group discussions with community members and community directed distributers (CDDs) of ivermectin and semi-structured interviews with health professionals were conducted in the health zone of Rethy.
RESULTS Onchocerciasis is known as 'filaria' in the health zone of Rethy. Ivermectin was well accepted as treatment against onchocerciasis and is also known as treatment for onchocerciasis, scabies, and lice and able to reduce itching, improve vision, improve sexual virility and fertility. During a first round of CDTi, side effects were a common reason for refusal to take ivermectin. Since the second round of CDTi the community understood the importance of taking ivermectin and considered side effects as a proof the drug was active against the parasites. However a local religious group discouraged people to take ivermectin (they said ivermectin is the drug of the second

world 'the world of Satan'). Moreover, CDDs complained about the lack of incentives for the distribution of ivermectin while for malaria control activities incentives were given.
CONCLUSION In the Rethy health zone, ivermectin is a well-accepted treatment against onchocerciasis. To increase the success of the CDTi program health authorities should address the negative attitude of a religious group active in the area and also find ways to overcome the lack of motivation of the CDDs.

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Projected number of people with onchocerciasis-loiasis co-infection in Africa, 1995–2025

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INTRODUCTION In Central Africa, community-directed treatment with ivermectin (CDTI) against onchocerciasis is hampered by co-endemicity of *Loa loa*, as people with ≥30 000 *Loa* microfilariae/ml of blood can develop potentially fatal severe adverse events (SAEs). To be conservative, test and treat approaches will likely use a threshold of ≥20 000 *Loa* microfilariae/ml for exclusion from ivermectin treatment.
AIM We estimate the number of individuals with *Onchocerca volvulus* and *Loa* co-infections who are at risk (≥20 000 *Loa* microfilariae/ml) for post-ivermectin SAEs, for 1995, 2015 and 2025.
METHODS We combined pre-control rapid assessment data (REMO and RAPLOA) on onchocerciasis and loiasis prevalence. The loiasis data were categorised by proportions of people with ≥20 000 *Loa* microfilariae/ml. We used the mathematical model ONCHOSIM to calculate the expected trends in *O. volvulus* prevalence for 1995 to 2025, accounting for local treatment history. The impact of ivermectin treatment on loiasis was considered based on published data,[3] with a one-time reduction in *Loa* prevalence and intensity after one round of CDTI.
RESULTS Among areas where *Loa* is potentially endemic, the number of cases with *O. volvulus* declined from 19.5 million people in 1995, to 14.2 million in 2015 and 3.3 million in 2025. Of those, 114 771 people were co-infected with *Loa* microfilaraemia ≥20 000/ml in 1995; 44 370 predicted in 2015 and 20 477 in 2025. In 2025, 89% of cases ($N = 18\ 320$) will live in onchocerciasis hypoendemic areas which would not benefit from control/elimination programmes. Democratic Republic of Congo and Cameroon will contribute to 78% of all cases in 2025.
CONCLUSION Mass distribution of ivermectin as part of the onchocerciasis elimination efforts is problematic in many countries. We predict that in 2025 over 20 000 people will require treatment for onchocerciasis while being at high risk of SAEs, justifying increased effort in research and development for safer drugs and control strategies targeted especially towards onchocerciasis hypoendemic areas which are co-endemic for loiasis.
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Neglected diseases in a marginalized population: priorities of intestinal parasitic infections in mobile pastoralists at Lake Chad

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INTRODUCTION In the Sahelian belt of Africa, mobile pastoralism represents a highly adapted lifestyle to a scarce environment and it is practiced by an estimated 20–30 million people. However, when it comes to access to water, sanitation, and health care, mobility represents a challenge and the pastoralist populations face marginalization.
AIM This study is elucidating the prevalence of helminth and protozoan intestinal parasite infections in mobile pastoralists at Lake Chad in order to obtain a holistic picture on parasite species present and to identify disease priorities and treatment needs.
METHODS On the eastern shores of Lake Chad, mobile pastoralists participated in repeated cross-sectional surveys. Within each participating group, 20 individuals older than 5 years of age were randomly selected and urine and stool samples were collected. Urine filtration and Kato-Katz thick smears were analyzed in a mobile field laboratory for helminth infections. Additionally, stool samples were preserved in sodium acetate-acetic acid-formalin (SAF) solution for further analysis focusing on protozoans in a specialized laboratory in Switzerland.
RESULTS In 19 mobile pastoralists groups, a total of 415 individuals participated. Protozoa were found in 90% of all stool samples. Prevalence of pathogenic protozoa (*Entamoeba histolytica*/*E. dispar* and *Giardia intestinalis*) was 42.5%. *Schistosoma haematobium* was identified as the most prevalent helminth with a prevalence of 8.1%, followed by *Enterobius vermicularis* with 2.1% and *Hymenolepis nana* with *1.4%*. Prevalence of soil-transmitted helminths and *S. mansoni* were <1%.
CONCLUSIONS Urinary schistosomiasis and pathogenic protozoa infections were identified as priorities in mobile pastoralist populations at Lake Chad. Future research and control measures should focus on intestinal protozoa infections and schistosomiasis by developing targeted, locally adapted and accepted interventions.

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Koko et les lunettes magiques – an educational entertainment tool to prevent intestinal worms and diarrheal diseases in Côte d'Ivoire

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INTRODUCTION Integrated control programs, emphasizing preventive chemotherapy along with health education, can reduce the incidence of soil-transmitted helminthiasis and schistosomiasis.
AIM The aim of this study was to develop an educational animated cartoon to improve schoolchildren's awareness regarding soil-transmitted helminthiasis, diarrheal diseases and related hygiene practices in Côte d'Ivoire.
METHODS In a first step, preliminary research was conducted to assess the knowledge, attitudes, practices and beliefs of school-aged children with regard to intestinal worm infections and hygiene, in order to identify key health messages. Secondly, an animated cartoon was produced, which included the drafting of the script and story board, and the production of the cartoon's initial version. Finally, the animated cartoon was pilot tested in 8 selected schools and further adapted.
RESULTS According to the questionnaire results, children believed that the consumption of sweet food, eating without washing their hands, sitting on the floor and consumption of spoiled food were the main causes of parasitic worm infections. Abdominal pain, diarrhea, lack of appetite, failure to grow and fatigue were mentioned as symptoms of parasitic worm infections. Most of the children knew that they should go to the hospital for treatment if they experienced symptoms of parasitic worm diseases. The animated cartoon 'Koko et les lunettes magiques' was produced by Afrika Toon, in collaboration with a scientific team composed of epidemiologists, civil engineers and social scientists, and the local schoolchildren and teachers. Pilot testing of the animated cartoon revealed that, in the short term, children grasped and kept key messages. Most of the children who were shown the cartoon reported to like it.
CONCLUSION Acceptance of the animated cartoon was high among children and teachers and the messaging was tailored to improve knowledge and practices for prevention of helminthiases and diarrheal diseases. Integration of such education tools into the school curriculum, along with deworming campaigns, might improve sustainability of control and elimination efforts against helminthiases and diarrheal diseases.

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Important progress towards elimination of onchocerciasis in the West Region of Cameroon

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BACKGROUND After more than a decade of community-directed treatment with ivermectin (CDTI) in the West Region of Cameroon, epidemiological evaluation conducted in 2011 showed that onchocerciasis endemicity was still high in some communities. The conceptual framework for onchocerciasis elimination recommends in such case to conduct additional phase 1A surveys at intervals of 3–4 years. Therefore, to assess the progress made towards the elimination of onchocerciasis in the West CDTI projects, we conducted a cross-sectional survey in May 2015 in 15 unevaluated communities where the highest baseline endemicity level were found in 1996. All volunteers living for at least 5 years in the community, aged 5 years or more, underwent clinical and parasitological examinations. Individual compliance to ivermectin treatment was also assessed.

RESULTS The mean age was 28 ± 22 years and there were 55% of women among the 2,058 persons we examined. The weighted prevalences were 5.5%, 2.1%, and 1.7% for microfilaridermia, nodule, and cutaneous signs respectively. The weighted microfilaridermia prevalences varied from 4.0 in 5–9 years old to 11.6% in 40–49 years old. In the 30 children under 10 years examined in Makouopsap, the weighted prevalences were 49.9% for microfilaridermia and 13.3% for nodule. In surveyed communities, the weighted prevalences varied from 0 to 41.6% for microfilaridermia with 11 (73.3%) communities having <5%. Except Makouopsap which was still mesoendemic, all the surveyed communities were hypoendemic. The community microfilarial load (CMFL) expressed in microfilariae/skin snip (mf/ss), also significantly dropped by 98–100% from 3.8–33.2 mf/ss in 1996 to 0–0.9 mf/ss in 2015. The weighted therapeutic coverage in 2014 was 69.4% and adherence during 5 year was only 39.3% among participants.
CONCLUSIONS After more than 15 years of CDTI, there is an important progress towards the elimination of onchocerciasis in the communities surveyed. Innovative strategy like semi-annual ivermectin treatment plus vector control or the adjunction of a vector control strategy to the current annual treatment should be implemented in the bordering districts of the Centre and West Regions and in other part of the country with persistent high prevalences in the sight of onchocerciasis elimination.

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Still mesoendemic onchocerciasis in two Cameroonian community-directed treatment with ivermectin projects despite more than 15 years of mass treatment

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BACKGROUND After more than a decade of community-directed treatment with ivermectin (CDTI) in Centre and Littoral Regions of Cameroon, onchocerciasis endemicity was still high in some communities during the 2011 epidemiological evaluations. Some corrective measures were undertaken to improve the CDTI process and therefore reduce the disease burden. The objective of the present study was to assess the progress made towards the elimination of onchocerciasis in the Centre 1 and Littoral 2 CDTI projects where the worst performances were found in 2011. To this end, a cross-sectional survey was conducted in April 2015 in eight communities of Bafia and Yabassi health districts (HD), chosen because assessed at baseline and in 2011. All volunteers aged of at least 5 years and living for at least 5 years in the community underwent clinical and parasitological examinations. Individual compliance to ivermectin treatment was also assessed. Analyses of data were weighted proportionally to age and gender distribution in the population.
RESULTS In the Bafia and Yabassi HD, 514 and 242 individuals were examined with a mean age of 35 ± 21 and 45 ± 16 years, respectively. In the Bafia HD, the weighted prevalences varied from 24.4 to 57.0% for microfilaridermia and from 3.6 to 37.4% for nodule across the surveyed communities. The community microfilarial load (CMFL), expressed in microfilariae/skin snip (mf/ss), significantly dropped from 20.8–114.5 mf/ss in 1991 to 0.3–1.6 mf/ss in 2015 in all the surveyed communities. In the Yabassi HD, the weighted prevalences varied from 12.3 to 59.3% for microfilaridermia and from 1.5 to 3.7% for nodule across the surveyed communities, while a significant drop was observed in CMFL, from 20.4–28.5 mf/ss in 1999 to 0.5–1.7 mf/ss in 2015. The 2014 weighted therapeutic coverage of participants varied from 65.8% (95% CI: 58.4–73.2) in Yabassi HD, to 68.0% (95% CI: 63.3–72.7) in Bafia HD, with important variations among communities.
CONCLUSIONS After more than 15 years of CDTI, onchocerciasis is still mesoendemic in the surveyed communities. Further studies targeting therapeutic coverage, socio-anthropological considerations of CDTI implementation and entomological studies would bring more insights to the persistence of the disease as observed in the present study.

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A call for podoconiosis, a neglected tropical disease

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INTRODUCTION Podoconiosis, *mossy foot* or endemic non-filarial elephantiasis, is a geochemical disease that causes lower limb lymphedema; it is directly related to walking barefoot over soils of volcanic origin rich in silica. Due to repeated trauma, these mineral microparticles enter the skin causing a chronic non-reversible lymphedema. In endemic areas, it must be distinguished from lymphatic filariasis.
AIM Describe clinical and epidemiological characteristics of the disease, helping to stablish a differential diagnosis in the tropical environment, as well as its causes and eventual infectious complications.
METHODS A prospective study was carried out since July until December 2013 in the rural highlands of West Arsi, in the Oromia region, with settlement in Gambo General Rural Hospital, Ethiopia. Infectious complications were analysed.
RESULTS 106 new podoconiosis cases were diagnosed, being 58% female and 52% male. Mean age at the time of diagnosis was 39 years. Mean delay from symptom onset until definite diagnosis was 11 years. Clinical staging, according to Tekola classification of lymphedema was: 85 patients (80.2%) stage 1, 17 patients (16%) stage 2 and 4 patients (3.8%) stage 5. Every patient lived in an area above 2000 m asl, where filarial transmission does not exist. At the time of diagnosis, 2 patients (1.9%) had ongoing cellulitis, 41 (38.7%) had trophic changes suggestive of fungal infection, and 8 (7.5%) suffered at least a previous cellulitis episode or lymphadenitis. Only 18.4% attended hospital because of podoconiosis, while 81% was diagnosed after an active search for cases, reflecting both stigma and ignorance or distance to reference centers pose the main problems these patients suffer. Every patient received local treatment with an antiseptic solution, besides lymphatic drainage and compressive bandaging, according to treatment guidelines for podoconiosis; two patients received oral antimicrobial treatment.
CONCLUSION Podoconiosis is prevalent in low income countries and should be considered in the differential diagnosis in patients with lymphedema, like lymphatic filariasis, as treatment significantly differs. Chronic lymphedema and wounds favor acute cellulitis and lymphadenitis. In advanced disease, fungal colonization often occurs. Treatment with clean water, soap, antiseptic solutions and lymphatic drainage diminish the risk for these complications.

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Strongyloides stercoralis a call for revising soil transmitted heliminthiases programmes

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INTRODUCTION Soil transmitted helminths (STH), including *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm are among most common infections worldwide. The infection is transmitted by eggs, released in human faeces, in areas of poor sanitation. STHs are included in the neglected tropical diseases (NTDs) program of WHO. Strategies for controlling the morbidity are based on periodic mass drug administration-MDA with albendazole of at-risk population: preschool and school-aged children; and women of childbearing age.

STH are widely spread in Ethiopia, with 9.1 million pre-school-aged children, 25.3 million school-aged children and 44.6 million adults, living in high endemic areas. Nowadays, a large-scale mapping of STH is going on in the country. In areas of high prevalence of STH (≥50%), de-worming interventions are launched twice per year. *Strongyloides stercoralis* is not included in NTDs program of WHO nor in NTDs master plan in Ethiopia; the needing of a non-standard diagnosis (focusing on larva, the form released in faeces); different treatment (ivermectin); and scarcity of data about its epidemiology, explain the exclusion and underestimation.

AIM To know the prevalence of *S. stercoralis* in a community in a rural area of Ethiopia, of high prevalence of STH, when using techniques for larva detection.

METHODS We conducted a cross-sectional study in a rural community of Bahirdar, in north-west Ethiopia, from March to June 2016. Stools were examined by (i) Formol ether concentration (FEC); (ii) Baermann technique (BT), for larva detection; and (iii) a specific PCR for *S. stercoralis*.

RESULTS 792 individuals were included, 43.7% male. The age ranged from 5 up to 85 (mean 24.4, SD 16.6), 37.1% ≤14. Prevalence of *S. stercoralis* was 6.94% by FEC, 32.96% by BT and 35% by PCR. The prevalence by combination of the three techniques was 56%. *S. stercoralis* was significantly higher in adults (>14) ($P = 0.002$).

CONCLUSIONS *S. stercoralis* is underestimated if only egg-detection used. Adequate diagnostic protocols will give more accurate mapping of STHs burden. Prevalence in adult population in our sample is significantly higher, suggesting the convenience of including adults in STHs programs. Further studies must be implemented, for improving control in endemic sites, (e.g. ivermectin in deworming programs).

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Impact of anthelmintic treatment on the burden of schistosomiasis and soil transmitted helminths in primary schoolchildren in Biyela health zone in Kinshasa, Democratic Republic of the Congo

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INTRODUCTION Mass drug administration with praziquantel and albendazole is the cornerstone for schistosomiasis (SCH) and soil transmitted helminths infection (STHI) control in developing countries. However, little is known about the impact of these anthelminthic, the appropriate timing and dosing space for an optimal school based deworming program in children.

AIM We evaluated the impact of anthelminthic treatment, given as non-investigational drugs, on SCH, STHI infection, anemia and level of haemoglobin in schoolchildren in Democratic Republic of Congo (DRC).

METHODS From November 2012 to November 2013, 616 asymptomatic children attending two primary school of Biyela health area were enrolled and received one dose of praziquantel at baseline and 3 doses of albendazole with 3 to 4 months' interval. During the 12 months of follow up, stool and urine samples were collected for *S. mansoni*, STH and *S. haematobium* diagnosis and finger prick blood for hemoglobin concentration determination. The impact of treatment was measured by comparing the situation before and after treatment.

RESULTS Baseline prevalence of SCH, STH and anemia were, respectively, 6.4%; (95% CI: 4.4–9.1), 36.9%; (95% CI: 32.6–41.6) and 44.9% (95% CI: 40.3–49.6). The Hb mean of all children was 11.57 g/dl (SD±1.28 g/dl). After 12 months of follow up, it was observed a decrease of prevalence of STH (from 36.2% to 6.0%; $P < 0.0001$). Prevalence of *A. lumbricoides* and *T. trichuira* decreased from 18.4% to 1.6%; $P < 0.0001$ and 26% to 5.2%; $P < 0.0001$. No significant changes in prevalence of *S. mansoni* infection (from 6.4% to 2.4%; $P = 0.0525$) was observed at 12-months post treatment with single dose of praziquantel (40 mg/kg). Similarly, no significant change was observed for Hb level (mean difference of 0.64; SD of 1.48) neither for anemia (from 41.3% to 40.4%; $P = 1$), at 12 month after treatment.

CONCLUSION These findings suggest that, albendazole, given 3 times in a year may be an effective mean to prevent STHI in schoolchildren. Whereas, more studies must be conducted to determine the appropriate timing, number and spacing dose for praziquantel to prevent or decrease the burden of SCH in schoolchildren.

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The need of placing schistosomiasis into context

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INTRODUCTION There are two major forms of schistosomiasis in Sub-Saharan Africa (SSA): uro-genital form, caused by

Schistosoma haematobium, and intestinal, caused by *Schistosoma mansoni*. About two-thirds of the infections are caused by *S. haematobium* being the highest prevalence and intensities in school-aged children (SAC), and young adults. Ethiopia is the second largest country in SSA, with a population of almost 92 million people. However, *S. mansoni* is widely distributed in, while *S. haematobium* is only restricted to small foci. A large-scale mapping has been conducted almost in all the country since December 2013. A big extension of the country has been qualified as non endemic. Recently, unknown transmission foci have been reported in different parts of the country, mainly related to migration to urban areas. Nowadays Ethiopia has a five-year national program for controlling the morbidity of schistosomiasis by 2020, involving the distribution of over 100 million treatments to SAC. Expanding treatment to adults will be considered in priority areas. Bahirdar zuria, in the north-west Ethiopia, is located in the south shore of the Tana Lake, the source of the Blue Nile. The area had been qualified as non endemic. It is made of a central urban nucleus and a surrounding rural area.

AIM To test the prevalence of *S. mansoni* in a rural community in Ethiopia with high level of migration to urban areas.

METHODS From March to June 2016, we conducted a study in the rural area, 30 km far from the city center. People in a rural community were randomly selected. Stools were examined by formol ether concentration.

RESULTS 793 people were enrolled. The age ranged from 5 up to 85 (mean 24.4, SD 16.6). 37.1% were school or pre-school age children (≤14). The prevalence of *S. mansoni* was 6.2% (n = 49), being higher in adults (6.7%) than in SCA (5.7%), although the difference was not significant.

CONCLUSION We detected a low prevalence (<10%) of *S. mansoni*. Further surveys with more sensitive diagnosis could provide accurate data in low endemicity areas for ensuring control program. Community based interventions, alongside with school interventions, are necessary.

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Onchocerciasis control in the Democratic Republic of Congo (DRC): challenges in a post-war environment

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OBJECTIVE To evaluate onchocerciasis control activities in the Democratic Republic of Congo (DRC) in the first 12 years of community-directed treatment with ivermectin (CDTI).

METHODS Data from the National Programme for Onchocerciasis (NPO) provided by the National Onchocerciasis Task Force (NOTF) through the annual reports of the 21 CDTI projects for the years 2001–2012 were reviewed retrospectively. A hypothetical–inputs-process-outputs-outcomes table was constructed.

RESULTS Community-directed treatment with ivermectin expanded from 1968 communities in 2001 to 39 100 communities by 2012 while the number of community-directed distributors (CDD) and health workers (HW) multiplied. By 2012, there were ratios of 1 CDD per 262 persons and 1 HW per 2318 persons at risk. More than 80% of the funding came from the fiduciary funds of the African Programme for Onchocerciasis Control. The cost of treatment per person treated fell from US $ 1.1 in 2001 to US$ 0.1 in 2012. The therapeutic coverage increased from 2.7% (2001) to 74.2% (2012); the geographical coverage, from 4.7% (2001) to 93.9% (2012). Geographical coverage fell in 2005 due to deaths in loiasis co-endemic areas, and the therapeutic coverage fell in 2008 due to insecurity.

CONCLUSIONS Challenges to CDTI in DRC have been serious adverse reactions to ivermectin in loiasis co-endemic areas and political conflict. Targets for personnel or therapeutic and geographical coverages were not met. Longer term funding and renewed efforts are required to achieve control and elimination of onchocerciasis in DRC.

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Trachoma elimination in Agago District, northern Uganda: district health system role in planning and implementation of mass drug administration for neglected tropical diseases

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INTRODUCTION Agago District is endemic for Neglected Tropical Diseases and has achieved elimination of trachoma as a public health problem. Trachoma is endemic in 42 countries; it's the leading cause of blindness and visual impairment affecting 1.9 million people worldwide. Trachoma is caused by an obligate intracellular bacterium *chlamydia trachomatis* and is spread through contact via hands, clothes, beddings and flies that has been in contact with discharge from an infected person. The two types are; the Active Trachoma in 1–9 age group and Blinding Trachoma (15 years and above).

AIM To document the processes by the District Health System towards planning and implementation of mass Drug Administration (MDA) cycles and eventual elimination of trachoma as a public health problem.

METHODS Agago District undertook sequential steps for each round of MDA which involved: Advocacy meeting with top District political, technical leadership, religious leaders and media, Tiered trainings of sub county supervisors, parish supervisors and science school teachers, Sensitization at sub county level, selection and training of Community Medicine Distributors(CMD's), registration and census updates of communities and schools, Delivery of drugs and implementation of MDA and supervision, Data collection and reporting.

RESULTS Since 2008, 5 rounds of MDA have been undertaken in the 13 sub counties and 3 town councils in Agago district with a population of 234 700. 2805 CMD's are trained in each round in all the 906 villages and 149 schools. In 2008 pre-MDA assessment, prevalence of active trachoma was 53% in 1–9 year age group and blinding trachoma at 6.1% in the 15 years and above group.

Impact assessment in 2014: Active Trachoma at 2.8% and Blinding Trachoma 1.6%, MDA was stopped as per the World Health Organisation recommendation of elimination upon achieving <5% prevalence of Active Trachoma in 1–9 age groups.

Surveillance survey in 2016: active trachoma 0.85%, blinding trachoma 0.27%.

CONCLUSION Involving the District Health System in the entire exercise was crucial to program ownership and sustainability; the same approach can be applied for other Neglected Tropical Diseases. MDA's should be conducted alongside health education on facial cleanliness and environmental improvement especially on water and sanitation.

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Evidence of negligible soil-transmitted helminth prevalence in the Bolivian Chaco triggers interruption of preventive chemotherapy and calls for strengthening of surveillance

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INTRODUCTION Soil-transmitted helminthiases (STH) are the most prevalent neglected tropical diseases worldwide. STH control programmes based on preventive chemotherapy (PC) are endorsed by the World Health Organization (WHO). In Bolivia, a program based on 6-months single-dose mebendazole delivery to school-aged children achieved a dramatic decrease in STHs prevalence from 1987 to 2013: hookworm from up to 50% to 0.4–1.3%, *Ascaris lumbricoides* from up to 19% to 0.9–1.5%, *Trichuris trichiura* from 19% to 0%.
AIM To further assess STH prevalence among school-aged children in the Chaco Region, in order to inform the Bolivian STH control program policy decision.
METHODS In September 2016, 548 school-aged children were enrolled in a cross-sectional study involving 9 sentinel sites, randomly selected among the rural communities of the Cordillera Province (Santa Cruz Department) and the Gran Chaco Province (Tarija Department). Stool sample for direct microscopy and Kato-Katz technique were collected. Haemoglobin levels (Hb) were assessed by HemoCue, as surrogate indicator of STH-related morbidity.
RESULTS Of 426 stool samples collected and analysed, only 3 cases of hookworms infection were detected, and none with *A. lumbricoides* or *T. trichiura* observed. The overall STH prevalence was 0.7 (95% CI 0.2–2.1). Conversely, the prevalence of intestinal protozoan infection was high: *Blastocystis hominis* (212/426, 49.8%), *Entamoeba hartmanni* (119/426, 27.9%), *Entamoeba coli* (113/426, 26.5%), *Endolimax nana* (111/426, 26.1%) and *Giardia intestinalis* (102/426, 23.9%). The mean Hb was 12.15 g/dl (95%C.I. 12.1–12.2).
CONCLUSION Given the STH prevalence <1%, PC delivery in the surveyed areas was no longer recommended and the Bolivian program decided to interrupt it. Monitoring through annual cross-sectional survey in sentinel sites to detect possible recrudescence of infections has been planned. No substantial reduction of protozoan infections nor improvement of Hb were observed with respect to previous surveys, conducted in the 1980s and 1990s.PC appears to have played a major role in STH transmission reduction, as otherwise poor hygienic and health conditions persist in the Bolivian Chaco. The contribute of other factors, such as climate or behaviour changes will be matter of further investigations.

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Seroepidemiological trend of strongyloidiasis in the Bolivian Chaco (1987–2012) in the absence of disease-specific control measures

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INTRODUCTION The prevalence of *S. stercoralis* infection is grossly underestimated because infections go mostly undetected (due to a combination of the asymptomatic or pauci-symptomatic nature of the infection and inaccurate diagnostics) though they can persist for a lifetime due to the worm auto-infective cycle.

In the Bolivian Chaco, the prevalence of soil-transmitted nematodes dropped dramatically in the past 25 years, but mebendazole used for preventive chemotherapy has no effect on *Strongyloides*. Meanwhile, the prevalence of intestinal protozoan infections remains unchanged.
AIM To compare *S. stercoralis* seroprevalence in rural communities of the Bolivian Chaco from 1987 to 2012.
METHODS Sera collected during two previous sero-surveys, conducted in the Chaco region in 1987 and 2012, were tested for *S. stercoralis* using a commercial enzyme-linked immunosorbent assay (Bordier-ELISA, Bordier Affinity Products, Switzerland).
RESULTS 366 sera were analyzed, 122 from the 1987 survey and 244 from the 2012 survey. Seropositivity for *S. stercoralis* was significantly more prevalent in 1987 (19/122, 15.6% versus 18/244, 7.4% in 2012), accounted for the age classes 5–14 and 15–35 year-olds. Conversely, there was a non-statistically significant higher prevalence in the over 35 year-olds in 2012. Multivariate analysis showed a significant association between seropositivity for *S. stercoralis* and age in the 2012 population (OR 1.02 for each one-year increase, 95% CI 1.00–1.04), but none in 1987.
CONCLUSIONS There is a significant reduction in *S. stercoralis* seroprevalence in rural Bolivian Chaco, which cannot be explained by preventive chemotherapy or improved social-sanitary conditions. As the drop in seen in younger generations, it is consistent with little transmission occurring. The persistent higher prevalence in adults is a testimony of infections occurring in the past. However, the risk of transmission still exists, as these individuals represent a potential reservoir due to the lifelong nature of *S. stercoralis* infections.

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Rabies the deadly disease; how much we aware?

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INTRODUCTION Human rabies is a hundred percent fatal but hundred percent preventable neglected tropical disease of the developing countries and is well controlled or eliminated in most of the developed countries. Rabies and animal bite cases are being routinely reported from the National & District Rabies Prevention and control centers in Bangladesh.
AIMS The aim of the study is to observe the present situation and management of animal bite cases specially rabies patient.
METHODS Here we describe 6 cases of rabies patient rushed to one infectious diseases hospital during the period Jun 2012 to December 2013.
RESULTS During this period total 2648 patients were given post exposure vaccination (ID-ARV). Most were(80%) due to dog bite, 10% cat bite, 5% fox bite and 5% others like bobcats, mongooses, monkey etc including rabid human bite. Age range from 1 1/2 years to 85 years. Of the total bitten patients; 30% were WHO-Category III bite and 15% of them got Rabies Immunoglobulin (RIG) along with vaccine. Total 6 Patients developed Rabies. Five developed Rabies during the course of active immunization; two even after inoculation of RIG. One 85 year old man admitted to the Hospital with history of multiple deep seated bites on both thigh and leg. Patient was given ARV, tetanus and antibiotic prophylaxis. RIG was given on next day due to unavailability of the drug. On 5th day he felt discomfort, salivation followed by respiratory difficulties and died. Another baby 18 month admitted with lacerated wound around the face due to dog bite died on third day inspite of giving ARV and RIG. Three patients with WHO-Cat-III developed rabies after 3rd doses of ARV. One girl 7 year old looked frighten, excessive salivation, aggressive and hydrophobic. She had history of dog bite 18 month back with no history of ARV. The patient died on next day.
CONCLUSION Here all patients died in their house. We have no facilities to keep them into hospital. So, complete evaluations and reporting of the patients were not possible. It is essential to develop a setup and standard operative procedure for human rabies management.

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Modeling the mass use of systemic insecticides in dogs to control zoonotic visceral leishmaniasis

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INTRODUCTION Mathematical models of infectious disease dynamics can be used to predict the progress of a disease in specific settings and to predict the outcome of public health intervention strategies such as vaccinations, early detection, and mass treatment campaigns. Several studies have used mathematical models to predict the benefits of public health interventions in controlling human incidence of Zoonotic Visceral Leishmaniasis (ZVL). Systemic insecticides in dogs have been suggested as a public health intervention to prevent human cases of ZVL.
AIM To predict the impact of systemic insecticide use in dogs as a public health measure to control human cases of ZVL using a mathematical model of ZVL transmission dynamics.
METHODS We used a Susceptible-Exposed-Infected (SEI) compartmental model to describe ZVL transmission dynamics in dogs, with a vectorial capacity term to describe transmission between dogs via sand flies. For the Infected (I) compartment we defined two levels, highly infectious and lowly-infectious dogs. Human incidence was estimated through its relationship to infection in the dog population. The system of differential equations describing the transmission dynamics was solved in R 3.2.0 using the package deSolve.
RESULTS From the model simulations annual human incidence of ZVL was approximately 3.5 cases/100 000 people with no systemic insecticides applied to dogs. Under the scenario where 65% of the sand flies were killed 48 hr after biting treated dogs (100% coverage) the estimated human incidence reached equilibrium of 1 case/100 000 people in about 300 days. Under the scenario where 80% of the sand flies were killed 48 hr after biting treated dogs (100% coverage) the estimated transmission of ZVL from dogs to humans decreased to almost zero in <100 days after starting the treatment.
CONCLUSION Mass application of systemic insecticides with 80% efficacy at killing sand flies 48 hr after biting on dogs could significantly reduce human incidence of ZVL in endemic areas. Future work will consider different scenarios of treatment coverage and treatment effectiveness to determine critical levels of coverage and effectiveness needed to interrupt transmission.

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Echinococcosis, a global economic and health burden

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INTRODUCTION Cystic echinococcosis (CE) is a parasitic zoonisis caused by the larval stage of *Echinococcus granulosus*.
CLINICAL CASE We present the case of a 5-year-old girl who was admitted for seizures. Radiologic work-up showed a cerebral cyst, diagnosed as a benign cyst. Due to recurrence of seizures, a complementary MRI was performed. The cyst presented then all characteristics of a hydatid cyst due to echinococcus species. Medical history revealed expositional risk factors: of Moroccan origin, she spent several months in the family farm in contact with dogs. Considering the localisation of the cyst, antiparasitic therapy was started in order to reduce cyst size and to facilitate surgery. After a 6-month course of albendazole, curative surgical resection was performed with no adverse effect. Pathology confirmed the diagnosis of infection due to *E. granulosus*, as did the serology that turned out positive in the meantime.
DISCUSSION Two major forms of Echinococcosis occur in human pathology, CE caused by *E. granulosus* and alveolar echinococcosis (AE) caused by *E. multilocularis*. *E. granulosus* has a worldwide location, with high endemic areas located in north Africa, South America and Asia. On the other hand, *E. multilocularis* is found only in the northern hemisphere. Globally, echinococcosis is responsible for 19 300 deaths and approximatively 1 million DALYs par year. The annual cost

associated with CE is approximatively 3 billion US$. The World Health Organisation (WHO) has published a consensus for treating AE and one for CE that involves the liver. In both, most appropriate treatment option is proposed on an image-based, stage-specific approach. For extra-hepatic locations of CE, therapeutic approaches are currently based on case reports and experts' opinion. Therefore, diagnosis and treatment of CE and AE remain widely based on imaging methods, which are, first, expensive procedures and generally not available in poor ressource settings, and, secondly, not sensitive for detecting early infection.
CONCLUSION Echinococcosis represents a global economic and health burden. There is a serious lack of guidelines concerning the most efficient therapeutical approach. Advances in knowlegde, and, development of new diagnostic and control tools is an urgent need to improve the heatlh and economic outcome of Echinococcus infection worldwide.

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The control of zoonotic visceral leishmaniasis in Europe: a survey among Spanish and French veterinarians

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INTRODUCTION Zoonotic visceral leishmaniasis (ZVL) is a tropical infection transmitted by female sandflies that may infect dogs, humans, and wildlife. In the last decade the disease prevalence has increased fivefold in several parts of southern Europe, where currently an estimated 2.5 million dogs are infected. The main drivers of transmission are the increase in sandfly distribution due to climate change and the traveling and migration of dogs. The European Union (EU), the World Health Organization (WHO), the European Food Safety Authority (EFSA), and the European Scientific Counsel for Companion Animal Parasites (ESCCAP) among others have created international guidelines, providing protocols describing intervention strategies to control the spread of this tropical infection into Europe.
AIM In this study, we research whether these guidelines are being implemented in the field to control the further spread of ZVL.
METHODS We conducted a survey consisting of 24 questions that we distributed via many online platforms and through multiple mailing lists to reach practicing veterinarians in Spain and France. The questions tested their (i) awareness of the spread and public health risks of ZVL in Europe, (ii) awareness of the international guidelines, (iii) type of protocol used when suspecting and confirming a ZVL case, and (iv) their reporting of confirmed cases.
RESULTS 889 veterinarians participated in the survey of which 616 were Spanish (64%) or French (36%). Even though 60% of them were aware of the current increase of ZVL in Europe, 70% were not aware of any guidelines. However, most of their preventive and treatment actions were in line with the intervention strategies as advised in the guidelines' protocols, apart from the fact that only 12% of veterinarians would report a confirmed case, including notifying colleagues within the same practice.
CONCLUSION We suggest that an easy online international network is founded where both veterinarians as well as general practitioners report confirmed cases of ZVL. This will be crucial for monitoring, control and preventing the further spread of this tropical zoonotic infection into Europe at the regional, national and international level.

4P115

Economic implications of the whole genome sequencing technology to control Salmonella

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INTRODUCTION During the last few decades Canada has experienced significant increases in the foodborne illness. Each year, approximately 88,000 people become sick from consuming food that is contaminated with *Salmonella*. This development has induced governments of Canada to spend millions of dollars on food safety. The problems associated with *Salmonella* contamination of fresh produce is addressed through the development of natural solutions to control the presence of *Salmonella* on fruits and vegetables as they are growing in the field. Whole Genome Sequencing is developed so that fresh produce can be quickly and efficiently tested for the presence of Salmonella before being sold to consumers. Also a new sequencing tool is developed to allow public health officials to better determine the source of Salmonella illnesses when they occur, which will allow for contaminated food to be removed from grocery stores, before purchase by consumers. Currently a multi-disciplinary team investigating the use of genomics to address the problem of salmonella in fruits and vegetables in the Canadian food system.
AIM The study evaluates the economic impact of using whole genome sequencing test for the early detection of Salmonella as compared to the existing technology in Canada. It also investigates the potential of a change in management practice at the farm level to decrease the level of salmonella.
METHODS It identifies the Costs and Benefits of Whole Genome Sequencing compared to current technology by emphasising on Public Benefits and Costs. The costs and benefits of the new management practices will also be estimated including the impact of this new technology on the healthcare system. Uncertainty in the model is also incorporated using Monte Carlo simulation. PERT distribution or Uniform distributions will be developed using the minimum, most likely and maximum values.
RESULTS The approximate costs are calculated at $2,853 CAD annually for one of the major vegetable producing company in Canada at 2015. This estimate includes costs of testing the samples by the company's internal laboratory, costs of getting the samples tested by an external private lab and transportation costs of sending the samples to the external laboratory. The benefits incurred by the producer are decrease in the false positive while testing for Salmonella in samples and decreased incidence of Salmonella due to use of bacteriophages. The benefits from the public health dimensions are earlier detection of salmonella outbreak and easier detection of source outbreak. The benefit of this new technology will be fewer sick individuals, less hospitalization and healthcare costs, better medical treatment of the sick because additional diagnostic information will be given, decreased absenteeism at work, and better health.
CONCLUSION The study will help in determining the economic benefits of the Whole Genome Sequencing technology.

Salmonella in fresh produce will not have a large impact on human health, however, controlling Salmonella will generate benefits to the society in terms of improved population health.

4P116

Assessment of the level of awareness and knowledge of Middle East respiratory syndrome (MERS Cov) among Saudi population

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BACKGROUND Middle East respiratory syndrome coronavirus (MERS-CoV) that causes MERS disease was first identified in 2012 in Saudi Arabia. Since that cases have spread within the Kingdom and some cases were transmitted to other Middle Eastern countries, Europe and the United States. However, KSA remains the epicenter of this serious respiratory infection that is associated with high mortality rates. This accentuates the public health concerns because Saud Arabia receives millions of pilgrims from all over the world.
AIMS This study investigated the attitudes and degree of awareness about MERS-CoV among Saudis of different ages.
PATIENTS AND METHODS Structured anonymous closed ended dichometous questionnaires were distributed to a large population of Saudi men and women of different ages. The questionnaires included questions about modes of transmission of corona virus, clinical features, outcome of infection, the impact of infection on pilgrimage, methods of prevention, the governmental efforts to combat spread, the availability of information.
RESULTS Respondents were recruited for the study by random selection. Sixty-eight percent of respondents have good knowledge about the mode of transmission, 82% were aware about the seriousness of the infection, 51% responded positively to non availability of curative treatment or vaccine. 74% knew the modes of prevention and 93% believed that the government efforts were successful. Of the respondents, 41% considered MERS-CoV was a serious risk during Hajj or Umrah. Government media, the Saudi Ministry of health posters, radio and television, the social media was the main source of information among young adults and older participants.
CONCLUSION The findings suggest that the level of awareness about MERS-Cov in among this Saudi population is high and the level of perception reasonable. The governmental health education campaign is critical for increasing MERS-Cov infection awareness.

4P117

An interventional program on selected mass gathering infectious diseases at Hajj

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INTRODUCTION This work improved Military Nursing Staff knowledge on selected mass gathering infectious diseases at Hajj. The results showed that only (20%) of the participating nurses attended training program about health hazard during pilgrim. But only (40.0%) of them found the training programs were specific to nurses. Most of them found the program useful (70.0%), and the average duration of this training program in weeks was 3.5 + 1.1. There was significant improvement $P = <0.001$, of correct knowledge about meningitis during pilgrim regarding causes, organisms, mode of spread, people at risk, transmission, prevention and treatment among nurses at military hospital, the highest improvement was in causes of meningitis the lowest was in vaccine of meningitis of adult. 25% of participants had adequate knowledge (>60% from total score) in the pre-test 93% in the post-test 72% after 3 month with significant difference among pre, post and Follow up regarding adequate knowledge.

Also, there were significant improvement $P = <0.001$ of correct knowledge about hypertension, dengue fever, skin scalding & others diseases during pilgrim among nurses at military hospital, the highest improvement was in skin scalding prevention the lowest was in first aid bag. 28% of participant had adequate knowledge (>60% from total score) in the pre-test 92% in the post-test 61% after 3 month with significant difference among pre, post and follow up regarding adequate knowledge.
AIM This work improved Military Nursing Staff knowledge on selected mass gathering infectious diseases at Hajj.
METHODS Research design: A quasi-experimental research design with pre-post assessment was used in carrying out this study. Study setting: The study was conducted in Military Hospital. The hospital provides services to military personnel and their families as well as civilian people. Inclusion criteria: Nurses who agreed to participate in the emerging educational program. Exclusion criteria include:withdrawal from or inability to complete the educational program.

The instruments used were developed to go on with the Egyptian rules as follows:

Tool (1): Self- administration Questionnaires: This instrument is divided in to four parts:-

Part1: Demographic Data Questionnaire (DDQ).

Tool (2): Educational needs assessment questionnaire.

Tool (3): Participants' feedback form (Program evaluation form.

Teaching methods: Group discussion and demonstration and re-demonstration were the main two methods used in the program. Also, different teaching media were used for illustration as data show, photos, and video films. Evaluation of the program: 1- Pre-test: before conducting the program, 2- Post-test: at the end of the program and 3- Follow up test: 3-months later.

Validity Test.
RESULTS There was significant improvement of correct knowledge $P = <0.001$ about seasonal influenza and respiratory diseases during pilgrim among nurses, the highest improvement was in influenza vaccine strains the lowest was in antiviral drugs. 23% of participants had adequate knowledge (>60% from total score) in the pre-test 94% in the post-test 66% after 3 month with significant difference among pre, post and FU regarding adequate knowledge. There was significant improvement $P = <0.001$ of correct knowledge about gastrointestinal diseases and food poisoning during pilgrim among nurses at military hospital, the highest improvement was in risk factors of food poisoning the lowest was in what GE patient should do. 22% of participants had adequate knowledge (>60% from total score) in the pre-test 91% in the post-test 58% after 3 month with significant difference among pre, post and FU regarding adequate knowledge. There was significant improvement $P = <0.001$ of correct knowledge about heat exhaustion during pilgrim among nurses at military hospital, the highest improvement was in non-communicable diseases the lowest was in sun stroke prevention. 27% of participant had adequate knowledge (>60% from total score) in the pre-test 94% in the post-test 74% after 3 month with significant difference among pre, post and follow up regarding adequate knowledge.

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CONCLUSION There was a significant difference between total knowledge score according to education, and work experience ($P > 0.05$) in the pre, post and after 3 month in age and in all intervention time in department the highest was ICU then ward then operation room.

4P118

Raising awareness for different concepts of personal protective equipment on a trainer-level

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INTRODUCTION Personal Protective Equipment (PPE) is as safe as the user is trained for it. In the field, especially during the recent West African Ebola outbreak, health care workers (HCW) were confronted with different concepts of PPE introduced by different organizations, as MSF (Médecins sans Frontières) or WHO. Different concepts and differences between their components as well as further tools (e.g. Fit-Test) are usually not taught within PPE training and are mostly unknown. The EFFO-project (Efficiency by Edification), a transcultural train-the-trainer-program preparing HCW for the management of highly contagious patients, adopted the MSF PPE concept. During a follow-up-workshop for the project's trainers, sensitization regarding differences in PPE approaches has been implemented.
AIM To enhance quality of PPE training for HCW by raising awareness for different PPE concepts and their strengths and weaknesses among trainers.
METHODS Various PPE concepts for viral hemorrhagic fever were presented (e.g. technical data) and discussed. In group work, participants set up a systematization of strengths and weaknesses of different PPE concepts of MSF and WHO.
RESULTS On the trainer-level, a compromise between different concepts was discussed as possible solution. However, a compromise cannot be regarded as safe in most cases (e.g. not all suits are liquid tight and chemical protective and can thus be decontaminated safely). Systematizing different PPE concepts can be used as an approach to reach a more profound comprehension among trainers regarding discrepancies of different PPE concepts. A sound technical knowledge and accurate user-skills of one PPE concept are fundamental to transfer knowledge to a different concept.
CONCLUSION Mixing different components or concepts of PPE without a profound understanding is highly problematic and may be dangerous in case of emergency. Among trainers, further knowledge on differences of various PPE concepts and their discrepancies regarding components cannot be assumed. Especially on the trainer level a deeper understanding of strengths and weaknesses of PPE concepts is paramount in order to permit high quality training.

4P119

Evaluation and analysis of acute flaccid paralysis (AFP), surveillance system data in the N'djamena regional health delegation, Chad, 2012–2014

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INTRODUCTION Significant efforts have been made by the Government of Chad and its partners to eradicate Poliomyelitis through surveillance of AFP cases (Polio Virus Savage, 380 cases). Since June 2012, no cases of PVS have been notified in the national territory motivating the evaluation of this surveillance.
AIM Assess the performance and attributes of the AFP surveillance system.
METHODS The evaluation included heads of health facilities and focal points epidemiological surveillance in all public health facilities of N'Djamena was descriptive of 2012-2014. The variables were non-Polio AFP (Objective >03 in children <15 years of age, more sensitive), percentage of stool samples collected within 14 days (Target >80%, WHO) and attributes of Surveillance System (simplicity, acceptability, representativeness, utility, stability, responsiveness, sensitivity, VPP and quality of the data. The data were obtained, by questionnaire, registers and reports were analyzed by Epiinfo7.
RESULTS By 2014, the non-Polio AFP rate was 3.5 per 100,000 children <15 years of age (target >03) and 100% (53/53) of the stool sampled were collected within 14 days. The simplicity (enunciation and suspicion of cases) and the acceptability of supervision as normal work among the respondents were 100% (30/30). The 100% representativeness (208/208) by completeness of the reports. The utility has been a response to the hot case and stability in human resources, material. The sensitivity (reported cases and withdrawals received by WHO 50/53) to 94.3% and Positive Predictive Value 0.0% (0 PVS confirmed in the laboratory.) The quality of the data by the completeness of the boxes indicated at 76% (651/860) and the verification of the notices by a second person at 100% (36/36).
CONCLUSION Overall, the system was efficient, simple and acceptable even if the quality of the data did not reach the desired objective. Although these data reflect good performance, it is imperative to maintain this level of surveillance so that the certification of the country free from Poliomyelitis is certain.

4P120

Meningitis surveillance in four health districts of the north-west region of Cameroon

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INTRODUCTION Cameroon is part of the African meningitis belt. From January to June 2016, the north-west Region

reported 81 suspected cases of meningitis with 90% from 4 districts and a 10% case fatality rate.
AIM A study was conducted to describe the cases and evaluate the surveillance system in those districts.
METHODS A descriptive study was conducted from January to June 2016 and the system was evaluated from January 2014 to June 2016. Data were collected using health facilities registers, medical case records and administration of a questionnaire to 30 health personnel in charge of surveillance. The case definition used was from the Cameroon guidelines for integrated disease surveillance and response. The attributes of the surveillance system were evaluated using the CDC guidelines for the evaluation of national surveillance systems.
RESULTS We identified 142 suspected cases of meningitis, including the 81 reported cases; 109 (76.8%) were children <15 years. From 60 cases (42.2%), cerebrospinal fluid was analyzed with 36 (60%) showing no sign of meningitis, 12 (20%) were probable cases of bacterial meningitis and 9 (15%) of cryptococcal meningitis. No sample was sent to the referral laboratory due to the lack of transport medium. Of health workers interviewed, 20 (66.7%) knew the case definition, 27 (90%) said surveillance was part of their work. The sensitivity of the system was 75% and the positive predictive value was 5.5%.
CONCLUSION There is an under-reporting of suspected cases of meningitis in the North-West Region. The system is accepted by health actors but not simple. The sensitivity and positive predictive value are not satisfactory. The strengthening of the surveillance system including response measures are needed.

4P122

Assessment of exposure and serostatus of contacts persons to Ebola virus disease cases in guinea (Contactebogui study)

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INTRODUCTION The West African Ebola virus disease (EVD) outbreak has resulted in 28616 confirmed or suspected cases. Contacts tracing and quarantine for 21 days were key actions. However, data on exposure to EVD cases, the proportion of antibodies to EBOV and of a- or pauci-symptomatic infection, as well as the presence of virus in body fluids of seropositive contact persons, remain scarce.
AIM The study aimed i) to quantify individual risk of exposure of contact persons to EVD cases; ii) to measure the level of antibodies to EBOV; ii) to look for EBOV RNA in semen of adult seropositive men.
METHODS Persons living in the same compounds than patients enrolled in a survivors's cohort in Guinea (Postebogui) in Conakry and Forecariah were invited to participate. After consent, a questionnaire detailing exposure to EVD cases was passed to establish a score of exposure. An history of vaccination against EBOV was recalled. Antibodies to GP, NP and VP40 proteins were assessed using Luminex® and EBOV RNA in semen was analysed by PCR.
RESULTS As of March 31, 2017, 1049 individuals were enrolled (54% males, median age 20 years [16-28]). Overall, 30% declared to have been vaccinated and 80% were exposed to less than 3 EVD cases (median = 1 [1-2]). Zero or low-risk exposure, one high-risk exposure and 2 + high-risk exposures were estimated at 4%, 59% and 37%, respectively.

Complete serology was available for 674 contact persons: 15 (2.2%) had antibodies to GP+NP or GP+NP+VP, and are strongly suspected to have been infected with EBV. In addition, 39 (5.8%) patients had antibodies to NP+VP40 or GP+VP40 and 146 (22%) to a single antigen, GP (n = 117, 17.4%), NP (n = 20, 2.9%) or VP40 (n = 63, 9.3%). An history of vaccination was associated with antibodies to GP (24.0% *vs* 12.3%, $P < 10^{-3}$). Exposure was marginally associated with antibodies to GP+NP (zero-low risk = 1.0% *vs* ≥2 high exposures = 3.6%, P = 0.08). EBOV RT-PCR was negative in semen of the 11 tested men.
CONCLUSION Only 2.2% had an antibody profile corresponding to an EVD infection suggesting a-/paucisymptomatic infections but various other antibodies profiles were observed, warranting complementary investigations.

4P123

Sentinel surveillance of flu in the Central African Republic

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In the Central African Republic (CAR), influenza-like illnesses are the most common causes in consultation. The Institut Pasteur of Bangui (IPB) set up a surveillance network in 2008 to monitor the circulation of the influenza viruses. The first step of this surveillance network was achieved in Bangui city (capital of the CAR) and its neighboring areas. Epidemiological data of syndromes similar to influenza-like illnesses and throat and nasopharyngeal swab samples are weekly transmitted to IPB. A multiplex reverse transcription (RT)-PCR method was used for detecting and subtyping influenza A (H1N1 and H3N2) and B viruses. Between January 2010 and December 2015, a number of 5,385 throat samples were collected. Age <5 years was the most infected (61.1% or 275/450). A proportion of 8.3% samples (n = 450) yield at least one influenza virus and a total number of 454 strains of influenza virus were identified (coinfections, n = 4). The InflB was the most frequent with a proportion of 56.2% (n = 201), while proportions of H3N2 and H1N1pdm09 were 39.0% and 16.7%, respectively. In conclusion, it is clear that this step of implementation of sentinel surveillance shows important findings about circulating influenza virus. A nationwide implementation of sentinel sites for this program is suggested.

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4P124

Evaluation of vaccine coverage and its determinants in children aged from 12 to 23 months in the Democratic Republic of Congo

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INTRODUCTION Vaccination remains a prevention pillar of pediatric infections in Sub-Saharan Africa. In the Democratic republic of Congo (DRC), despite the Expanded program on immunization, the vaccine coverage in children aged from 12 to 23 months is inadequate (<50% estimation).
AIM Evaluate the immunization coverage in children aged from 12 to 23 months and the obstacles to vaccination.
METHODS We conducted a transverse survey using a two-stage cluster sampling in the Kabinda health region. The data collection method was based on the individual home interview of mothers. The dependent variable was the vaccination status (health record) and the independent variables included individual and household sociodemographic characteristics, and the responders' knowledge regarding vaccination. Bi-variate analysis and multivariate analysis through logistical regression were conducted respectively using the SPSS software.
RESULTS We included 374 responders. The coverage rate was 61.5%. The main obstacles to vaccination were the fear from side effects (vaccin pentavalent), poverty and the poor organization of health care network. Factors associated with a low immunization coverage were the lack of knowledge regarding the EPI (ORa = 3.2 [1.9–5.4]) and the immunization schedule (ORa = 1.7 [1.2–2.3]), distance from primary care centers greater than 5 Km (ORa = 5.9 [1.1–32.9]), low involvement of husbands (ORa = 3.0 [1.8–5.1]) and home births (ORa = 3.2 [1.9–5.2]).
CONCLUSION Parents' awareness about vaccine side effects, and integrated immunizations within the minimum primary care package, should be among the priority measures which are likely to improve vaccine coverage.

5P1

How patients navigate diagnostic ecosystem in a fragmented health system: A qualitative study from India

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INTRODUCTION Diagnosis of disease condition is an integral part of medicine. Depending on a country's diagnostic infrastructure, patients and providers embody different roles in ensuring that correct and timely diagnosis is made. Little is known about the work that patients have to do in accessing diagnostic services and completing the 'test and treat loop' in a fragmented healthcare delivery system. To address this knowledge gap, we traced the diagnostic journeys of patients and examined the work they have to do to arrive at a diagnosis.
METHODS This paper draws on a qualitative study, which included 78 semi-structured interviews and 13 focus group discussions with patients, public and private healthcare providers, community health workers, test manufacturers, lab technicians, program managers and policymakers. Data were collected between January and June 2013 in rural and urban Karnataka, South India, as part of a larger project on barriers to point-of-care testing. We reconstructed patient diagnostic processes retrospectively and analyzed emerging themes and patterns.
RESULTS The journey to access diagnostic services requires a high level of involvement and immense work on the part of the patient and/or their caretakers. This process entails overcoming cost and distance, negotiating social relations, continuously making sense of their illness and diagnosis, producing and transporting samples, dealing with social consequences of diagnosis, and returning results back to the treating provider. The quality and content of interactions with providers were crucial at each step involved, with direct implications on the completion of test and treat loops. If the tasks became overwhelming, patients either opted out, delayed getting tested, switched providers and/or reverted to self-testing or self-treatment practices.
CONCLUSION Our study demonstrates the various challenges that patients in India have to overcome in order to follow through diagnostic pathways and how the health system works as far as diagnostics are concerned. If new point-of-care testing are to be implemented more widely, policymakers, program officers and test developers need to find ways to address these barriers and ease patient navigation through diagnostic services.

5P2

Improving access to HIV services for key population groups in achieving the 90:90:90 goals in Nigeria

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INTRODUCTION Key population groups which include Female sex workers, Injection Drug users, Men who have sex with men constitute 1% of the general population and estimated to contribute 40% of new HIV infections in Nigeria, with HIV prevalence ranging between 25% (FSW) 9.3% (IDU), 17.2% (MSM). It therefore remains impossible to achieve the UNAIDS 90:90:90 goals by 2020 without reaching these key groups.
AIM This qualitative study aims to determine challenges affecting access to HIV services among these key Populations in Nigeria.
METHOD Non probability sampling was used to identify study participants. 2 Focus group discussion and Key informant interviews were held in December 2016 in Lagos an Abuja. The focus group discussions had between 8- 15 participants, with 1 FGD focused on brothel based FSW s and the second FGD targeting members of key population groups in Lagos. Client confidentiality was strictly applied in all procedures.

Findings: Stigma and discrimination by Health providers was noted to have been worsened by the 2014 legislature which had criminalized MSM activities, with only few facilities nationwide providing MSM targeted /integrated services. It was noted that although the law had prohibited same sex marriages with a 14 year jail term, the legislature however did no prohibit access to health services by MSM. Harm reduction programs were not available to IDU's, with condoms still not consistently used with clients among brothel based FSW. Interventions targeting Non-Brothel based sex workers remained very limited.
CONCLUSION The challenges to reaching Key population groups with HIV services remain a significant threat to achieving the UNAIDS 90:90:90 targets by 2020 in Nigeria. It remains

therefore critical that specific projects be targeted to these groups, especially focusing on behavior of Health care worker to reduce stigma and discrimination.

5P3

Improving HIV service delivery in Nigeria; A review of the 2014 National task shifting policy

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INTRODUCTION Nigeria has the highest number of women in need of PMTCT treatment in the world with only 30% of HIV + pregnant women receiving medication. This poor coverage jeopardises the UNAIDS Global goal of achieving an HIV free generation by 2020. Task shifting allows the rational delegation of roles to less specialized health personnel and presents a unique strategy to achieve the 2020 goals improving service delivery. In 2014, Nigeria developed the first National Task shifting policy focus on HIV.
AIM The aim of this study is to evaluate the implementation of this policy in Nigeria.
METHODS This study utilised secondary data from a literature search of the following data bases: Global Health, PubMed, Med line and Web of science. In-depth interviews were held between December 2016 and January 2017, with Health Care Workers in Lagos state.
RESULTS The study showed that despite a low public sector doctor to nurse Ratio (1doctor:7 nurses per 100,000), task shifting was yet to fully implemented in health facilities, with the initiation of ART still dependent primarily on doctors. Most doctors are based predominantly in urban area with Nurses and community health workers based in rural areas with a greater number of women in need of PMTCT. An analysis of stakeholders identified the Nigeria Federal Government, NACA, United States Government, Global Fund, Professional groups as the most influential bodies influencing task shifting. Professional protectionism still persists with certain groups opposing the other. In depth interviews also revealed most Health care personnel were unaware of the Policy, however the few Health care Workers (HCW) who had taken-up new roles had not received training or supervision to undertake their new tasks.
CONCLUSION Despite the development of the National task shifting policy in 2014, awareness and implementation of the policy among HCW's remained poor. Faced with the human resource for Health challenges in Nigeria, the goal of achieving an HIV free generation may be unachievable in the absence of task Shifting/sharing .Key stakeholders including professional bodies must be re-engaged to ensure proper implementation, training of Health Personnel and periodic supervision of HCWs engaged in task shifting/sharing.

5P4

Factors affecting use of generics drugs in the Philippines

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Part of a study commissioned by the Philippine Department of Health through the Philippine Council for Health Research and Development

INTRODUCTION Patients in low-and-middle income countries, where most healthcare expenditures are out-of-pocket, are commonly observed to choose costlier branded medicines over generics. In the Philippines, laws promoting use of and access to generics drugs were enacted in 1988 and 2008, but uptake is poor.
AIM We investigated patient-related factors that may influence use of generics medicines in the Philippines.
METHODS We conducted a mixed-methods explanatory QUANTITATIVE qualitative study through a cross-sectional community-based household survey in four purposively selected towns/cities representing Metro Manila and Luzon, Visayas and Mindanao and qualitative interviews with selected household-respondents and healthcare workers.
RESULTS We interviewed 1597 household-respondents; 60% of which reportedly use generics drugs (generics users or GU) but only 22% exclusively use generics.

GUs had a higher perceived self-efficacy in choosing generics (mean = 3.94/5) than branded users (BU; mean = 3.62/5; $P < 0.001$). Positive attitudes towards generics were significantly higher in GUs (mean = 3.60-3.65/5) than BUs (mean = 3.17-3.34/5; $P < 0.001$) and negative attitudes were lower (GU = 2.56-2.6/5; BU = 2.85-2.94/5; $P < 0.001$). GUs list government health centres as primary source of drugs; BUs list their private primary healthcare provider (PCP) as primary source. Among a list of possible influencers, assurance of good quality is significantly ranked higher by BUs.

Factors positively associated with generics use are: having a public PCP, procuring drugs from government health centres, positive attitudes towards generics, and perceived self-efficacy in choosing generics. Factors negatively associated are: older age, negative attitudes towards generics, and higher education level.

Exclusive generic use is associated positively with having a public PCP and negatively with higher education level and negative attitudes.

Attitudes were noted to be significantly associated with perceived self-efficacy.

Qualitative themes were: suspicious quality of generics; branded medicine-prescribing and -dispensing habits of private physicians; branded medicine-suggestions of private drugstore staff; and a perceived low self-efficacy due to lack in education regarding generic drugs.
CONCLUSION Policies implementing generics laws should include: provision of education and support; transparent measures for quality assurance of drugs; and strict and universal enforcement in both public and private health sectors. However, as long as bulk of expenses is out-of-pocket, laws and regulations will be harder to implement and healthcare will always be a business.

5P5

Exploring resilience in a complex Crisis: Iraq's health system response to a triple security, financial and ecological shock

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INTRODUCTION The literature on health systems and health policy in conflict-affected settings often disproportionately focuses on the disastrous impact of conflict on health service delivery. Research rarely examines the factors that promote health system resilience in the face of disruption. in 2014 Iraq

has been stricken by a triple financial, security and environmental crisis. The was a sharp fall in energy prices. The Syrian conflict triggered a major humanitarian crisis. Iraq also experienced drought, loss of arable land and flash floods.
AIM This study aims at examining the challenges and the factors that enabled the health system to continue providing services in the conflict-affected setting of Iraq during 2014 and 2015.
METHODS This study adopts a qualitative methodological approach. Thirty-one documents were analysed. Fourteen semi-structured interviews were conducted with decision makers between November 2015 and March 2016. One focus group discussion (attended by 21 participants) was also carried out in November 2015. The main challenges to service provision and key responses to those challenges were identified by applying a systems dynamics analysis of collected data.
RESULTS Shortages in financial resources are identified as one of the most critical challenges. Issues in staffing, medicines, medical supplies and inability to collect and use data were also highlighted. Emotional factors (such as contributing to protecting fellow citizens and human beings) are highlighted as crucial in strengthening the will of healthcare providers to offer services. Private provision of services (both for-profit and not-for-profit local and international NGOs) are also identified as flexible tools that can overcome difficulties. Humanitarian pooled funding is recognised as an effective tool to coordinate donor funding.
DISCUSSION This research identifies potentially generalizable health system resilience factors that can be further developed and applied to similar contexts. Developing pre-crisis planning, anticipatory budgeting, decentralisation through contracting with NGOs, and investigating emotional contributors to better response are among the recommendations of this study.

5P6

A systematic literature review of effective strategies for delivery of child health interventions using the private sector in low and middle income settings

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INTRODUCTION Health systems in low and middle income settings are pluralistic in nature, with public and private sector co-existing, to meet population needs. An analysis of 198 Demographic and Health surveys (DHS) from 70 countries shows that the private sector provides more than half of diarrhea (54%) as well as fever and cough (57%) treatments in children. Despite high care seeking, there is no clear guidance on how to engage the private sector for public good.
AIM To review evidence of effective approaches for engaging the private sector in delivery of cost effective child health interventions and to identify how current delivery strategies can be strengthened or modified to work more effectively with private health providers. This review was part of the 2016 WHO Integrated Management of Newborn and Childhood Illnesses (IMNCI) Strategic Review and focused on the role of the private health sector.
METHODS A systematic review of existing literature to assess the strength and summarize the evidence around utilization of the private sector to meet public child health goals. We searched both published and grey literature available on line, using Pub med/Medline and Google Scholar and included the following types of studies only: systematic reviews; randomized controlled trials; non-randomized controlled trials; and pre-post studies with a control. Some examples of programs utilizing the private sector to improve child health outcomes were included.
RESULTS The most effective approaches in engaging the private sector for delivery of child health interventions include: social marketing, social franchising, voucher systems, accreditation and contracting-out of services to the private sector. For maximum benefit, these approaches should be introduced in combination, since single interventions are not effective. Particularly the WHO Integrated Community Case Management (iCCM) strategy, when used within a social franchise, has great potential to improve quality of care in the private sector. Finally, a systems thinking approach is needed to understand the intended and unintended health system effects of private sector interventions.
CONCLUSION Private sector engagement is important for improving access and quality of care for children. Effective approaches like franchising, social marketing, and strategies like iCCM and IMCI should be utilized.

5P7

Economic burden of malaria and predictors of cost variability to rural households in South Central Ethiopia

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BACKGROUND While recognizing the recent achievement in the global malaria reduction, the disease remains a challenge to the malaria endemic countries in Africa. Beyond the huge health consequence of malaria, policymakers need to be informed about the economic burden of malaria to the households. However, current evidence regarding the economic burden of malaria is scant for Ethiopia.
AIM The aims of this study were to estimate the economic burden of malaria episode and to identify predictors of cost variability to the rural households.
METHODS A prospective costing approach from a household perspective was employed. A total of 190 malaria patients were enrolled from 3 health centers and 6 health posts from Adami Tullu district in South Central Ethiopia, in 2015. Primary data were collected about expenditures due to malaria, forgone working days because of illness, socioeconomic and demographic situation, and households' assets. Quantile regression was applied to predict factors associated with the cost variation. Socioeconomic related inequality was measured using concentration index and concentration curve.
RESULTS The median cost of malaria per episode to the household was USD 5.06 (mean = USD 6.1). The direct cost accounted for 39%, while the indirect counterpart accounted for 61%. The direct medical cost (median = USD 1.56) was 62% higher than the non-medical counterpart (median = USD 0.59). The history of malaria in the last 6 months and the level of the facility visited in the health system predominantly influence the direct cost. The indirect cost was mainly influenced by availability of the ant-malarial drug in the health facility. Falciparum is significantly costly compared with vivax especially

in terms of the indirect costs. The concentration curve and the concentration index for direct cost indicate significant pro-rich inequality. However, for the indirect cost, there was no noticeable socioeconomic related difference.
CONCLUSION The economic burden of malaria to the rural households in Ethiopia was immense –mainly to the poor – indicating that reducing malaria burden could substantially contribute to the poverty reduction as well. The national malaria program should ensure uninterrupted malaria diagnostic and treatment service in all levels of primary care facilities.

5P8

The side effects of the 2014/15 Ebola epidemic: a review

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INTRODUCTION The latest Ebola outbreak in West Africa affected routine health services and added additional non-Ebola morbidity and mortality. There is also uncertainty about its social and economic consequences.
AIM To comprehensively analyse the collateral damages of the Ebola Outbreak on the population.
METHODS A narrative literature review on the collateral impacts and consequences of Ebola in West Africa was carried out, considering expert inputs from Sierra Leone, Liberia and Guinea gathered during in-country meetings.
RESULTS International aid and local health care mainly focused on the Ebola outbreak while the regular burden of disease was left unattended. Health care workers were more likely to get infected, resulting in absenteeism that could ultimately lead to the close down of health facilities and collapse of routine care. Utilization of maternal health services decreased for deliveries and Caesarea, ante- and post-natal care and family planning, resulting in rising maternal fatality. Consultations at hospitals and health centres due to diarrhoea and respiratory infections of children decreased indicating a reduction of health care utilization. Decrease of vaccination coverage increased the risk of Measles outbreaks. Fever cases seen at health facilities and paediatric admissions for malaria fell. The number of children <5 years receiving treatment and intermittent preventive treatment during pregnancy dropped. Two models suggested a massive morbidity and mortality due to malaria during this outbreak. Less patients visited HIV facilities, prevention of mother-to-child transmission services as well as diagnosis and treatment of new cases went down. Default in renewing antiretroviral prescriptions was reported. Increase in crime, school dropout, child exploitation, and economic consequences such as job losses, food insecurity/malnutrition, drop in Gross Domestic Product and income were also reported.
CONCLUSION The latest Ebola outbreak heavily impacted the capacity to maintain the routine health system, affecting the ability to deliver on almost any health service other than those addressing Ebola outbreak control. Sustained reinforcement of health systems is urgently needed. The efforts should be directed at diversification of the health systems, creating capacity to mobilize resources, building up trained local workforces and tackling access barriers like lack of trust, stigma and non-free services.

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5P9

Factors influencing the family planning service availability and utilization in Blue Nile State, Sudan

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INTRODUCTION Although Sudan has a free of charge Family Planning policy; access to and utilization of service remain low.
AIM This study aims to evaluate the quality, equity and scalability of Family Planning services in Blue Nile state, Sudan.
METHODS A cross sectional descriptive study was carried out to evaluate the quality, distribution and opportunities to expand Family Planning services in Blue Nile state, Sudan. Different programmatic and operational inputs were assessed in addition to client's perception. Interviews of 422 clients, 45 service providers were conducted in addition to assessing 45 Family Planning health facilities, observing 90 Family Planning service sessions, interviewing 13 reproductive health managers at different administrative levels and conducting seven focus group discussions at state and locality levels to map the current service availability and equity and identifying scalability options.
RESULTS Clients were predominantly (82.9%) satisfied with the provided Family Planning services despite the limited providers' knowledge (60% or less for contraindications) and biased promotion of Family Planning methods (10% for injectable against 100% for bills). There was a serious gap in necessary supplies and equipment (26.7% measure Blood Pressure); limited method mix choices; low use of Information, Education and Communication materials (available in 60% of facilities); and high and unequal Out-of-Pocket cost for contraceptives despite the declared free service policy.
CONCLUSION Family Planning service availability has serious mal-distribution and when adding the associated clients incurred cost, many rural and poor clients have barriers to access it.

Investment on the family planning supply and demand is required for it to yield the anticipated maternal mortality reduction. Focus on clients' awareness will improve the demand to and utilization of survives. In addition, clients need to be sensitized on their rights to access quality services while improving their knowledge on the determinants of quality they should receive. The current inequitable access to services presents an opportunity for quick expansion once the right scale up plan is implemented.

5P10

Improving health system capacity to address healthcare disparities: a systematic review of the role of academic health centres in contributing to equitable health systems

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INTRODUCTION Academic health centres (AHCs) are complex organisations often defined by their 'tripartite' mission to achieve high standards of clinical care, undertake clinical and laboratory research, and educate health professionals. In the last decade, AHCs have sought to move away from a dominant focus on

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high impact clinical interventions, towards a population-health oriented paradigm requiring networked institutions and responsiveness to issues of health outcomes distribution and health determinants. Reflective of this shift is a growing interest in the role of AHCs in addressing health system equity.
AIM To systematically review the current evidence on the role of AHCs in contributing to equitable health systems locally and globally.[1]
METHODS We searched peer-reviewed and grey literature published in English between 2000 and 2016. We included articles that identified AHCs as the primary unit of analysis and that also addressed health equity concepts in relation to the AHC's activity or role. Unpublished data and records reporting clinical interventions or trials were excluded. Analysis also considered contextual health system and health status data relevant to the AHCs profiled in the literature.
RESULTS 473 unique records were identified of which 103 met the inclusion criteria. 80% examined AHCs in the United States, and 6% examined activity of AHCs within low- and middle-income countries. A majority (70%) were written as individual perspectives or opinions, and the remaining 30% were mostly empirical studies using a descriptive case study approach. Analysis revealed consensus that AHCs have a role as leaders in addressing gaps in health service provision to vulnerable populations, through integrating with primary care organisations, adopting population-health performance metrics, and fostering community-engaged research. Reflecting the geographic predominance of northern American literature, a major theme was the implications of health care reform on US-based AHCs.
CONCLUSION The review has found consensus that AHCs are well positioned to lead health care reform initiatives aimed at addressing healthcare disparities. Yet the current evidence base lacks high-quality empirical studies and is predominantly limited to northern America. Future research should improve the quality of the evidence base by empirically examining health equity strategies and interventions of AHCs across multiple countries and contexts.
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5P11
Implementation and results of an indigents' healthcare exemption scheme in the district of lokossa-athieme (Benin)

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INTRODUCTION To reach universal health coverage, special attention must be paid to indigents. With the generalization of user fees introduced by the Bamako Initiative in 1987, those people were excluded from healthcare services, given that planned exemptions mechanisms were barely put in place. In 2000, the government of Benin created an Indigents' Health Fund (budget line) but this exemption scheme faced implementation and governance issues. In the context of political change and the elaboration of a national social protection policy, a World-Bank supported programme (called PRPSS) has been trying out a new exemption project for the poorest since August 2016.
AIM This research aims to analyse the implementation of PRPSS' exemption scheme and its results in terms of access and utilization of health services by indigents in the district of Lokossa-Athieme.
METHODS Using a socio-anthropological approach, this study is mainly based on semi-structural interviews with providers and beneficiaries, along with different stakeholders such as social assistants and project managers. Available quantitative data (i.e. number of beneficiaries, use of service and cost) were also collected and analysed.
RESULTS Further to targeting process, which combined community-based selection and proxy means testing (PMT), 12.282 indigent cards had been delivered in the district in March 2017. Although few inclusion mistakes were reported, exclusion biases came from the process of identification, as people were missing during PMT. The results in terms of use of services are dissimilar from one health centre to another but remain quite low, which suggests the existence of other barriers to access. No reimbursement had been received after 8 months of implementation. However, providers and other stakeholders recognised the merits of this exemption scheme.
CONCLUSION Along with the conclusions that can be drawn from the different steps of implementation of this pilot project, sustainability issues are raised since PRPSS ends in June 2017 and the new social protection policy is still in the process of elaboration.

5P12
Determining factors in the use of health services in a metropolitan area of Havana, Cuba

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INTRODUCTION The use of services at the primary care level depends on the organization of consultations, efficiency, planning and management of resources. A rational and organized use generates higher quality care, better patient and providers' satisfaction.
OBJECTIVE To identify the determining factors of the users, providers and organization that influence the use of health services in a metropolitan area of Havana (Lawton Polyclinic) in 2016.
METHODOLOGY A cross-sectional observational study was carried out in users, providers and managers of health services, who were given different techniques and instruments that were created for this purpose. For the sample selection of the users of the services, a two-stage probabilistic sampling was made taking into consideration the total number of houses and that in each one there was an average of 4 people. Those users who became ill during the last month and used a health service were surveyed. In addition, the director of the polyclinic, the two heads of the Basic Working Groups and the family physicians who were linked to the medical offices were interviewed.
RESULTS Of the 792 people interviewed, 69.9% became ill in the last 30 days and 45.4% used formal health services. Chronic non-communicable diseases predominated as a problem. The most frequent entrance door was the doctor's family (40.6%) and the instability of the doctor was among the deficiencies to

access (45.4%). 54.5% of family physicians were trained in the last 2 years, the most capable physicians were the specialists of the area (31.7%).
CONCLUSIONS The most important determinants in the use of services by the users were the factors of need of health, among them chronic diseases. In the providers influenced their experience and training, and in the organization the availability and accessibility to the health programs.

5P13

The influence of price variability on the use of prenatal counseling services in the city of Lubumbashi

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AIM The aim of this work was to determine the influence of price variability on the use of prenatal counseling services in Lubumbashi from 1995 to 2015.
METHODS The study was correlational. Through a questionnaire and a literature review, we collected data on prenatal antenatal care (ANC) data and prices for the first prenatal visit between 1995 and 2015 in 343 health facilities in the city of Lubumbashi. The correlation coefficient and simple linear regression were used to investigate the influence of the change in the number of new cases at the first prenatal visit (y) as a function of the variation in the price of this visit (x).
RESULTS The results indicate an increase in the number of health facilities that have integrated the antenatal clinic from 1995 to 2015 (from 27 to 343 facilities). At the Sendwe hospital, a decrease in cases at the first visit (from 90.6% to 4.6%) was observed from 1995 to 2015, while the price of the first visit increased (from US $ 0.5 to US $ 3). In the other structures providing the service, however, there was an increase in cases of prenatal consultation (from 9.3% to 95.4%).
CONCLUSION Price variability has a major influence on the use of the ANC in Lubumbashi, and is likely to constitute a major barrier to universal coverage and equity in health care.

[Correction added on 12 December 2017, after first Online publication. Author name K. FMalonga was corrected to K. F. Malonga].

5P14

Assessing cost of illness among type 2 diabetic patients with complications in a tertiary health facility in North-west, Nigeria

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INTRODUCTION Diabetes mellitus (DM) has been a significant and growing health problem worldwide, including Nigeria. It is a complex chronic disease that requires long-term medical attention both to limit the development of its devastating complications and to manage them when they occur. There is paucity of studies showing economic burden associated with diabetes mellitus and its complications in Nigeria.
AIM To estimate the health economic burden relating to cost of illness among type 2 diabetic patients with complications on the population.
METHODS A 'Cost-of-Illness' study for diabetes with complication care was conducted in both in-patient and out-patient clinics of Ahmadu Bello University Teaching Hospital, Zaria, between June and July 2016. An interviewer-administered questionnaire was used for data collection on a random sample of 104 patients. The data was analyzed with SPSS version 20 statistical software.
RESULTS The mean (SD) age was 52.75 (29.04). Majority of the patients were females (62.5%) and only 27.9% had tertiary education. By occupation, 37.5% were petty traders, 17.3% housewives and only 9.6% and 4.8% were employed in public and private sectors respectively. Of the total, 71.2% of the patients had income range of N5000-N39, 999. The daily mean direct and indirect cost for each patient was estimated to be N605.73 and N592.7 respectively. Socio-demographic characteristics such as gender, marital status, and the number of children significantly increase the burden of cost on society ($P < 0.005$). Comparing cost with average patient's income, it was found that the poorest segment of the society is spending 29.89% of their total income on diabetes with complication care.
CONCLUSION Substantial expenditure is incurred by diabetic patients with complication. This implies that resources could be saved by effective prevention strategies, early detection and a reduction in diabetic co-morbidities and complications towards improved diabetic care. Large scale and cost-effective prevention programs need to be initiated to maximize health gains and to reverse the advance of this rising epidemic in developing countries.

5P15

Visceral leishmaniasis treatment access – The reality on the ground in Sudan

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INTRODUCTION The KalaCORE project is a DFID-funded initiative to eliminate and control visceral leishmaniasis (VL) in Bangladesh, India, Nepal, Ethiopia, South Sudan and Sudan, aiming to reduce the health impact and economic burden of VL by ensuring access to early diagnosis and complete treatment. In Sudan, implementation of VL care is hindered by a lack of readiness of health facilities diagnosing and treating VL.
AIM To assess readiness of hospitals for the provision of V services.
METHODS 36 hospitals in 10 states providing VL treatment were assessed via a tool for collecting information on the readiness of health facilities for the provision of VL services.
RESULTS 24 out of 36 (67%) of hospitals experienced stock-out of first line VL drugs in the 3 months previous to the visit, and in 29 out of 36 (81%) hospitals no trained staff member (trained in VL in the year previous to the visit) was present. In only one facility the laboratory was fully equipped for VL diagnosis and in most (34) hospitals the wards did not meet basic standards. Due to the lack of training, there was low awareness of the national VL protocol and malpractices in diagnosis and treatment were observed in some of the hospitals.

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In many cases, patients had to pay for diagnostic tests and VL drugs. As a result of the assessment, several urgent measures were put in place: immediate on-site training for senior medical doctors in each hospital; a VL 'hotline', a phone number reachable 24/7 for urgent clinical and other questions; immediate distribution of VL drugs and rapid diagnostic tests to be provided for free to patients; an urgent training for lab technicians in high-burden hospitals; an orientation on VL for the State Coordinators; a rapid rehabilitation of the VL patient ward in Um El Kher hospital in Gedaref State.
CONCLUSION Roll out of the VL control program in Sudan is dependent on the success of all aspects of implementation: an effective supply system for drugs and diagnostics, provided for free to patients and involving, educating and motivating health workers and other stakeholders on the ground.
REFERENCES
Are not needed.

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The alternative called Rashtriya Swasth Bima Yojana: Care access and the quality of hospitals panelled under RSBY in Palakkad district in Kerala

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INTRODUCTION Rashtriya Swasth Bima Yojana (RSBY) is a national levels health insurance scheme fully subsidised by the government which target the pople in the low income households. This scheme has been developed to address the increasing out of pocket expenditure for health among the low income households. There was evidence which suggest people fall in to poverty trap because of heavy out of pocket payment for health. A large numbe5r of households do not see health care because of the growing expenditure. This study has been conducted as part of the PhD research and covered rural urban and tribal population in palakkad district. Palakkad district is one among the most backward districts listed by the planning commission.
AIM To understand does the financial protection provided ensure quality care?
METHODS The study was done among the rurak, urban and tribal households who are card holders in Palakkad district. The study analysed in detail the health seeking of card holders and the pattern of hospitals accessed and the quality of these hospitals. Quality has been assessed by comparing the kinds of services accessed by card holders and and the departments available at the various panel hospitals under RSBY in palakkad.
RESULTS Though there are many hospitals panelled in the district under RSBY it has been understood that the leading and most preferred hospitals and not in the panel list. Majority of panel hospitals in Palakkad are still public hospitals which are behind major women related specialities and specialists. The lack of most preferred and popular hospital in the panel and the minimum of alternatives to public hospitals the beneficiaries do not see the scheme as very different from the existing provision.
CONCLUSION There is a need to understand the pattern of hospitals, preferred hospitals of the beneficiaries and enhancing the services available at the different panel hospitals.

5P17

Does Bacillus Calmette-Guérin vaccine protect against infection with *Mycobacterium tuberculosis* ascertained by tuberculin skin testing?

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INTRODUCTION There is conflicting evidence as to whether Bacillus Calmette-Guérin (BCG) vaccination offers protection against *Mycobacterium tuberculosis* infection ascertained by a positive tuberculin skin test (TST).
AIM To investigate the association between BCG vaccination status and TST result in a cross-sectional survey.
METHODS Secondary analysis of data from a tuberculin survey done in 2000-2002 among schoolchildren in Tanzania, randomly selected by cluster sampling. BCG vaccination status was ascertained by the presence of a typical scar.
RESULTS We analyzed data of 96 067 children of whom 89.3% were BCG vaccinated and 6.4% had TST indurations ≥15 mm, 3.6% ≥17 mm and 1.7% ≥19 mm. TSTs were significantly more often positive in BCG-vaccinated children at cut-off value ≥15 mm (adjusted odds ratio [aOR] 1.17; 95% CI 1.05-1.31), but showed no association with BCG vaccination status at cut-offs ≥17 mm (aOR 1.01; 95% CI 0.88-1.16) and ≥19 mm (aOR 0.92; 95% CI 0.78-1.08).
CONCLUSION We found no evidence of a protective effect of BCG vaccination on *Mycobacterium tuberculosis* infection ascertained by a positive TST. This is in contrast with studies that found such effect for interferon-gamma release assays (IGRA), and suggest that TST and IGRA measure different aspects of *Mycobacterium tuberculosis* infection.

5P18

Cross-sectional surveys in Bangladesh, India, Ethiopia & Sudan to understand visceral leishmaniasis treatment seeking, diagnosis, treatment and household economic burden

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INTRODUCTION The KalaCORE project is a DFID-funded initiative to eliminate and control visceral leishmaniasis (VL) in Bangladesh, India, Nepal, Ethiopia, South Sudan and Sudan. The goal is to reduce the health impact and economic burden of VL by ensuring access to early diagnosis and complete treatment.
AIM To collect baseline data to identify where support from KalaCORE to national VL control programmes can be targeted to improve patient management and access to care.
METHODS Cross-sectional surveys of VL patients treated at 46 VL treatment facilities in endemic areas of Bangladesh, India, Ethiopia and Sudan were conducted between February and

September 2016. A structured questionnaire was used to collect data on patient and household characteristics, the treatment pathway and cost to household of the recent VL illness episode.
RESULTS 909 VL patients were interviewed across the four countries. The patient demographics varied by country: In Bangladesh and India, 60% of patients were male; most were young adults and males had a median age 7 years older than females. In Ethiopia, almost all patients were young males of working age; just over half were migrant workers. In Sudan, the median age of patients was 13 years; almost 70% were male. The shortest time between onset of symptoms and receiving VL treatment was in Sudan with a median of 21 days. This compared to 40 days in Ethiopia, 52 days in Bangladesh and 54 days in India. Total financial costs exceeded 20% of annual household expenditure for between 13.7% (India) and 31.4% (Ethiopia) of patients. In all countries, diagnostic procedures and treatments received before a correct VL diagnosis incurred substantial financial loss for the patient. Including reported loss of earnings for the patient and caretakers resulted in economic costs approximately double the financial costs.
CONCLUSION VL illness results in substantial economic burden for patients and their households, largely due to financial costs incurred before receiving a VL diagnosis and loss of income to patients and/or their caretakers. KalaCORE will contribute to the VL control programmes in Bangladesh, India, Ethiopia and Sudan to reduce time between onset of symptoms and start of treatment through patient- and provider-side interventions.

5P19

Cost of postpartum services for mothers and of infant immunization services in Kaya health district (Burkina Faso)

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INTRODUCTION The *Missed opportunities for maternal and infant health (MOMI)* project has implemented interventions both at community and facility levels, including the integration of maternal postpartum care (PPC) with infant immunization to upgrade PPC services.
AIM This paper assesses the cost of the integration of postpartum services for mothers and infants to infant immunization services, both at demand and supply side in 2013 (before the intervention) and in 2015 (at the end of the intervention) in Kaya health district (Burkina Faso).
METHODS We used National Health Accounts to evaluate financial flows in reproductive health, and particularly PPC, and infant immunization services in Burkina Faso in 2013 and in 2015. Based on two household surveys collected in 2012 ($N = 757$) and in 2014 ($N = 754$) among mothers within 1 year postpartum (PP), we also estimate the cost at household level of the PPC visit for mother. We compare the costs of PPC with or without integration in infant immunization services. We focus on the intervention at day 6-10 that was most successful.
RESULTS Reproductive health expenditures in Burkina Faso increased steadily since 2011 due to the implementation of MDGs with a 2015 deadline and an increase in the subsidies to family planning. The costs of delivering PPC increased in 2015 compared to 2013 while the cost of infant immunization declined during the same period. The average cost of unit health services for day 6-10 PPC increased from 2013 to 2015 but remain lower than in non MOMI sites due to an increase in PPC utilization. Women did not have to pay for maternal PPC and infant immunization. Household expenditures in terms of time and transport are lower for integrated maternal PPC to child immunization services and significant for day 6-10 PPC. Overall, the societal costs of integrating maternal PPC to infant immunization at day 6-10 decreased from 2013 to 2015.
CONCLUSION The integration of maternal PPC to infant immunization proves to be cost effective, as shown for day 6–10, both at the household and health services level.

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The Kenyan malaria market after AMFm

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INTRODUCTION In 2010, Kenya piloted the Affordable Medicines Facility for malaria medicines (AMFm) with funding from Global Fund. The objective was to scale up quality assured antimalarials ACTs by bringing down the price through factory gate subsidies, and flush out antimalarial monotherapies, particularly in the private sector. The MOH recommends the use of Sulphadoxine Pyrimethemine (SP) for malaria prophylaxis in pregnancy in endemic areas only. ACTWatch survey is a multi country research project implemented by PSI. The objective is to monitor key antimalarial market indicators at national level post AMFm.
METHODS A representative sample of locations was selected from each of Kenya's 4 malaria zones. A census of all outlets-both public and private, within these locations with potential to sell or distribute antimalarials or provide malaria blood testing was completed. 19,108 outlets were enumerated, while 2271 outlets were interviewed. Data were analysed using Stata.
RESULTS Availability of quality assured ACTs (QAACTs) in public facilities increased from 88% in 2010 to 95% in 2016, and in the private sector, availability rose from 20% to 46%. Availability of non-QAACTs in private facilities increased from 43% to 52%. Among public facilities, SP availability was 70% in endemic areas, and not available in other zones. In the private sector, availability of SP in endemic zones was 47% but high in the low risk zones at 76%. The private sector dominated the antimalarial market composition at over 80%, with 40% being unregistered pharmacies. General retailers accounted for 10% of the market share with almost all treatments distributed being SP.
CONCLUSION There is a high readiness for the management of malaria in Kenya, particularly in the public sector. The MOH and regulatory bodies should engage the private sector to decrease the use of non-QAACTS and ensure SP is not used for malaria treatment, as is evident from its widespread availability in non-endemic areas. More efforts are needed to increase the availability of SP for malaria prophylaxis in pregnancy in the endemic regions.

5P21

Systems effectiveness and patient adherence to dihydroartemisinin piperaquine in northern Ghana

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INTRODUCTION Chemotherapy remains one of the major tools for malaria control. Prompt and appropriate treatment followed

by patient adherence to the treatment provide individual benefits of cure, prevent severe outcomes resulting in community benefits of reducing infectious reservoir, reinfection and drug resistance. High levels of adherence to fixed-dose antimalarials have occurred in recent times but more information is needed on new treatments like dihydroartemisinin-piperaquine in endemic countries.
AIM The goal of the study was to determine patient adherence to dihydroartemisinin-piperaquine treatment and to specifically document the proportion of correctly diagnosed, prescribed and treated malaria patients who complete the recommended age-specific dose regimen.
METHODS The study was conducted at the Navrongo Health Research Centre of northern Ghana from October 2014 to November 2015. Patients attending health facilities with symptoms suggestive of malaria were recruited after satisfying the selection criteria including informed consent and positive rapid malaria diagnostic test. Structured questionnaire were used to document baseline information, patients taught how to take medications at home. Patients were follow up at home after the third day of treatment to check the availability of the blister pack, inspect remaining tablets, elicit information on dosing, adverse effects and leftovers. Day 28 follow up was done to document changes after the first visit and to take blood for malaria parasite test. Study outcomes were classified as complete, incomplete and non-adherent.
RESULTS A total of 299 patients were enrolled, 56.5% females and 37.1% aged <5 years. All patients completed the fourth day of follow up, 98.7% completed 28 days and four were lost to follow up. Approximately 49.8% did not take the medication as instructed, 12.7% had leftover pills, 4.7% vomited without redose. Most recurring adverse events were weakness 32.6%, dizziness 18.4%, abdominal pain 12.2%, itching 10.2%, headache 8.2% and loss of appetite 4.1%. Approximately 45.5% were classified as completely adherent, 41.8% as incomplete adherent and 12.7% as definitely non-adherent. Females and older patients were more likely to be adherent.
CONCLUSION Poor adherence poses a challenge to the longterm effectiveness of dihydroartemisinin-piperaquine treatment for malaria in Ghana.

5P22

Evaluating access barriers to visceral Leishmaniasis diagnostic and drugs in 6 endemic countries in eastern Africa: is regional approach the solution?

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INTRODUCTION Provision of diagnosis and treatment is a key strategy in controlling the deadly disease known as visceral leishmaniasis (VL) in the endemic countries in eastern African region, namely: Ethiopia, Kenya, Somalia, South Sudan, Sudan, and Uganda. Access to life-saving VL diagnostic and drugs is crucial. Differences in contexts, supply system and overall health system capacity are elements thought to be too large to solve and knowledge is fragmented on this front. The regional approach towards overcoming this challenges has never been analysed: its gaps, potentials and acceptability among key stakeholders at global, national and local levels.
METHODS By using the conceptual framework of access (Frost and Reich 2010), We review the VL specific diagnostic and drug pharmaceutical supply system in the 6 selected countries using WHO and MSH rapid assessment tool and mapping of stakeholders. This will then be followed up by a cross-sectional surveys using semi-structured questionnaires and a specific qualitative section involving in-depth interviews with key informants. Triangulation on access priorities and evolution over the course of 2005-2017, as well specific regional solutions would be explored. Text data will be analyzed using NVivo.
RESULTS Findings are expected by September 2017. Main research outcomes are expected to provide insights on understanding of VL access barriers within the context of medicine supply management systems, across a region with its specific challenges (epidemiological cycles, foci distribution, levels of assertion/integration at the national policy platform, logistic pharmaceutical system, political and security contexts) and whether pragmatic steps in regional direction would have more chance to be successful.
CONCLUSIONS By providing this multi-country studies, control programs can draw specific lessons and recommendations on improving VL access to medicines in this region, contributing to the most optimal model. Empirical findings may indicate the gaps which have to be addressed at different levels.

5P23

Improving financial security and access to maternal health services in a rural setting: An assessment of community health insurance in Uganda

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INTRODUCTION Evidence shows that user fees discourage the poor from utilizing health services, are associated with delays in accessing care and increased use of home remedies and informal care sources. This is counterproductive in reducing mortality and morbidity. Uganda scrapped user-fees in public sector resulting in increased usage of public facilities, but with subsequent increase in out-of-pocket health spending over a 4-year period. This shows that user-fee abolition had no effect on out-of-pocket spending in absence of sustainable health financing alternatives. To ensure financial security and improve access to affordable quality health services in rural communities, the Uganda Protestant Medical Bureau (UPMB) with support from Health Partners and Save for Health piloted a community health insurance (CHI) scheme in 15 network facilities between 2010 and 2015. This was achieved through village saving and loan associations (VSLAs) in health saving products.
AIM The evaluation was aimed at assessing the effect of community health insurance on access to maternal health services in a rural setting in Uganda.
METHODS This was a prospective study to assess the effect of community health insurance on access to maternal health services in a rural setting in Uganda.

Data on facility/skilled deliveries, postnatal care attendance and receipt of intermittent presumptive treatment (IPT) for malaria were collected and analyzed for women aged 15-49 yrs seeking maternal health services.
RESULTS There were 73,200 registered members with ongoing community health insurance schemes in the 15 UPMB member facilities. Of all pregnant women who accessed antenatal services, 93.3% insured compared to 81.1% non-insured received at least 2 doses of IPT. Out of all those who delivered in the health facilities, 84.1% were under CHI compared to

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79.0% non-insured. Furthermore, 79.6% insured compared to 77.9% non-insured received postnatal services.
CONCLUSION In light of funding constraints, CHI allows funds to be pooled to reduce financial barriers for childbearing women aged 15 – 49 yrs who need to use maternal health services they could not otherwise afford, improving service access.

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Willingness to pay for HPV vaccines among married women aged 15–49 years in 2 locations in Vietnam

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INTRODUCTION In Vietnam, cervical cancer ranks as the second most frequent cancer among women at childbearing ages (1) with the crude incidence rate of 11.3 and mortality rate of 11 per 100,000 women (2). Human papillomavirus (HPV) types 16 and 18 are mainly responsible for this (3). HPV vaccine, the bivalent and quadrivalent, were introduced in Vietnam since 2011. However, till now, it has been still treated as an uninsured service, not as free as other vaccines in EPI.
AIM We study the willingness to pay (WTP) for HPV vaccines among married women aged 15-49 in 2 locations in the north of Vietnam (Chi Linh and Thanh Thuy district).
METHODS Firstly, 2 wards and 2 communes were randomly selected. Then, within each ward or commune, women were chosen systematically. 651 participants were employed. We used logistic regression analysis along with hierarchical approach to evaluate the effect of factors associated with WTP.
RESULTS Half of women aged 15-26 were willing to pay for HPV vaccines for themselves and half of women above 26 years old were willing to do so for their daughters. Perception on HPV vaccine cost as acceptable was the factor associated with WTP among those 15-26 years old (OR = 4.0, 95% CI 1.2-13.0, $P = 0.03$). As regards women aged 26-49, occupation, knowledge, the uptake of cervical cancer screening, perception on HPV cost were found to have association with WTP in bivariate analysis. After controlling for all other variables, perception on HPV cost appeared as the strongest determinant of women's decision making (OR = 7.91, 95% CI 5.2-12.1, $P = 0.00$). Additionally, women in the study suggested affordable cost for 3 doses of HPV vaccines of under 23 US$ to maximum 46 US$.
CONCLUSION Since the cost of HPV vaccine is still a huge matter in women's vaccination decision making, vaccine manufacturer, donors and the government should work in partnership to reduce HPV cost soon to ensure the right to reproductive health care for all women. More studies, especially on cost-benefit of HPV vaccination, need to be carried out to provide stronger evidence for advocacy.
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[Correction added on 10 January 2018, after first online publication. The name of the author B. Anne was corrected to A. Buvé.]

5P25

Evaluating the effect of PMTCT-focused structured sms messaging and calls in improving service uptake in Suleja, North Central Nigeria

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INTRODUCTION Nigeria is one of the countries in Africa leading the way in using m-Health solutions for health service delivery. This is driven by myriad factors: penetration of mobile networks in rural communities, reduced costs of mobile handsets, and innovative technologies that integrate mobile applications with traditional health service delivery models.
AIM This study examines the use of m-health technology by Mentor Mothers (MM) on prevention of mother-to-child transmission (PMTCT) service uptake by mentees in Suleja, North Central Nigeria over a 6 month period.
METHODS The project identified and trained 13 MM who were then randomized into two arms. The intervention arm (7 MMs) included the facility-based intervention, home visits, voice calls, and SMS. The non-intervention arm (6 MMs) consisted of the facility-based intervention and home visits. Each MM was then assigned five mentees each and those in the intervention arm used mobile phones to provide support via voice calls and SMS. A total of 72 mentees were enrolled in the study (41 intervention arm and 31 in non- intervention arm). Two FGD sessions were held with one group consisting of 7 Mentor Mothers and the other group had 6 Mentees.
RESULTS Both groups had an average of 3 antenatal care appointments per mentee. The total percentage of infants delivered in the facility was 55% (63% for the intervention arm and 43% for the non-intervention arm). 65% of all mentees had disclosed their status to their partners, with 57% in the intervention arm and 43% in the non-intervention arm. Focus group discussions showed that mentees were more receptive to receiving voice calls than SMS, with stigma remaining a major issue among them. The use of a mobile application to report client data also proved a challenge to some mentor mothers, due to internet connectivity and non-familiarity with the app.
CONCLUSION The limited network infrastructure in rural area are major challenges in the implementation of mHealth in the country. Although the study did not reflect significant differences between both group, m-Health continues to offers a unique opportunity to improve uptake of PMTCT services in many rural settings in Nigeria.

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Improving tb outcomes by modifying life-style behaviours through brief motivational interviewing and text-messaging – a feasibility trial

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INTRODUCTION Smoking and problem-drinking are common among TB patients in South Africa and the majority of these patients are co-infected with HIV. Alcohol and tobacco may worsen TB and HIV-related treatment outcomes.
AIM To develop and test the feasibility of implementing a clinical trial for the "ProLife" model – a complex behavioural intervention – aimed at improving TB treatment outcomes. The model comprises three brief motivational interviewing (MI) counselling sessions augmented with text messaging (SMS), targeting as appropriate: tobacco smoking, problem-drinking and treatment adherence.
METHODS The intervention was developed through an international expert review workshop. SMS-messages were translated into three languages. Lay counsellors were trained in MI techniques and their before-after knowledge determined. The intervention was piloted with TB patients, with or without HIV co-infection, who currently smoke and/or drink (AUDIT 7-19) at nine clinics in three provinces in South Africa. MI sessions were recorded and analysed for intervention fidelity, and lay counsellors and patients were interviewed about their experience with the intervention.
RESULTS Of the 138 TB patients screened, 44 were eligible for the study: 14 smokers, 12 hazardous/harmful drinkers and 18 co-joint users. The mean age was 40.1 years and 81.8% were male. Participants received 10 adherence- and 7 to14 alcohol- and/or tobacco-related messages, as appropriate. Data synchronisation problems led to some SMS-messages not being delivered according to the twice-a-week schedule. Overall, participants were very satisfied with the counselling sessions although some experienced technical cell phone problems or could not fully understand the SMS messages. Preliminary analysis points to some gaps in MI intervention fidelity during delivery.
CONCLUSION These preliminary findings suggest efficient recruitment and provide valuable lessons on how to improve the delivery of the intervention.

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Sexual education and data inquiry about sexual behavior through mobile phone services in Uganda

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INTRODUCTION Ask Without Shame provides sex education via mobile phones through an app, different sms services and phone calls in Uganda. Medical experts and counselors are available 24/7 to assist users with information regarding sexuality. This service aims to fight the lack of sexual information due to taboos in East African societies.
AIM Data collection regarding sexual behavior of Ugandan adolscents.
METHODS We conducted semi-structured interviews within 3 months. Basic information was asked: sex, age, origin, religion, number of sexual partners, relationship status, sex life, reason for calling. Data was evaluated with Microsoft Excel.
RESULTS We enlisted 944 inquirers. 97% gave informed consent (n = 912). Stickers made them aware of our services (79%, n = 214). 43% used sms services (n = 401), 32% our app (n = 304), 25% were telephone calls (n = 238).

93% came from Uganda (n = 504), 63% from outside Kampala (n = 285). 68% were male (n = 413), 32% were female (n = 193). The average age was 24 years (n = 261). 155 told us their religion: 68% were Christian (n = 106), 10% were Muslim (n = 15). 23% were married (n = 92) and 76% were single (n = 304). Their average age of first sexual encounter was 17.5 years (n = 158), their average number of sexual partners was 3.1 (n = 176). The average menstruation age was 13.6 years (n = 65). They had in average 2.0 children (n = 59). Out of 202 people 57% used family planing of any kind.

300 people called because of an emergency (32%), 224 because of a problem (24%) and 419 wanted to get some information (44%). The reasons were (n = 543): 12% male masturbation (n = 65), 4% erectile dysfunction (n = 21), 4% starting a relationship (n = 20), 3% pain during sex (n = 18), 3% oral sex (n = 14), 3% vaginal dryness (n = 14), 2.2% abnormal vaginal discharge (n = 12), 2.0% how to have sex or libido (n = 11), 1.8% non-fulfilling sex-life (n = 10), 1.1% abortion (n = 6), 0.9% female masturbation or delayed ejaculation (n = 5), 0.7% STD related, infertility, squirting or anal sex (n = 4).
DISCUSSION Through the ability to offer health services, we have the unique possiblity to get an insight in sexual behaviors and issues of adolescents in Uganda. Hence, we can adjust sexual education and public health programs in Uganda and other African societies.

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Connecting the unconnected in sub-Saharan Africa: Non-discriminating access for digital inclusion with an emphasis on health (DigI)

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INTRODUCTION Free access to information technology for everyone is of utmost importance to foster equitable distribution of digital health information. However, huge gaps need to be filled in sub-Saharan Africa that are partly due to the lack of sustainable health message distribution platforms. Thus, the main objective of DigI, a 3-year funded project from the Research Council of Norway (NFR) and the Norwegian

Government, is to establish pilot projects for the InfoInternet access in Tanzania (TZ) and The Democratic Republic of the Congo (DRC). DigI collaborates with CYSTINET-Africa, a large health network in eastern Africa with a focus on neglected tropical diseases, exemplified by *Taenia solium* cysticercosis, funded by the German Ministry of Education and Research.
AIM 1) Empower people by bridging the digital gap through free access to the Digital Global Health platform, 2) encourage stakeholders to support a sustainable business model including free access to health information and 3) pilot digital global health and establish key performance indicators (KPI) for the uptake of digital health information.
METHODS DigI encompasses 11 partner organisations from 7 countries, which will establish and promote digital health information and content at health posts. The above-mentioned pilot projects will be evaluated, and the InfoInternet will be established as an independent and self-sustainable information, communication and technology infrastructure for digital inclusion. Specific attention throughout the project will be given to diseases like HIV/AIDS, bovine tuberculosis, *Taenia solium* cysticercosis and anthrax. Mixed methods will be employed. In-depth interviews (qualitative) will be used to measure the experienced change in empowerment. Quantitative methods, such as a randomized control trial, will be used to measure the KPIs and the change in knowledge, attitudes and practice (KAP) with regards to the uptake of digital health information.
PROJECT STATUS Digl has established the ontology for the Digital Global Health platform, and is currently translating this ontology into a framework. Main focus will be on open interfaces towards other Global Health platforms, opening for a distributed Knowledge Centre for Global Health. In parallel, the selection of villages is ongoing to allow for pilot installations of free health information access.

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Innovative on-line approach though eLearning to health agents on the field

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INTRODUCTION Universitat Oberta de Catalunya (UOC) has implemented interactive on-line programs to train health professionals in the management of several infectious diseases: Cutaneous Leishmaniasis (CL) and Sexual Transmitted Infectious (STI).
AIM This on-line training programs aim to update and improve the disease management skills among health and healthcare professionals working in endemic areas.
METHODS Each program consists of 10 ECTS (European Credit Transfer System) targeted to clinicians, nurses or policy makers (250 study hours). Students receive up-to-date information on: natural history of the disease, epidemiology, diagnosis, treatment and surveillance. Teaching strategies are on-line, asynchronous and participatory, interacting with specialist experts in the field. They are based on scientific articles, WHO manuals or the study and the sharing of the different field experiences. The student's achievements are measured through continuous assessment activities together with a final multiple choice test which is compared to pre-test at the beginning of the course. Once finished the students are asked to give their feed-back of the course though an on-line questionnaire.
RESULTS To date, three editions of CL and two about STI have already been organized. The CL editions were in 2014 (English and French) and one in 2016 (French). The total number of people who enrolled for the courses was 47 from seven countries: Afghanistan, Algeria, Chad, Morocco, the Syrian Arab Republic, Tunisia and Yemen. The 92% of the students who did the full course had a successful final assessment. The STI editions have been organized in 2015 and 2016 (both in Spanish) and a total of 48 students from Spain, UK and Mexico have been trained. The grade average has been 7.05 out of 10 and 77% of the total students successfully passed the course. A broader scope of the CL course content will be implemented in the future and it will be focus on Skin Neglected Tropical Diseases clinical management. Also a similar program about Tuberculosis clinical management will be organized next Fall 2017.
CONCLUSIONS On-line training courses on clinical management of infectious diseases are a useful tool to train health professionals on the field.

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Design of a technology platform for knowledge sharing among health professionals to improve maternal and child healthcare

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INTRODUCTION Knowledge is a valuable asset for individual as well as organizations to be successful in this demanding global economy. The change of information into knowledge is mainly due to the effort of human cognitive capacity. Knowledge Management (KM) is therefore a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organizational performance. KM includes processes like knowledge capture and/or creation, knowledge sharing and dissemination, and knowledge acquisition and application.
AIM The major aim of this project is to explore the knowledge sharing status and design knowledge sharing technology platform for health professionals working on maternal and child healthcare unit.
METHODS A qualitative cross sectional case study design was conducted to gain insight; explore the depth, richness, and complexity inherent in the topic of interest. The hospital technical staffs working in MCH unit were included as study participants. An in depth interview guide was used to collect qualitative data. The collected data was analysed using the thematic inductive analysis method.
RESULTS In this project/study the overall findings show that knowledge sharing brings common understanding among professionals, its application depends on resource of the health

facility and professional's knowledge, skill and attitude (KSA), is facilitated by development of technology platform and automating the hospital system in general and it also need committed management body for its execution. Based on the study, appropriate sample content development and technology platform using word press software for knowledge sharing among professionals at MCH unit is designed.
CONCLUSION The findings highlight the on-going educational, informational, infrastructural and other interventions to address the issue of knowledge sharing among professionals. In addition, appropriate recommendations are forwarded to the respected bodies.

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Personalised management of health and health expenditure: Role of technology; experiences of patients using iDecide digital health platform

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INTRODUCTION Health Expenditure has been a growing concern in India with an increasing out of pocket health spending. In this context the health promotion and preventive interventions that make patients to be able to manage their health is becoming important. Health Insurance has not been proved very effective in addressing the health spending in India. Thus the need of self care and personalised management of Health using digital technologies is becoming important. iDecide is a platform that facilitate patient to learn about care through peer interactions, mutual learning and skill building on care. iDecide is an android platform, a comprehensive solution for self care.
AIM To understand how technology application and self care interventions could minimise the cost of care.
METHODS From those who subscribed in the iDecide web application 250 patients were provided with a mailed questionnaire to understand their knowledge about their disease and self care options. Then this has been compared with their health spending. We have provided with online health education to 250 candidates through iDecide. 250 patients were selected randomly from the data base of iDecide web application and they were provided with the SMS messages that concern their health problems and a questionnaire was used to pre-test and post test.
RESULTS The self care knowledge among the patients is relatively poor among non chronic patients. Though chronic patients has some knowledge. Chronic Patients were able to minimise visits with the knowledge gained on self care through iDecide. Female patients were better able to minimise cost because of self care compared to male counterparts.
CONCLUSION Self care knowledge building could minimise the cost of care to both patients and to various health care providers. Self care interventions could thus save money for insurance companies through minimising claims.

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Scope of leveraging mhealth for routine immunization strengthening in India

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INTRODUCTION Routine Immunization is one of the most cost effective methods to avert inevitable under 5 years morbidity & mortality rate. Despite of India being one of the leading producers of affordable vaccines, annually 5 lakh children fall prey to vaccine preventable diseases. Henceforth, there is immense need to leverage technology in system strengthening of routine immunization program in India.
AIM Identifying scope of mHealth for routine immunization strengthening in areas of low immunization coverage.

Methods An extensive literature review & analysis of government immunization data conducted to collect all good quality evidences for low immunization coverage in poor performing states of India and a conceptual framework constructed. Similarly, another review was performed to gather all plausible information related to usage of mHealth in immunization program across globe. Grounded on these quality evidences and based on feasibility in current settings, a scrutiny of opportunities of mHealth usage in immunization program of India done.
RESULTS The examination of evidences suggests that mHealth could be of vital importance in routine immunization program of India, for both demand & supply side. On the demand side, mHealth technology could be widely utilised for educating, sending voice or text reminder messages to families for immunizing their children. Moreover, mHealth provides a platform where families could share their concerns & participate in surveillance of vaccine preventable diseases & adverse events following immunization. On the supply side, mHealth could be an effective tool for digitalization of immunization data in electronic registers. It could also be vital in supporting health workers for taking appropriate decision & reducing chances of errors through algorithm based software, incentive cash transfer to mobilizer, tracking of vaccines &logistics utilization, surveillance of vaccine preventable diseases, improvement in data flow and supervision of health-workers.
CONCLUSION The result of literature analysis and immunization data suggest that there are several robust evidences for mHealth usage in immunization programs that would help both in system & programmatic strengthening. There will definitely be certain challenges such as huge investments, mobile network availability, political motivation, training issues etc which need to be assessed in particular scenario.

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Information technology in health vs provider accountability to patients – The experience of iDecide a patient managed clinical care platform

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INTRODUCTION Increase techno advancement is in a way enhanced the diagnostic process though increased the cost of care. The sharpness in diagnosis and treatment because of technology advancement has changed the health care across the world. Countries like India where the out of pocket expenditure

is high and a significant proportion of expenditure is private spending the techno advancement sharply increased the cost. The patient accountability though could be improved by technology worked almost reverse in third world especially in India because the users have limited knowledge to understand the tech diagnosis. The web application that we developed hep patients to be informed and learned through various methods of learning including on line and peer interacted learning. iDecide through peer education and knowledge sharing help patients to be informed and participate better in the care decision making.
AIM Understand Patients Perceptions on emerging diagnostic technologies.

Understand how the peer education contributes to better cope with chronic disease and reducing cost.
METHODS We have done a random study among those who subscribed iDecide and have done interactions. We did not have a control group since the study try to understand the pattern of knowledge and the level of confidence. The study was a descriptive qualitative study.
RESULTS Patients feel that cost have escalated considerably because of the technological advancement and a significant number of patient do not participate in care decisions because of the medical technology illiteracy. Per interaction enhance their confidence and are able to netter own care.
CONCLUSION Peer networking will have an excellent impact on patient care and care outcome including cost. This could enhance compliance and thus the overall care outcome. iDecide have all options to made better care decisions.

5P34

Mobile health care – A review of Indian mobile health initiatives

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INTRODUCTION Mobile health technology, or mhealth, is a rapidly developing factor in health care today, promising to make health care better and more efficient. The World Health Organization says we can think of it as medical and public health practice supported by mobile devices. India is the third largest smart phone user market in the world with most of the population living in rural areas. Mobile health would prove to be a great support in India because it faces a lot of healthcare challenges, considering the ratio between patient to practitioner and patient bed to population, it is the lowest in India.
AIM Understand mobile health Technology Advancements in India and globally.

Review Major e-Health and m-Health Initiatives in India and globally.

Understand mobile health initiatives contribution to enhance Equity and quality of care.

Mobile health technologies and its contribution to cost minimisation.
METHODS A secondary data review of all the mobile health initiatives in India and case study documenting of 10 top mobile health initiates in India. We have also done client interactions to understand their perception.
RESULTS There is a fast growth on Mobile Health projects in India. Many promising products exist and these products could be taken up in the digital India programs. Many of them has high potential ti transform the way people seek health care. People perceive mobile health as a way to strengthen accountability. Virtual consulting is an option provided under some of the mobile health applications and this could be a way forward t protect privacy and enhance accountability.
CONCLUSION Mobile health / hospital anywhere and everywhere has a great scope in the next century. It has all potential to make care patient accountable, cost effective and quality driven.

5P35

eLearning in public health education in India

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INTRODUCTION In several low and middle income countries such as India, the public health sector needs systematic capacity building to generate skilled health workforce to solve the enormous health problems in the country[1,2]. Most of the trainings are still conducted in a traditional way for long periods[1] while health workers could not remain absent from their work,[3] due to which they are unable to attend the training program. In recent years, most of the distance education programs involved working-students receiving learning materials in the form of textbooks or CDs with minimal interaction, having them to travel to the training center only from time to time. The use of open source learning platforms such as Moodle offer new possibilities for creating interactive learning activities to improve both teaching and learning processes. These emerging technologies have the potential to create appropriate learning outcomes: rather than being a passive recipients of information, students feel empowered to try out and learn more, using various interactive tools.
AIM We assess the current status of distance learning trainings available in public health education in India and subsequently describe strategies distilled from the experience at the Institute of Public Health Bangalore while implementing the eLearning capacity building program.
METHODS We performed an internet search using specific keywords and literature review to investigate the current status of available distance learning programs in the public health sector in India. We also identify strategies and tools from our experience to bridge the gaps in public health trainings, using eLearning.
CONCLUSION There is a need to foster the potential of technology and improve the current distance learning courses. The potential of tutor guided eLearning can be leveraged to address the training needs and to improve interactivity, unlike "traditional" distance learning course. eLearning method also very cost effective way to train large number of participants who are widespread across the country.

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Abstracts

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Improving contraceptives supply management by addressing the human factor

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INTRODUCTION Sound supply and service provision systems don't seem to be able to guarantee that stock-outs of family planning methods are completely avoided. If stock-outs were a purely technical issue, the problem would have been solved already. In order to boost progress, it is necessary and urgent to explore non-technical factors that may contribute to good supply management. A crucial but seldom considered building block in optimizing family planning services is the human factor: the degree to which staff is motivated and feels responsible for delivering top quality and maximally meeting customer's needs and expectations.
AIM A research project was set up with the aim to explore the relation between staff motivation and quality of stock management and to find ways to improve stock management by influencing motivation.
METHODS In 3 groups of 5 health facilities in Maputo Province, 10 monthly audits were implemented. Stock cards were examined and stock-counts were carried out for 6 contraceptives. Based on these audits, 2 groups received a monthly evaluation report reflecting the quality of their supply management. One of these 2 groups was also awarded material incentives conditional on their performance.
RESULTS Supply management improved considerably in all facilities, also in these of the control group, though progress there was slower than in the facilities that received material incentives and/or a monthly evaluation.
CONCLUSIONS/DISCUSSION Providing evaluation reports and material incentives proves to have a beneficial influence on stock management, but probably the most important outcome from a policy perspective is that a regular follow-up on stock management in health centres can already reduce stock-outs. This may inspire the development of interventions that are based on regular visits to health centres and feedback on the findings.

5P37

A qualitative analysis of the northern Ugandan catholic health system

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INTRODUCTION In Uganda, 41% of hospitals are operated by the faith-based sector, and like in other low and middle-income countries, faith-based institutions contribute significantly to the national health system. The northern region experienced two decades of armed conflict, and the post-conflict environment presents a set of challenges that deeply affect the health sector. Health systems are known to be complex systems and the understanding about the dynamic interaction of the different systems is lacking generally and specifically for this region.
AIM This health system analysis, based on the Health System Dynamic Framework, explores the perceptions of health managers of the institutional and organisational capacities of the Catholic Health Service (CHS) in Northern Uganda.
METHODS Fifteen interviews were conducted between January and February 2016 with upper and lower cadres of health managers of the CHS in three dioceses in Northern Uganda. In vivo coding of verbatim transcripts and thematic content analysis were used to generate categories and themes based on the Health System Dynamic Framework.
RESULTS Managers' perceptions of the goals of the CHS reach well beyond the merely curative aspect and include also a balancing social effect. The service delivery by the CHS is perceived to be equitable and accessible. The role of the CHS is seen as complementary to the government health system with an advantage of perceived higher quality of services by the CHS. The internal management of the CHS is perceived to have improved substantially over the years although some bottlenecks are perceived to exist still. These include weak financial sustainability with a high donor dependency and human resources turnover that needs to be tackled with urgency as it may affect the quality of service delivery within the CHS.
CONCLUSION This study shows the practical applicability of the Health System Dynamic Framework for a qualitative health system analysis. The results may be used to set priorities for interventions to sustain the quality of service delivery by improving the institutional and organisational capacities of the CHS. This methodological approach including complex system thinking, and generating an internal view on the system could thus be used in similar settings.

5P38

Do under-resourced health systems have the ability to offer financial risk protection for primary healthcare? A baseline study of outpatient expenditure to inform health financing and universal coverage reform in the Democratic Republic of Congo (DRC)

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INTRODUCTION DRC is in the midst of a sound health financing reform towards universal access to care.
AIM To describe expenditure levels, distributions and main drivers, and to investigate whether incurring excessive expenditure is associated with a series of demand- and supply-side factors.
METHOD As part of a quasi-experimental research study to assess the impact of a DFID-funded health systems strengthening project in DRC, a baseline population-based household survey was conducted in four provinces in 2014. Data included, type, level and utilization of healthcare services, accessibility to care, patient satisfaction and disaggregated out-of-pocket expenditures. Multivariate logistic regressions of excessive expenditure for outpatient care – set at various thresholds such as greater than double the median expenditure – were performed to explore incidence and predictors of atypically high expenditure incurred by individuals.
RESULTS Of 3341 individuals, 65.6% of those reporting an illness in the past 4 weeks sought outpatient care with an average of 1.1 visit per episode of illness. Overall mean expenditure per visit was US$6.7 (SD=10.4) with 29.4% incurring excessive expenditure. Main predictors of excessive expenditure included utilizing public services offering the

complementary benefit package, expenditure composition, severity of illness, residence and wealth ($P < 0.05$). Most results were fully consistent across all regression models: Individuals belonging to lower wealth quintiles, owning a transportation mean, with a lower severity of illness and <1 Month of days lost due to illness, living in the Western provinces (Equateur, Kasai Occidental or Kasai Oriental) rather than in the North-eastern ones (Maniema or Orientale), being a child under 5, and seeking care in health facilities not equipped with centrifuges seemed to be better protected against excessive out-of-pocket expenditure for outpatient care.
CONCLUSION With limited cost-sharing mechanisms available, burdensome expenditure for health is a health financing challenge. Advancing equitable access to primary healthcare should pass through better knowledge of healthcare utilization and financial protection. New evidence is needed as a health financing and universal health coverage reforms is running in the DRC. National policy-makers and international stakeholders may learn from expenditure studies and should implement data-driven policies.

5P39

Assessing health equity in the Democratic Republic of Congo (DRC) – A focus on financial protection

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INTRODUCTION While equity in access to primary healthcare is central to policy-making towards effective coverage, there is a lack of evidence-based guidance with respect to reaching the entire population.
AIM To provide a comprehensive picture of health equity, care-seeking behaviours and financial protection nationwide.
METHOD Comprehensive economic analyses were conducted using micro-level data from various national households' surveys over 2004-2013 (such as the Demographic and Health Surveys). All analyses were performed with the World Bank ADePT methodology and STATA for additional statistical and quality control tests and based on standardized selection of indicators. Topics covered health outcomes inequalities, health behaviour and healthcare utilization; benefit incidence analysis; and financial protection for health.
RESULTS Progress has been made to reduce child mortality rates between the 2007 and 2013 DHS surveys, but under 5 mortality rates remains high. Inequalities in health outcomes were relatively low, slightly in disfavour of the poorest children, and they decreased the study period. However, large wealth and regional inequities persist in mother and child with respect to healthcare utilization for the main diseases prevalence such as malaria control or for antenatal care. Regarding financial access to primary care, <10% of households faced spending above 25% of their total consumption budget on out-of-pocket payments, which contributed to increase the poverty rate by 2.1% on average. The burden of impoverishing health expenditures was concentrated among households already living below the poverty line. While the incidence of catastrophic health expenditure was most likely pronounced among the worst-off classes of the population, the severity of out-of-pocket payments was greater among the wealthiest group of the population.
CONCLUSION Analysis of equity gaps shed light on the future policy challenges including addressing regional disparities and moving towards evidence-based policy-making; increasing public subsidies, performance, quality of primary healthcare delivery and accountability; and reducing heavy reliance in OOP for all and progress towards better financial protection for health. National policy-makers shall now build on health equity assessment and expenditure studies to draw meaningful recommendations with respect to the health financing and UHC agenda.

5P40

Performed-based financing in Mali: Can it be called emergence?

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INTRODUCTION Several initiatives have been developed in Mali to improve maternal and child health indicators. Some of these are particularly focused on the performance of health personnel. This is the case of performance-based financing (PBF) which was tested through two pilot projects implemented between 2012 and 2017 in three and later 10 health districts of the Koulikoro region (central Mali). After a long and complex process, the PBF approach was adopted as a "strategy" in the National Ten-Year Plan for Health and Social Development (2014-2023).
AIM How PBF has been built as a "health approach"? Can it be spoken about "emergence of PBF" in Mali after the implementation of two projects? This piece of work aims to answer to these questions.
METHODS The methodological approach is based on semi-structured interviews. The survey targeted the actors who played a major role in the implementation of this process. A total of 40 interviews were conducted between February and October 2016.
RESULTS Analysis of the collected data shows that there has been no emergence of the PBF in Mali due to a series of constraints: the absence of a PBF public policy, low Ministry of Health leadership, low visibility, short implementation time of the two PBF projects (14 months for the first project and 8 months for the second one), few political entrepreneurs, and strong scepticism among health staff.
CONCLUSION More widely, this research questions the sustainability of development initiatives in Africa, which are often based on a more political than technical agenda.

5P41

An experience of health education in a Primary Health Care Project with a community in Colombia - Preliminary findings

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INTRODUCTION Health education should be understood as a mean for the exchange of information and the development of a critical vision of health problems and not as a simple process of

data transmission. This education is not proposed in the traditional mechanistic sense as an instrument for political exercise, but a humanistic and political sense for emancipation. This project is focus on the educational process through a Primary Health Care project, it is developing in Vereda Granizal which is a suburban area close to Medellin.
AIM To understand the meanings of health for the population from a social justice perspective, which involves public health process of research and education which is carried out with Primary Health Care project participants'.
METHODS There is an ethnography as the basis to understand health in a framework of political, historical and social relationships. It is carry out through an educational program based on Popular Education from Latin-American perspective (which include participative methodologies). As techniques it include interviews and participant observation during educational meetings.
RESULTS There is a population with problems, needs and difficulties in accessing health care. With regard to health and sanitary conditions, the population is living in precarious situations, they have many difficulties; such as the construction of housing with waste materials, lack of potable water and sewage system, inadequate services for garbage collection and lack of access roads. In addition, the activities of disease prevention from multiple health institutions that interact on the field, often cannot recognize people from your life story and diversity, because they come from different contexts, many rural areas with particular health practices. The community appreciate the participative educational process for their lives and find new opportunities to think their health.
CONCLUSION To think health in communities needs to consider a wider dimensions than disease. Health education is a way to promote a critical vision of public health in which people have the opportunity to learn and decide about their health. Especially in a context with high violation of human rights, where the public health interventions should fully consider how people understand their health.

5P42

Improving attraction and retention of rural health workers: building up a sustainable and cost-effective housing cooperative in Zambia

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INTRODUCTION Zambia faces a human resource for health crisis. Especially rural areas are heavily understaffed. There is a call for attracting and retaining health workers to rural and marginal communities to improve within-country equity in health services. Especially missing accommodation, but also where accommodation exists, inadequate housing conditions contribute to a very low attraction and retention of health workers in rural Zambia. WHO advises to focus on enhanced living conditions for improved retention in rural areas.
AIM The pilot project targets to improve attraction and retention of rural health workers in Zambia by enhancing the living conditions for health workers and their families.
METHODS A housing cooperative for rural health workers was set up in Zambia and started operations in 2012. Members of the cooperative are the respective hospital administrations at the housing sites. For the start, it is funded by SolidarMed, the Swiss Organization for Health in Africa. The cooperative developed to be a profitable but not-for-profit company. A public-private partnership (PPP) with the Zambian government includes a deduction code agreement for effortless rent collection.
RESULTS Up to now, 26 new housing units were built. 15 existing staff houses were incorporated by the cooperative from rural health facilities and thereon upgraded and renovated, bringing the house portfolio to currently 41 units. The housing cooperative is able to renovate and maintain the houses by own means in an efficient, cost effective and sustainable way. Starting 2017, the housing cooperative sustains an own maintenance team, which carries out all needed maintenance works at the housing units. The maintenance team additionally started vocational training in General Building for marginalized youths in rural areas. The cooperative targets to be operable without external support within 5 years and to grow by own means afterwards.
CONCLUSION The pilot project is a showcase model for innovative health system financing. The project will increase the number and condition of staff house units for health workers in rural areas and improve their living conditions. Improved living conditions contribute to a higher attraction, retention and satisfaction of health workers, and to an improved health status of the population subsequently.

5P43

Knowledge, coverage and usage patterns of health insurance in rural South India

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INTRODUCTION Out-of-pocket payments by individual households are the main source of health care financing in India. Contrary to most other consumption expenses, medical expenditure is largely unpredictable both in timing and quantity. Households, especially in low income countries, cope either by divesting their savings, borrowing, mortgaging or selling assets or by forgoing treatment.
AIM To study the knowledge, coverage and usage patterns of health insurance in a rural area of south India.
METHODS A community based cross sectional study was done in a village in south India. The study participants included the head of family of the households selected in the village. Data was collected by questionnaire method and analysed.
RESULTS This study found that 30.4% households were enrolled in a health insurance scheme. Among the eligible households only 14.5% were aware about government funded health insurance schemes. Highest enrolment was in Sampoorna Suraksha Scheme 33 (47.1%), followed by ESI 21 (30%). Among the enrolled households 118 (51.4%) had utilised it in the past 1 year. Majority of the enrolled households, 68 (97.1%) were satisfied with their Health insurance scheme. A statistically significant association was found between enrolment and awareness, age, religion, occupation, ration card and OOPE of respondents.
CONCLUSION Presently people are getting aware of health insurance, through acquaintances, health insurance agents, mass media etc., but this awareness has not yet resulted in satisfactory levels of enrolment / utilisation. As the results have shown, that only 30.4% of households are being covered by some form of health insurance scheme, a large chunk of the population is still financing health care expenditure without health insurance coverage. Moreover it was observed that a large proportion of

the eligible households were unaware about Government funded Health insurance schemes. It was found that almost all the households covered by Health insurance schemes were satisfied with the services provided and were willing to continue with the scheme they have opted for. There was also a significant association between awareness, age, religion, occupation, ration card and OOPE of respondents with their enrolment status in a Health insurance scheme.

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Equipment for essential surgical care in Africa: availability, barriers and need for novel redesign

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INTRODUCTION Essential surgical care is recently recognised as an important component of public health (1). Besides increased workforce capacity increased availability of surgical equipment will be required to improve surgical capacity worldwide (2).
AIM To investigate status and availability of surgical equipment to identify gaps and to create global interdisciplinary awareness among biomedical engineers, surgeons and public health specialists.
METHODS A survey was conducted among surgeons attending the annual meeting of the College Of Surgeons of East, Central and Southern Africa (COSECSA) in December 2016. General information of the facilities, availability of surgical equipment, barriers to availability, daily usage of equipment and options for re-design were assessed.
RESULTS Forty-three respondents participated in this study, representing 33 individual health facilities (14 public referral, 9 public district and 10 private (for-profit and non-profit)). The respondents worked in 9 countries across Africa. A deficiency in availability of basic surgical equipment across Africa was found, especially in district hospitals. The largest barriers and unavailability were found for electrosurgical units, endoscopes, defibrillators, infusions pumps and electrocardiogram monitors. Costs, lack of spare parts and training were identified as the largest barriers to availability of equipment. Lack of maintenance and old/overused equipment was identified as major reason to failure of equipment. The percentages of delayed and cancelled surgeries was lower in private hospitals (delay 9%, cancellation 4%) than in public hospitals (delay 29%, cancellation 21%). Twenty-five out of 39 respondents indicated that novel redesign of context appropriate equipment could be a solution to the current problems regarding surgical equipment.
CONCLUSION Availability of surgical equipment should be increased, especially in district hospitals. Novel context appropriate redesign might be a solution to decrease the barriers to availability and reasons to failure of equipment identified within this study. Therefore, collaboration between surgeons, surgical training programs, biomedical engineers and companies to create novel context appropriate surgical equipment is highly recommended.
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5P45

Impact of short term clinical training on tropical and infectious disease to medical doctors working at remote part of Nepal

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INTRODUCTION Medical school in developing countries focus on understanding basic pathophysiology and learning clinical methods on content authoritarianism environment during the half decade academic training. This may not address clinical decision making in knowledge to practice gap situations. This approach has focused mainly on knowledge, comprehension and application component of cognitive domain and perception, set, guided response, mechanism and complex overt response of psychomotor domain.
AIM The aim of the study was to assess enhancement of cognitive, psychomotor and affective domain of learning in clinical practices in real time scenario among the medical doctors who have been received the training.
METHODS Short term training on tropical and infectious diseases training is collaborative program of B.P. Koirala Institute of Health and Sciences, Dharan; Ministry of Health, Nepal and Institute of Tropical Medicine, Antwerp. It is a 5 week residential clinical training that covers the common tropical infectious disease of Nepal. A performa was mailed to each individual who had received the training. The individuals were reminded to respond the mail every fortnightly till 50% of the participants responded. Each participant was asked to give response only if the training has brought changes on each component of cognitive, psychomotor and affective domain with a real time scenario example.
RESULTS By the end of eight batches 114 doctors from 46 districts (75) were trained. Changes in following component of cognitive domain i.e. knowledge, comprehension, application, analysis, synthesis and evaluation were found by 72%, 70%, 88%, 60%, 60% and 66% respectively. Changes in following component of psychomotor domain i.e. perception, set, guided response, mechanism, complex overt response, and adaptation and origination were practiced by 60%, 52%, 40%, 42%, 82%, 80% and 24% respectively. Changes in following component of affective domain i.e. receiving phenomena, responding to phenomena, valuing, organizing values and internalizing values were experienced by 94%, 68%, 46%, 38% and 50% respectively.
CONCLUSION The training has incremental impact on different domain of learning. Continuity and sustainability of the training is likely to cover more number of doctors and is likely to improve the decision making in clinical practices of tropical diseases in resource limited country.

Abstracts

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Measuring quality of care *as a result* – The example of RBF (results based financing)

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INTRODUCTION Quality of Care (QoC) is usually monitored in terms of *structure*: the availability of equipment, human resources, etc. – meaning if providers are *in the right conditions to* provide QoC. Which does not mean that *if* providers are in good conditions, that the quality provided indeed was of good quality – as a *result*. In Provider Payment Mechanisms – such as health insurance schemes (HIS) or results based financing (RBF) – payments come ex post, based on verified results, that is: quantitative results. When it comes to QoC, payments are not based on results.
AIM Developing an approach and instruments that enable monitoring QoC *as a result*.
METHODS Capitalisation of experiences with RBF and QoC was carried out in Burundi, Cameroon, Nigeria, Burkina Faso. Defining QoC in terms of result-indicators was based on a literature study and then stakeholder workshops. Instruments were developed for monitoring QoC. Protocols were developed to pilot the approach in Senegal (RBF), Sudan (HIS) and Guinea (RBF).
RESULTS The capitalisation exercises showed that attention in RBF was shifting away from quantitative results only towards improving QoC through PBF. Only, most QoC monitoring was on "structure" – which indeed resulted in improved structure.

The processes to develop scoring lists based on QoC-results were long and difficult because of stakeholders being reluctant to define "QoC as a result". They preferred to continue with "structure" – even though one could argue that "structure" must be available to obtain "results" in QoC. When scoring lists had a mixture of structure-/ process-/ results indicators – where QoC- results were defined in terms of the patients' perspective, as well as from the provider's perspective. Testing these lists resulted in impressive QoC results.
CONCLUSION Monitoring QoC in terms of results *is* possible. The fact that providers knew which results were expected from them, and what were the consequences –made them creative to find ways to arrive at the expected *results in QoC*. Ex-post payment mechanisms (like HIS and RBF) represent appropriate strategies to operationalize this concept, which may prove to be useful for other input-based types of health interventions than HIS and RBF.

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Budget support to Peru's health sector: A PFM perspective

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INTRODUCTION Budget support (BS) agreements have had a significant effect in levelling Peru's path towards Universal Health Coverage (UHC) in vulnerable regions. The Belgian Development Agency (BTC) mobilises BS in Peru to improve UHC and outcomes of Maternal and Child Health (MCH). Implementation of BS requires a commitment from partner countries towards credible progress in public finance management (PFM) reforms and, in this case, towards better allocation of resources and more efficient provision of public services. It seems to have had also relevant implications for PFM performance, both at national and regional/local levels.
AIM Description of BS and PFM elements in BS to the Peruvian MCH programme.
METHODS Analysis of studies on BS and PFM, key informants interviews and documents in MCH.
RESULTS Central-level PFM performance analysis allowed for BS to be disbursed from Belgium to Peru. Within the overall macroeconomic and fiscal reality, health financing, although still insufficient, is directed to priority populations and used more efficiently for negotiated service outputs and outcomes. Budget execution rose, and accountability and transparency increased on decentralised level. Closer cooperation between health and finance officials increased the health sector budget allocation in most years since the introduction of BS, but other tangible benefits of this association have been, amongst others, increased budget predictability and execution and lower funding fragmentation. Hence, improved public services. However, sector, regional and programme challenges remain. Increases in health spending aim mainly at expanding coverage while control and quality mechanisms are still weak or uncoordinated. Fragmentation in health financing overall persists although priority programmes, as MCH, pooled resources.
CONCLUSION PFM in Peru at national level is reasonably sound and conforms in general to international best practices allowing for BS. However, on the level of service provision a number of issues require attention to provide guarantees that public funds are spent correctly and to ensure public accountability. Problems with PFM at sub-national level need to be acknowledged and properly addressed, with a comprehensive strategy to strengthen its performance. Policy dialogue should shift in this direction, given that PFM reform at the national level has delivered important results.

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Performance based financing for mother and new-born health in Peru: A focused development cooperation

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INTRODUCTION Performance based financing (PBF) in Peru seeks to promote better-informed decentralised decision-making in the allocation of scarce government resources. The Finance Ministry disburses additional budget support (BS) funds of the Belgian Development Agency to increase the use and provision of quality health services for vulnerable populations in two selected regions with high maternal & neonatal mortality. BS agreements guarantee extra funding for the regions and allow for negotiated top-ups when meeting targets of critical minimal processes and intermediate outcome indicators.
AIM Analysis of preliminary PBF results on management indicators of the Peruvian maternal and neonatal programme.
METHODS Performance verification and evaluation follow an evaluation manual and utilize public registries and health information systems databases of involved institutions. Field visit, interview and compliance reports describe results and challenges.
RESULTS The two regional governments of Amazonas and Cajamarca demonstrated progress towards the management processes of operational programming, supply chain management, operational organisation, M&E. The 2014 baseline

saw only two of six supply chain criteria met. In 2015, Cajamarca reached all 16 targets negotiated. End of 2016, Amazonas and Cajamarca met the target of 75% availability of critical inputs to deliver services in health centres with 99% and 97.7% respectively, compared to 44% and 11% in early 2015. Regarding operational programming, over 77% of pregnant women in the nominal register at district level were covered by the public health insurance in the first trimester of pregnancy. From 2013 to 2016, institutional birthing in the supported rural areas increased from 49.5% to 62.7% in Amazonas and 56.7% to 68% in Cajamarca. Challenges such as mayor difficulties in purchasing processes remain, but interaction between different governing levels deepened to resolve these.
CONCLUSION Three years in the PBF cooperation, the two regions actively engaged and improved critical processes regarding registration, planning, human resources and organization of services. Although increasing yearly targets makes full disbursement difficult, the additional BS funds remain allocated to the regions ensuring continued motivation and learning. Qualitative feedback confirms PBF as an effective incentive and management tool, linking different government actors to support decision-making on allocation of resources and resolving bottlenecks.

5P49

Inside the black box: Administration of the Tanzanian Community Health Fund and its interaction with other health financing mechanisms

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INTRODUCTION In Tanzania the health financing system is extremely fragmented with cost sharing strategies in place to supplement funds provided from the central level. The Community Health Fund (CHF), a voluntary health insurance scheme for the informal rural sector, is one of these strategies. Yet, its implementation has been cumbersome.
AIM Investigate CHF administration processes and their interactions with other health financing mechanisms.
METHODS Two councils with different perceived administrative capacity were selected for this study. Administrative routine data were collected at council and health facility level. Additionally, an economic costing approach was adopted to estimate CHF administration cost and the contribution of other health financing mechanism.
RESULTS Bottlenecks in CHF administration processes led to implementation failures, which were likely to have affected CHF enrolment. Exemption policies and healthcare seeking behaviour in connection with adverse selection undoubtedly influenced the maximum potential enrolment rate, which could possibly be reached with a voluntary scheme. Furthermore, user fee policies and fund pooling mechanisms might have set incentives for care providers to prioritize one income source over the other. Costing results clearly pointed out the lack of financial sustainability of the CHF as such. However, they showed that owing to significant contributions of other health financing mechanisms, the CHF would theoretically be left with more than 70% of its revenues for reimbursing provided services assuming all administration processes would be working.
CONCLUSION Given the context in which the CHF is implemented and its interaction with other health financing mechanisms, it is highly questionable if improvements in CHF administration processes are feasible and scalable. The question also remains if such efforts were value for money. Thus, this publication calls for a realistic reconsideration of approaches taken to address the challenges in health financing and emphasises the importance of looking beyond a single health financing mechanism.

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Between marketing and universal coverage of obstetric and neonatal care: what about determinants of the variability of expenditures in Lubumbashi, Democratic Republic of Congo

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INTRODUCTION Make health care profitable is now accepted to fill the gap in countries where the State health budget is insufficient. However, to want too make profitable, cost recovery has become a barrier to access to quality care. In Lubumbashi, more than 70% of households pay directly obstetric and neonatal care, but there is no standard pricing of such care.
AIM This work studied the determinants of the variability of these expenses.
METHODS Between March and April 2014, we followed 1390 women, since their admission to the exit in 180 maternity units in Lubumbashi. During this period, we have triangulated collecteet, interview with new mothers, nurses and the literature review, data relating to childbirth-related expenses (transportation, medical care, buying medicines, food, and time of the accompanying). The determinants of the variability of expenditures were determined by regression multiple quantile. Expenditure have been converted into dollars ($1 USD = 920FC).
RESULTS The median cost of childbirth was variable depending on the type: eutocic: $ 45 USD ($ 17-260 USD); Caesarean section: $338 USD (USD$ 163-782). Membership (public versus private) and the level of the establishment (second versus first), nature of the provider (doctor versus nurse), increased the cost of two types of childbirth ($P < 0.001$). Expenditures were also elevated when they were subsidised — by a business or non government organization — and when they were directly insured by the couple. Caesarean section cost more expensive when it was carried out by a specialist when it was by a general practitioner ($P < 0.001$). More than 60% of women came to give birth in the establishment of health, without knowing, in advance, how much they would pay, and more than 15% having undergone major obstetric interventions were detained for not paying the costs of the care.
CONCLUSION In Lubumbashi, expenses related to obstetric care are arbitrary and could be catastrophic. Implement a system of exemption from the costs of care, is the way to avoid that pregnancy and childbirth deplete more households.

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Abstracts

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Postgraduate training in tropical medicine and international health – Results of an alumni survey on career development and implications for course content needs

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INTRODUCTION The Antwerp Institute of Tropical Medicine has – as one of its core functions – a longstanding tradition of postgraduate training in Tropical Medicine and International Health for masters (MDs, pharmacists, biomedical scientists, ...) and bachelors (mainly nurses and midwives).
AIM Aiming at updating the course content based on field needs, a survey on career development and on course content relevance was realized among alumni graduating between 2005 and 2015 (masters' course), and between 2013 and 2016 (bachelors' course). Results were compared with similar data from 2005 (Masters) and 2007 (Bachelors) when a last survey was carried out, before a curricula reform.
METHODS The on-line questionnaire related to evolving job context and content of missions abroad (country, employer, level of responsibility, main functions, areas of expertise). Alumni were also invited to critically evaluate their postgraduate training received in function of the field needs (knowledge, skills and competencies). They were asked if and how they perceive the course has been useful for their career, and how the teaching content should be adapted to evolving needs.
RESULTS 667 master alumni and 264 bachelor alumni were invited to participate. 37 master alumni and 38 bachelors (28 from the French courses, 10 from the English courses) answered the questionnaire.

We present an overview of their professional activities: countries and organizations, level of responsibility, job assignments. Alumni worked in a broad array of low and middle income countries, and worked at all levels of the health system (from local to international).

Overall evaluation of the course content is excellent, with emphasis on the importance of public health concepts and management tools. Concrete elements towards fine-tuning the content are proposed.
CONCLUSION Despite the low response rate, the answers give a qualitative insight in existing career opportunities and related training needs. The overall evaluation of the courses is excellent. Results are important to fine-tune course content in function of evolving field of work profiles and training needs.

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Complex leadership in health

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INTRODUCTION Health systems are widely acknowledged to be complex systems.Therefore, scholars, academics, practictioners and policymakers are getting more aware about the need to adopt complexity lens in health policy and system research. However, less attention has been paid to the implications of complexity science in the study of leadership in health.
AIM We conducted a scoping review of complex leadership (CL) in health care to explore how complex leadership in health care has been defined and conceptualised and to investigate how has 'complex leadership' been applied in health care settings.
METHODS We followed the steps described by (Arksey and O'Malley, 2005): (1) specifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, (5) collating and summarizing the findings and (6) reporting the results. We searched four databases (Google Scholar, Medline, Psychinfo and Wiley online library).

Our inclusion criteria were: 1) publication type: peer reviewed articles, theses and book chapters; 2) phenomenon of interest: complex leadership; 3) Context: health care; 4) Period of publication: between 2000 and 2016.
RESULTS Our search and selection resulted in 37 papers. We note that empirical studies on complex leadership are few and almost all research reported by these papers was carried out mainly in USA and UK.

The research papers adopt mostly an explorative or explanatory approach and do not focus on assessing effectiveness of complex leadership approaches. We found that there is some variation in definitions of complex leadership. Finally, we found that the majority of researchers seem to adhere to the mathematical complexity perspective.
CONCLUSIONS More investigations are needed to explain the multi-layered nature of leadership, define required CL competencies, and assess contextual validity of CL in low middle-income countries. Empirical studies are crucial to develop and test middle range theories on complex leadership.
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1. ARKSEY, H. & O'MALLEY, L. 2005. Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology,* 8, 19-32

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5P53

Impact of community-level factors on the volunteers services in rural Nepal: a qualitative study

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INTRODUCTION Volunteer community health workers are a key workforce for primary health care provision in low- and middle-income countries. In Nepal, female community health volunteers form a fundamental part of the public healthcare system and provide basic maternal and child healthcare to most of its rural population. Despite the importance of this role, empirical research on these volunteers is limited.
AIM The impact of community-level factors on the volunteers' services in rural Nepal is investigated.
METHODS The selection of villages was across geographical locations (the hill and terai). Communities were chosen with varying degrees of access to nearby healthcare centres. Interviews were held with 20 volunteers, 26 service users and 11 health workers. In addition, four focus group discussions were held with 19 volunteers between April and September 2014. Field notes were taken throughout the study. Data were analysed using thematic analysis method.
RESULTS The study shows volunteers are crucial for maternal and child health care in the areas with insufficient resources. When the volunteers' work was recognized and appreciated by health workers and service users, they were more motivated. Yet

many volunteers reported that they were concerned about community misunderstandings of their role especially among ethnic minorities. The misunderstandings and other issues that are a problem are: the villagers perceiving volunteers as paid workers, therefore expecting too much of them; seeing them as unnecessary medicine providers; a lack of awareness of healthcare services; competition with faith healers and unhelpful power dynamics within the family.
CONCLUSION These misunderstandings can lead to some serious consequences for maternal and child health. In order to get the best out of the volunteers' services, the national and local governments need to collaborate to inform communities on their roles.

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A prime vendor system to complement public sector supply- a public–private partnership in Tanzania

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INTRODUCTION Communities equate quality of health care with the availability of medicines. Clinicians depend on medicines to provide health care. Medicines availability in public health facilities in Tanzania is problematic. One cause of medicines shortage is unavailability at Medical Stores Department (MSD), the sole supplier for public health facilities. Districts may purchase from private suppliers in case of stock-out at MSD. However this procedure is intransparent, bureaucratic and uneconomic.
AIM Alternative strategies were needed to fill the supply gap and to complement the public sector supply system. While MSD will remain the backbone for medicines supply, Dodoma Region together with the Swiss government funded Health Promotion and System Strengthening (HPSS) project established a Prime Vendor (PV) system as a public private partnership (PPP). The aim was to improve availability of health commodities in public health facilities.
METHODS A concept for a scenario with a sole private vendor was endorsed and procedures to procure complementary supplies in a pooled regional approach were developed. A supplier was selected based on Good Procurement Practice and contracted with fixed prices. The PV system is financed with complementary funds such as community health fund, user fees and basket funds. The region operates a PV office. The system is closely managed by mandated administrative structures. It is monitored within an M&E framework and guided by a procedures manual.
RESULTS The Dodoma PV system was launched in 2014. Availability of medicines has increased by over 40%. The PV system is anchored in the Dodoma Regional Administration and Local Government. It is embedded in the systemic context recognizing the importance of capacity building and measures to strengthen accountability to avoid leakage.
CONCLUSION The PV system serves as a safety net in case of stock rupture at MSD. Health facilities manage their own funds following stringent operating procedures hence enhancing fiscal decentralization. Funds are used for pooled purchase from the PV, based on a PPP contract. The system supplies medicines and supplies of assured efficacy, safety and quality. The registered Jazia® PVS has been replicated in two more regions in Tanzania and may be rolled out nationally.

5P55

Performance for universal health coverage – efficiency analysis of sub-national health systems in Pakistan

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INTRODUCTION The World Health Report 2010 urged countries to not only spend adequately on health, but also efficiently to achieve Universal Health Coverage (UHC). Public health spending in Pakistan is the lowest in South Asia. Because of a constitutional amendment, the provision of health care has become a provincial government responsibility and all provinces have recently committed to enhancing public health spending and improving efficiency of health systems. However, there is very limited evidence on health systems efficiency in Pakistan.
AIM The purpose of this study is to comprehensively assess and compare the performance of health systems of all 28 divisions (sub-provincial geographical units) in the country to move towards UHC.
METHODS Data Envelopment Analysis (DEA) was used for analysis. A set of UHC indicators (health service coverage and financial protection) were the outputs and per capita pooled public health spending by the divisions was the input. Pakistan National Accounts 2011-12 was used for estimating pooled public spending on health. Data for the UHC indicators came from the Pakistan Social Living and Measurement Survey 2012-13. Sensitivity analysis for factors outside the health sector influencing health outcomes was conducted to refine the main model specification. Spider radar graphs were generated to illustrate the differences between divisions with similar public spending on health but different performance for UHC. Pearson product-moment correlation was used to explore the strength and direction of the associations between proxy health systems organization variables and efficiency scores.
RESULTS The DEA results showed large variation in performance of divisions for the selected UHC outputs. The results of sensitivity analysis were also similar. Overall, divisions in Sindh province were better performing and divisions in Balochistan province were least performing. Some noteworthy factors related to access to health care, responsiveness of health systems, and patients' satisfaction were found to be correlated with the efficiency scores.
CONCLUSION This research suggests that progress towards UHC is possible even at relatively low levels of public spending. The local health authorities can use findings of this study as a starting point for gauging UHC performance and should consider determinants of efficiency while planning reforms.

Abstracts

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Factors influencing the distribution of health care workers to rural areas in a Nigerian state in an era for Universal Health Coverage

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INTRODUCTION World health organisation has identified doctors and nurses/midwives-population density as key predictors of the outcome of health and a measure for assessing the quality of care for every population. Although the majority of the global population are rural dwellers, they are disproportionately cared for by 25% and 38% of the total physician and nursing workforce respectively with poorer health outcome. This condition is worse in Nigeria with its critical shortage of skilled health workforce. This inequitable distribution has resulted in very poor indices for all indicators of health for rural dwellers compared to their urban peers. Again, this has resulted in rural dwellers being exposed to significantly higher cost of healthcare compared to their urban counterparts.
AIM This study aimed to find out the factors responsible for the inequitable distribution of healthcare workers (doctors and nurses/midwives) to rural areas in Ebonyi State, Nigeria.
METHODS The study was carried out between June and August 2016.We obtained qualitative data using semi-structured in-depth interviews and focus group discussions from 25 participants drawn from doctors, nurses and policymakers in the State.Analysis was done using both an inductive and deductive methods to draw out key themes relevant to the study objectives.
RESULTS The study also showed that there were diverse reasons for this inequitable distribution broadly classified into socio-cultural, health system and personal healthcare workers (doctors and nurses) intrinsic factors. Of all of the various reasons mentioned under these broad groups the issues of stigma and poor recognition associated with working in rural area, inadequate recruitment of doctors and nurses for over a decade in the state, the concentration of specialist/training facilities in urban area where some of the key sub-themes that emerged. Other themes that emerged included neglect of staffing and equipping of rural health facilities, poor living conditions for the workers, uneven salaries associated with different tiers of government and poor career progression and prospect in rural areas.
CONCLUSION Based on our findings, there may be a need to implement both non-financial and financial actions to encourage more urban based healthcare workers to move to rural area.

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What keeps community health workers in Kenya going? A qualitative study

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INTRODUCTION Community Health Workers (CHWs) act as a key interface between communities and the formal health system in order to reach communities with much needed health care services. Sustainability of CHW programmes continues to be affected by attrition of CHVs and their low performance in many settings. CHW motivation is a key factor of CHW performance and is influenced by both health system and community level factors. In Kenya, CHWs are known as Community Health Volunteers (CHVs) and are supervised by Community Health Extension Workers (CHEWS).
AIM We sought to determine the factors that influence motivation of CHVs in two counties of Kenya.
METHODS In this qualitative study, in-depth interviews (IDIs) were conducted with 16 CHWs and 4 CHEWS in four community units in 2 Nairobi (urban) and Kitui (rural) Counties between November and December 2016. Participants were purposively sampled. IDIs collected data on sources of motivation and the factors that influenced their motivation to perform their roles. Transcribed IDIs were analyzed using a thematic approach using Nvivo 10®.
RESULTS Community recognition, encouragement from immediate family members, opportunities for further training, job satisfaction, training opportunities, volunteerism and supportive supervision were reported as sources of motivation. Community recognition of CHWs by community members was reported to be through reception during household visits, consultation for any health needs/queries and invitations to address community members during community meetings. Lack of commodities e.g. badges for identification, lack of standard reporting tools, inadequate supervision from their supervisors, unrealistic expectations from community members and lack of consistent financial support for community related activities and remuneration were reported as the key de-motivators for CHWs.
CONCLUSION Study findings show that local communities play an important role in CHW performance through CHV motivation. As the end-users of health services provided and supported by CHW programmes, there is a need to involve them in the development and implementation of such programmes to ensure community support and ownership. In addition, there is need to address the health system gaps that affect the implementation of such programmes to ensure continued motivation of CHVs and consequently their improved performance in our settings.

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Community expectations of community health volunteers in Kenya: bridging community and health systems

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INTRODUCTION It is important to design community health programs around the health care needs of the community members. There is need therefore to shape and respond to community expectations to make health programs responsive to needs. In Kenya community health services entail promotive and preventive health services that are provided at the households by lay health workers known as Community Health Volunteers (CHVs).
AIM To identify expectations of community members who are receiving services from Community Health Volunteers (CHVs).
METHODS Qualitative data was collected in March 2016 in Nairobi (urban) and Kitui (rural) asking about community needs and perception of CHV work. 12 Focus Group Discussions were administered on community members, 35 In-depth interviews

with CHVs, and 40 In-depth interviews with CHV supervisors at the community, health facility and sub county levels.
RESULTS Community members expected CHVs needed to offer complementary goods to support the services they offered such as drugs, contraceptives, water treatment materials, insecticide treated nets (ITNs), and health facility referral forms. Some community members referred to health facilities expected CHVs to offer them with transport, and free and fast services at issuance of CHV referral form at the health facility. While the community members understood that the CHVs were required by policy to only refer them to the health facility, they felt that the CHVs needed capacity to offer treatment for minor aliments and carry out rapid tests at home such as for HIV. CHVs were more often than not unable to meet the community expectations since these were either beyond their roles or the materials/capacity required was not availed to them. Lack of meeting their expectations resulted in reduced trust and lack of support for CHV work by community members, which in turn demotivated CHVs.
CONCLUSION There is a disconnect between services offered by CHVs and what their clients expect from them. While community members require sensitization on the roles and responsibilities of CHVs there is need to consider re-shaping and re-orienting of community health services in Kenya to improve satisfaction of community members.

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Impact of the Lesotho maternal and newborn health performance-based financing system on reproductive health indicators

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INTRODUCTION In 2014, the Lesotho's Ministry of Health initiated the Maternal and Newborn Health Performance-Based Financing (PBF) project (currently HSPE project) in the light of Lesotho's poor progress to achieve the three health Millennium Development Goals) (reducing child mortality, improving maternal health and combatting infectious diseases, like HIV/AIDS). According to the 2014 Lesotho Demographic and Health Survey, Maternal Mortality Rate and Under-5 Mortality Rate were among the highest in Sub-Saharan Africa: 1,024 deaths per 100,000 live births and 85 deaths per 1,000 live births respectively.
AIM The Lesotho PBF project is based on four principles: 1) autonomy of health facilities to plan and manage service provision 2) involvement of the local population in service management 3) use of business plans, contracts, external data verification and quality assessments and 4) separate functions for policy formulation/regulation (by the MoH PBF Unit), service provision (by health facilities) and purchasing (by a separate Performance Purchasing Technical Agent (PPTA), run by HealthNet TPO and MCDI).

Starting in two pilot districts, the project is now operational in six of the eight districts in Lesotho, encompassing 92 Health Centres and 8 district hospitals and using separate checklists to independently monitor quantity and quality of care.
METHODS Monthly PBF and Health Management Information System (HMIS) data were used to calculate project progress on selected Reproductive Health indicators.
RESULTS The percentage of pregnant women in Lesotho delivering in health facilities rose from 53.2% till 74.3% between December 2009 and December 2016, while the number of pregnant women making use of ANC services rose from 17,233 till 51,774 women. Also, the average Quality of Care score in the implementation districts rose from 50.6% till 70.7% between December 2009 and June 2016.
CONCLUSIONS The PBF project has helped Lesotho to make significant gains on reproductive health indicators. However specific demand-side barriers (like sociocultural beliefs and the country's rugged terrain) hamper further progress. In the coming 2 years the project will therefore focus on innovative approaches, like maternity waiting homes for full-term mothers and gift hampers for pregnant women, while at the same time further professionalizing the different PBF functions.

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Health surveillance Assistants remain critical to fill health workforce gaps in Malawi

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INTRODUCTION Malawi's Health Surveillance Assistants (HSAs), a CHW cadre, have increased in number over the past 10 years, partially in response to increased HIV needs. Funding from previous Global Fund grants was dedicated to deploy over 4,000 new HSAs in 2006. In 2016, nearly 9,200 HSAs make up about half of the overall health staffing levels in Malawi.
AIM To assess the history, role, benefits, limitations and sustainability of the scale-up program of HSAs in Malawi.
METHOD Interviews with key informants and analysis of policy, programmatic and budget documents related to the human resources for health (HRH) situation in Malawi.
RESULTS In the Malawian context of severe health staff shortages with just 36 health workers per 100,000 population in 2009, HSAs have played a critical role in filling gaps in service delivery in health facilities, in particular for tasks in vaccination, malaria or HIV testing. Initially HSAs were meant to be working in the community, but they have also been providing in-facility services.

Rather than being complementary to professionally trained staff, HSAs are compensating for staffing gaps since numbers of qualified health workers remain in large shortage in public services and don't keep up with population growth. Comparing staffing levels between 2009 and 2016, the overall staffing ratio per population has actually reduced. In rural areas the burden on HSAs is more important, due to uneven urban-rural distribution of qualified staff. National task shifting guidelines for HSAs are now developed, but with limited supervision and expectations to take on multiple tasks, concerns exist about the quality of care.
CONCLUSION With persisting severe staff shortages in Malawi's public services, HSAs remain a critical cadre. Without significant investment by donors and government into training professional staff, measures to ease swift absorption onto the public services' payroll and deployment in areas in highest need, HSAs alone cannot mitigate shortfalls in the health workforce for better service provision.

Abstracts

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In post-Ebola era, still waiting for the strengthening of health workforce in Sierra Leone

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BACKGROUND Health system inadequacies in West-Africa largely explain the deadly spread of the Ebola epidemic (2014-2016). Health workers were particularly vulnerable with 881 cases and 512 deaths. All affected countries faced critical health staff shortages with Sierra Leone having 2 doctors per 100,000 population, Liberia 1.4 and Guinea 10. Considering Sierra Leone has one of the highest maternal mortality rates worldwide, addressing human resources for health (HRH) gaps is essential for health system strengthening and increasing access to quality care.
AIM Identify bottlenecks and collect lessons learned to adequate HRH development in Sierra Leone's public sector.
METHOD Analysis of staffing numbers, HRH related plans and policies. Review of enabling and blocking factors to deploy an effective health workforce before and after the Ebola outbreak, looking at their contribution to responsive health systems.
RESULTS While the country's overall minimum staffing level stands at 16,000, in 2016 only 9,910 health workers were on the MoHS payroll. An additional 9,120 unsalaried trained health staff work in public health facilities as 'volunteers', without official employment status. Following graduation, waiting times to be absorbed vary between 2 and 10 years. Without adequate pay, volunteers charge informal patient fees, reducing access to and quality of care. The chronic staffing shortages are further exacerbated by maldistribution of staff, with 74% of the health workforce working in only 10% of facilities, predominantly in the western urban area. While the Government committed to absorb staff mobilized during the Ebola outbreak, a limited uptake of 549 mother-and-child aides was noted in 2016. In addition to professional staff, community workers have been key to fight the Ebola epidemic.
CONCLUSIONS Increased level and speed of recruitment of health workers into the public sector is needed to fill existing staffing gaps. However, underlying structural issues related to fiscal space remain unresolved and hamper effective and sustained measures to allow recruitment, remuneration and retention of health workers. Also after the Ebola crisis, many of the barriers pre-dating the outbreak continue to prevent adequate HRH-levels and health service delivery, weakening the country's capacity to respond to outbreaks. The promised international support to post-Ebola health systems strengthening has failed to address major HRH-related concerns.

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Gender dimensions of the ASHA programme: Programme design, evolution, and implementation truths

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INTRODUCTION India's ASHA program consists of over 850,000 female community health workers (CHWs). Launched in 2005, there is now an ASHA in each village and across urban centres who supports health system linkages and provides basic health education and care. These ASHAs receive incentives for specific tasks, including facilitating institutional childbirth, conducting home based newborn care, and conducting health education meetings.
AIM To identify the gender considerations in the design of the ASHA program, describe how these components have evolved, and reflect on current challenges.
METHODS This reflective piece draws from the authors' experience in programme design and implementation over the past decade, as well as government evaluations and reports.
RESULTS The ASHA program has evolved from framing the all-female CHW cadre as an instrumentalist consideration to an empowerment opportunity. Given that the initial impetus for the ASHA program was to address reproductive and child health issues, policymakers decided that a female cadre of health workers would be best positioned to engage with beneficiaries. ASHAs were selected from among the female residents of the village they were to serve and were trained nearby, to reduce travel requirements. Residential training workshops were added, which included crèche facilities, to enable immersive learning, develop empowering knowledge and skills, and build solidarity among ASHAs. ASHAs are expected to move beyond the female-sphere and serve as member secretary of their village health committee. Economic incentives provide an important source of financial empowerment and necessitate that ASHAs open bank accounts. ASHA calls for improved financial and career opportunities have been answered with an increase in the number and regularity of incentivized tasks and government scholarships for higher education. Gender based violence against ASHAs has been on ongoing program reality, with reports of ASHAs being harassed and sexually assaulted while carrying out their work.
CONCLUSION While the program has been increasingly designed to support ASHA health and empowerment from a gender-perspective, ASHAs continue to struggle with issues of gender-based violence and to seek improved financial and career opportunities through the program. New innovations, including training for ASHAs on gender based-violence and sensitization for healthcare workers, suggest positive next steps.

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A solidarity fund to improve emergency obstetric and neonatal care in Mirriah department, Niger

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INTRODUCTION In Niger, maternal mortality remains unacceptable with 1 woman out of 23 dying due to maternal reasons. Financial barriers are an important factor for not accessing to quality health care when needed. Efforts have been made to provide some free services like deliveries or healthcare for children <5 yrs old but transport costs remain nevertheless too high for many families. In order to reduce these costs and to improve access to emergency obstetric and neonatal care (EmONC), an action-research was conducted in Mirriah health district.

Methology: A participative process was initiated in 2009, starting with a survey to better understand the problem and

assess if people would be interested in a "solidarity fund" to cover transport costs for EmONC. Sensitization was organized in order to inform the community and all other stakeholders (official authorities, traditional leaders, practitioners, etc.) about this initiative. A general assembly set up the operating procedures and household financial contribution. Simultaneously, training has been provided to improve technical and relational skills of integrated health center practitioners and traditional midwives.
RESULTS The study showed that transport was indeed a real barrier and that most women were interested in contributing to an official solidarity mechanism. The general assembly unanimously decided that each household would pay 100CFA extra tax per year and 100 CFA in addition to medical consultation costs. From 2010 to 2016, approximately 1.000 deliveries and more than 2.500 evacuations were covered by the fund for a total cost of 33 million CFA francs. Assisted childbirth rate improved from 12 to 22% between 2009 and 2014.
CONCLUSION Solidarity initiatives can help to improve access to EmONC in countries with limited resources. A participative action-research is a good methodology to obtain the community support and ensure the sustainability of a solidarity fund. Such financing mechanism could be promoted as a mean in the pathway to universal health coverage in Niger.

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Cost-effectiveness of first-line antiretroviral regimens in a Nigerian HIV clinic: a 5-year retrospective study

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INTRODUCTION The need to provide antiretroviral therapy to the people living with HIV/AIDS has thrown enormous challenge to the Nigerian HIV programmes and the government due to the dwindling resources. Studies carried out to determine the cost-effectiveness of the various first-line ARV regimens in Nigeria remain limited.
AIM This study aimed to provide the gap in ARV cost-effectiveness studies in Nigeria.
METHODS This was a retrospective cohort study of all those enrolled into the HIV clinic of ABUTH, Zaria from 2009 to 2013. Demographic and clinic data were retrieved from the electronic database, case notes and supplemented with literatures. Direct medical costs were calculated while the utility measures were derived from published literature.
RESULTS The combination therapy AZT/3TC/EFV provided the most utility of 0.913 among the first-line drugs, followed by TDF/3TC/NEV (0.901) while TDF/FTC/NEV provided the least utility (0.848). Overall, AZT/3TC/NEV (ICER per QALY = $815.6) is the most cost-effective of the first-line ARVs, followed by AZT/3TC/EFV (ICER per QALY = $1173.7) while TDF/FTC/EFV is the least cost-effective (ICER per QALY = $2397.8). A one-way sensitivity analysis showed that varying the QALYs gained has an overall impact on the ICER/QALY.
CONCLUSION HIV programme managers, authorities and payers for HIV medications should focus on the use of AZT/3TC/EFV, AZT/3TC/NEV and TDF/3TC/ NEV as the fulcrum of their first-line ARV drugs in their programmes.

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Enhancing chronic condition care for urban poor: role of the local health systems

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INTRODUCTION The sheer volume of people living with chronic conditions and having qualitatively different care demands is stretching limits of the already weak health systems in many low- and middle-income countries. Despite commitment for and knowledge about strategies to address chronic conditions, there is little known on how to implement these strategies within resource-constrained local health systems.
AIM To understand the role of local health systems in enhancing chronic condition care.
METHODS Based on a 5-year doctoral research in a poor urban neighbourhood in South India having a mixed health system: (1) a survey of 9299 households to understand illness profile, health-seeking practices, and healthcare expenditures; (2) interviews of 19 health providers and 16 diabetes patients to understand organization of and access to care; and (3) a quasi-experiment involving four intervention and matched control health facilities to evaluate a health service intervention (patient education, use of standard treatment guidelines and generic medications).
RESULTS 13.8% adults reported chronic conditions, with people in poverty at significantly greater odds of reporting chronic conditions. 80% patients relied on the private sector. 69.6% households spent out-of-pocket for outpatient care and 16% experienced financial catastrophe, doubling the number of people living in poverty within 1 month in the neighbourhood. Socially defined roles/positions limited women and elderly in managing care. Fragmented health services implied visits to multiple health facilities for a single episode of care. The limited use of medical records and lack of referral systems hindered continuity of care. Poor regulation of the private sector and corruption marked ineffective governance. While the government sector fails to provide adequate care, the private sector strives to maximize profits. Care for the poor is at best seen as charity. The efficacious strategies did not readily translate into better care and health outcomes for diabetes patients. Implementing a positive change requires careful considerations of complex nature of local health systems, of local dynamics and opportunities.
CONCLUSION There is need to address the systemic impediments in the local health systems and to integrate social and health care in order to enhance care for chronic conditions.

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Assessing quality of HIV counselling services offered in public health facilities in Kampala

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INTRODUCTION HIV counselling has increasingly become available in public health facilities in Uganda. Counselling is a key component in HIV/AIDS prevention programs as an entry point into care, treatment and support services, but there is paucity of literature about the quality of counselling provided during HIV/AIDS care.

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AIM We assessed the quality of HIV counselling services offered in public health facilities in Kampala by reviewing adherence to the HCT policy guidelines, content of counselling information and health facility amenities.
METHODS This was a cross-sectional study utilizing quantitative methods of data collection, with particular focus on the provider's perspective. The sample size constituted of 74 health workers offering HIV counselling services in five public health facilities. The overall quality of HIV counselling was categorized as 'poor' if the final composite score was below 70% and 'good' if the composite score was above 70%. Likewise, for the three dimensions of quality, the same cut off of 70% was considered. Principal component analysis was utilized to obtain and reveal current composite scores of the variables. Data were summarized into frequencies and proportions using STATA, version 13.0.
RESULTS Overall the quality of HIV counselling was found to be 'poor' as only 26% of the HIV counselling service providers offered 'good' quality of HIV counselling. Results also revealed poor adherence to the HIV Counselling and Testing guidelines as only 25.6% of the counselling service providers adhered to the guidelines. In addition, 67.6% of the health workers offered 'poor' content of counselling information. Also only one out of five health facilities was found to have adequate amenities.
CONCLUSION Overall quality of HIV counselling was found to be poor. The study also revealed poor content of counselling information offered to clients as some topics like the window period, disclosure and family planning among others were haphazardly dealt with. Amenities in health facilities were largely found to be inadequate. Improvements should be focused on mentorship programs for all health workers involved in HIV counselling. Provision of modest space for counselling is also required so as to ensure privacy during counselling sessions.

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Integrating nutrition products into health system supply chains: making the case

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INTRODUCTION UNICEF commissioned a study on supply chain management (SCM) for nutrition products to inform broader policy and strategic guidance for supply chain integration via consolidation of key findings from nine UNICEF-commissioned country studies in sub-Saharan Africa.
AIM The purpose of this article is to summarise the key findings and contribute to a limited evidence base for identifying bottlenecks and enablers ensuring successful integration of nutrition supply chain into national systems.
METHODS To systematically analyse the data, a conceptual framework was developed linking the supply chain with relevant WHO health system strengthening building blocks. Interviews with (inter)national stakeholders, literature review and e-survey were conducted to supplement findings from the country studies.
RESULTS Review of the country studies identified enabling and constraining conditions for integration of parallel nutrition supply chains. It was reconfirmed that health systems strengthening consideration should be taken to ensure sustainable integration results. Overall findings suggested that the current level of integration of the nutrition product supply chain differs significantly. In most countries, most supply chain elements are not integrated in the national supply chain. Most integration happens downstream in the chain. The literature review and interviews with stakeholders showed support for integration of parallel supply chains (not limited to nutrition products). Such support seems to be built on less strong empirical evidence as the literature review could not identify many published case studies on integration experience. This study contributes to strengthen this knowledge base.
CONCLUSION The study concludes that a number of minimum conditions should be addressed before countries can embark on an integration process of a supply chain. Once these conditions are met, several technical SCM issues have to be addressed. Recommendations were developed to gradually integrate parallel supply chains into the national chains. Based on this study, partners participating at the Nutrition Supply Chain Practitioners' Forum in Copenhagen (June 2016) highlighted key principles on the nutrition supply chain.

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Effect of primary health care worker training on identification of child- and adolescent mental health conditions: A randomised controlled trial in Uganda

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INTRODUCTION Globally, up to 20% of children and adolescents suffer from mental, neurological or substance use (MNS) disorders, but a mental health treatment gap exists, which can be closed through integrating MNS services into primary health care (PHC). However, the ability of PHC workers to detect and manage child- and adolescent mental health conditions (CAMH) is inadequate. The WHO Mental Health Gap Action Program (mhGAP) is designed to aid integration of MNS disorders into PHC in low and middle income countries.
AIM To evaluate the effect of a CAMH-focused mhGAP training of PHC providers on identification of MNS disorders among children and adolescents in Eastern Uganda.
METHODS This randomized controlled trial compared the yield of CAMH patients in intervention (n = 18) compared to control clinics (n = 18) following mhGAP training of PHC workers. Clinics were included in the intervention if they neither had psychiatric staff nor had been exposed to mhGAP. Providers of PHC services to children and adolescents were trained on identification and referral for CAMH, based on the mhGAP implementation guide. The primary outcome was the proportion of clinics in the intervention arm with a non-epilepsy CAMH diagnosis for three consecutive months post- training, compared to control arm clinics. Data were analysed using fisher's exact test and logistic regression based on Intention to Treat principles.
RESULTS The proportion of clinics registering a CAMH diagnosis was significantly higher in the intervention (8%) than in the control (3%) arms (P = 0.037). The odds of a CAMH diagnosis were 2.5 times higher in intervention sites (AOR 2.50; 95% CI [1.32, 4.76]; P = 0.005) adjusting for patient age and sex, and accounting for clustering of patients at the clinic level, while number needed to treat (NNT) is 23,256.
CONCLUSION Training PHC providers on mhGAP results in significantly higher CAMH cases being identified in Eastern Uganda. However, detection rates are still very low.

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Factors associated with poor glycaemic control among diabetic patients in primary health care services in Morocco

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INTRODUCTION Diabetes is a real public health problem worldwide. Its prevalence is increasing in Morocco and all over the world as well. The last estimation of diabetic patients indicates that two millions of people live with the condition in the country. Only one-third of them are managed in primary health care in public sector. Inadequate glycaemic control in diabetic patients contributes to increased rates of macrovascular and microvascular complications.
AIM The objective of the study was to determine factors associated with poor glycaemic control, among diabetic patients in primary health care services in Kenitra province.
METHODS We conducted a cross-sectional study in 2016, during April and May, by applying a standardized questionnaire to a sample of diabetic patients, randomly selected from those attending 24 health centers in Kenitra province. We explored biological parameters and patient characteristics by descriptive statistical analysis. Thus, multivariate analysis was performed by using Stata, version 11.0.
RESULTS In total 777 patients were included. The mean HbA1c was 9% ± 2.2. Of them, 82.6% had an HbA1c ≥7%, indicating poor glycaemic control. As key finding being unemployed (OR = 1.6, 95% CI 1.1-2.3), without medical coverage (OR = 1.4, 95% CI 1.2-1.6) and diagnosed as diabetic patients over 5 years (OR = 1.8, 95% CI 1.2-2.6) were more likely to present poor glycaemic control. There was no difference in glycaemic control related to sex or type of therapy. Even though 77.6% of diabetic patients reported dieting and exercising, it does not seem to improve their glycaemic control.
CONCLUSION This study indicated that glycaemic control in diabetic patients was very poor. Long duration of diabetes and some social characteristics of patients, such as lack of employment and medical coverage were independent predictors of poor glycaemic control. Interventional strategies should focus on promoting social determinants and education programs in order to enhance glycaemic control.

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Kira Mama! A continuum of care for neonatal health

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INTRODUCTION Despite global progresses in reducing maternal and child mortality, neonatal health remains an unfinished agenda with about half of deaths among under-5 children occurring within the first 28 days of life. Comitato Collaborazione Medica (CCM) committed to reduce neonatal mortality and morbidity in Cibitoke district (Burundi), embracing the *Every Newborn*[1] strategic objectives and promoting a continuum of care from community to facility.
AIM The project aims at testing the effectiveness of a three-level approach – Community, Health Centre (HC) and Hospital care – to improve neonatal health in Burundi and exploring its scalability in similar settings.
METHODS The project develops across the whole district, involving 16 HC and the District Hospital. Activities include the training and on-job coaching of health workers; a calendar of three postnatal home-visits within the first week of life to mothers and babies; and the establishment of a hospital Neonatal Unit to manage premature, LBW and sick babies. Communities and women's groups are empowered to improve home care practices, identify danger situations and refer them to facility. Services are tracked throughout the project life with key indicators.
RESULTS Over 16 months, 135 nurses and 13 doctors were trained on essential newborn care and care for the sick and premature baby; 401 Community Health Workers and 34 supervisors coached in following the postnatal home-visits calendar. Averagely each month, 860 institutional deliveries and neonates are assisted in the district; 33 babies admitted in the hospital Neonatal Unit, 7% of which still referred to higher level of care in Bujumbura; 690 mother-baby pairs visited at home (74% of all district deliveries).
CONCLUSION The three-level approach revealed essential in improving neonatal health in the district. The closer and more effective link between community and facility care allowed harnessing the power of both families and providers for better neonatal outcomes. The accurate documentation of results may guide the scale-up of the approach.
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Quality determinants of diabetes mellitus services in Sudan: a descriptive study

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INTRODUCTION Diabetes Mellitus is a growing health concern in Sudan despite the health development and investments. This is further challenged by the limited data on access, quality and utilization of services.
AIM The aim of this study is to assess quality of diabetes care services in the specialized diabetes centres in Sudan.
METHODS A cross sectional descriptive study was carried out to evaluate the quality of services provided at specialized centers using Donabedian framework. It assessed the infrastructure, equipment and supplies; adherence of health care providers to diabetes management protocol; patients satisfaction and the state of patients diabetes control.
RESULTS Most of the specialized diabetes centers (more than 81%) has adequate structure to provide quality care including consultation, dressing, foot care, nutrition and education and waiting areas. However, availability of emergency equipment and specialized care provider team were low (22.2%) with most of the available care providers partially adherent to the diabetes management protocol (21%). Most health educators (60%) identified audio-visual media material, as has no effect on compliance of the patients to diabetes care. Most of the patients were satisfied with the quality of the provided diabetic services (more than 89%) while having difficulty in accessing diabetes centers (39% not satisfied with the distance) and the waiting time at the center (52% consider it long). Medical records were deficient in recording key means of monitoring diabetes (HbA1c, cholesterol, blood pressure and eye examination), which has limited this study ability to assess the state of patients diabetes control.

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CONCLUSION Diabetes patients were satisfied with provided services despite the service quality limitation (lack of required equipment, limited provider's adherence to management protocols and limited use of health education). Specialized diabetes care providers need to be regularly trained, mentored and monitored to ensure adherence to diabetes management protocol. Diabetes specialized centers require investment on equipment availability and proper use of health education materials.

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A task-shifting mental health program: integration of primary health care and social care on depression

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INTRODUCTION 14.9% of the Vietnamese population suffers from 10 common mental conditions, in which 2.8% have depressive disorders [1]. The Ministry of Health (MOH) and the Ministry of Labour, Invalids and Social Affairs (MOLISA) currently manage two parallel mental healthcare systems, which provide support and care for Vietnamese people with common mental disorders; however, lack of a comprehensive national mental healthcare program has resulted in inefficient interactions between these two systems, leading to worse quality of care, especially at the local level. Additionally, both of these agencies focus on psychotic disorders and ignores illnesses such as depression [2]. Therefore, it is imperative to build a task-shifting mental healthcare program at the grassroots level involving both MOH and MOLISA.
AIM To pilot and examine the feasibility and effectiveness of a task-shifting approach, which combined both health and social resources for depression at the primary care level of Vietnam.
METHODS A total of 82 health workers (HWs), social workers (SWs) and volunteer lay social workers working in MOH's and MOLISA's facilities at eight selected communes of two provinces were trained and involved into steering groups to recruit and refer patients. Patients visiting commune health centers (CHCs) were screened by HWs, while high risk individuals in the community were screened by SWs and volunteers. Severe cases were referred to higher levels for treatment, while mild and moderate cases were recruited into the study. The recruited patients subsequently received follow-up care from both HWs at CHCs and from SWs and volunteers at home. Questionnaires that measured changes in depression and functional difficulty from pre-to post-intervention were analysed.
RESULTS HWs screened 2,148 participants and identified 45 depressed individuals, while SWs and volunteers screened 1,956 participants and identified 58 depressed individuals. Sixty-seven depressed individuals were recruited and at study completion, 60 (90%) fully recovered from depression.
CONCLUSION Integration of health and social resources to promote access and provide care for depressed individuals at the primary level in Vietnam is feasible and efficient. This task-shifting model should be used to provide evidence-based practice to support the Vietnamese government in the development of national mental healthcare program.

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Gaps in the access, diagnosis, treatment and control of hypertensive patients in a metropolitan area of Centro Habana, Cuba

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INTRODUCTION Knowing and facing the difficulties that appear during the control of the hypertensive patient is a challenge for any health system. This will only be possible being able to perform dynamic, effective and permanent actions in the different levels of care.
OBJECTIVE To identify the gaps in the access to health services, diagnosis, treatment and control of the hypertensive patient in a metropolitan area of Havana (Nguyen Van Troi Polyclinic in Centro Habana) in 2016.
METHODS A descriptive cross-sectional study was carried out from February to June 2016 at the Nguyen Van Troi Polyclinic in Centro Habana. Of the total number of 18 year- old and older patients who were discharged as hypertensive (4480), a sample of 521 was selected through a two-stage cluster sampling. These patients underwent a semi-structured individual interview with three blood pressure shots. In addition, we reviewed official documents of the area that allowed us to identify other existing breaches.
RESULTS 92.3% of the interviewed patients reported needing attention in the last year. Among these, 70.8% accessed health services at all levels, with a predominance of Primary care level (40.5%). 98.1% have indicated pharmacological treatment, with diuretics being the most used (61.0%), 50.7% have adherence to treatment according to the Morisky Test. 16.5% of the patients were not seen in the last year, the main reason was the non-scheduling or consultation appointment (36.0%). A significant association ($X^2 = 55.198$ $P = 0.000$) was observed between adherence to treatment and blood pressure levels.
CONCLUSIONS Access gaps were linked to the non-seeking of care despite perceiving the need. Poor follow-up and low therapeutic adherence in hypertensive individuals were the principles that supported the high percentage of individuals with uncontrolled blood pressure values.

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Gaps in the management of type 2 diabetic patients in a metropolitan area of Havana

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INTRODUCTION The prevalence of diabetes in the world is estimated to range between 2 and 6% of the population. It is

believed that 50% of cases remain undiagnosed, in Cuba it occupies the eighth position among the top ten causes of death for all ages.
OBJECTIVE To identify the main gaps that affect the integral management of diabetic people, in a metropolitan area of Havana (Lawton Polyclinic in October 10 municipality), during 2016.
METHODOLOGY A descriptive cross-sectional research was carried out. The selection of samples was done by means of a biphasic cluster sampling, in a first stage of the 23 existing clinics were selected 10, and of each of them 58 type 2 diabetic patients older than 18 years were chosen. The sample was formed by 580 patients, who were given an instrument prepared for this purpose. In addition, official documents of the area were reviewed that allowed us to identify other existing gaps.
RESULTS 96.4% of the diabetic patients interviewed stated that they felt a need for care in the last year and 90.2% of these patients accessed health services located in Primary Health Care. There were difficulties with the care received mainly due to organizational problems and lack of resources, although 84.2% of the patients were satisfied with the care received. The main gaps detected in the diagnosis were the lack of active search in risk groups and the failure to perform evaluative glycaemia in 6.6% of the diabetic population. 68.3% of these patients have indicated pharmacological treatment, 31.7% manage to control with diet exclusively and 77.5% is adhered according to the Morinsky test.
CONCLUSIONS The gaps related to access to health services and medical control are a direct consequence of the instability of the health personnel who provide their services in this area of health. This has repercussions on the control of the patient due to the non-compliance in the schedule and the frequency of follow-up medical consultations, which constitutes a failure of the program.

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Non-pharmacological factors associated with control of hypertension among older persons in Uganda: A cross-sectional survey

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INTRODUCTION In the past two decades, the global trend of people with hypertension has doubled, with increasing prevalence observed among the older persons (60 years and above). Every three in four (75%) of older persons are currently estimated to have hypertension in low and middle-income countries. Uncontrolled hypertension accounts to nearly 2 in 10 all cause of deaths worldwide. Therefore, optimum control of hypertension is essential in averting premature deaths due to cardiovascular complications among older persons in later years.
AIM The study aimed at determining non-pharmacological factors associated with control of hypertension among older persons in Uganda.
METHODS A secondary data analysis was done from a cross-sectional survey conducted in two districts –Mukono and Buikwe in 2012. Data collected consisted of socio-demographic factors, lifestyles factors, blood pressure and height measurements. We included 165 from 868 participants who were aware that they had hypertension. Hypertension was defined as systolic blood pressure >140 mmHg and Diastolic >90 mmHg. We used a backward stepwise logistic regression with survey estimation to determine socio-demographic and lifestyle factors that were significantly associated with control of hypertension.
RESULTS More than 2 in10 of the study participants had poor control of their high blood pressure (0.21%; 95% Confidence Interval (CI); 0.14-0.27). The factors that negatively affected control of hypertension were alcohol consumption (Odds ratio (OR), 2.50; 95% CI; 1.06 -5.56) and primary level of education (OR, 2.70, 95% CI; 1.09- 7.14). Factors associated with good control of hypertension included; participants having received health professional advice (OR, 0.39; 95% CI; 0.17-0.91) and attainment of secondary education (OR; 0.54, 95% CI; 0.31-2.22).
CONCLUSIONS Factors associated with control of hypertension among older persons included alcohol consumption, education and participants having received health professional advice. The government should prioritize interventions that address health promoting lifestyles as part of life course since ageing is a transitional process. Strategies should be drawn to improve health literacy levels on the management of chronic disease among older persons.

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Integrating mental health care (MHC) to the district health system: action-research in Niger

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According to surveys carried out in 2009 in Niger, mental health care (MHC) is anachronistic, difficult to access, rigid, self-centered and does not meet population's needs. In order to address this situation, the National Mental Health Programme decided to integrate MHC into primary health care (PHC), starting with two pilot health districts in Dosso region from January 2012. In 2013, a situational analysis showed several problems and an action-research was planned in 5 integrated health centers in each district in order to accelerate the integration process.

The aim of the action-research was to provide technical support to identify and correct any problematic situation and to write a best practices document about MHC integration into PHC.

Actions focused on 6 elements stemming from the situational analysis: practitioners capacity strengthening, health data collection, primary health agent supervision, financial accessibility to MHS, community involvement and psychotropic drugs availability. Support has been provided according to action plans that were build up together with field actors.

Positive results have been observed: the number of cases managed for mental health at decentralized level increased from 420 in the 2 first years of the pilot project to 887 the first year of the action-research and to 1000 cases the second year. Similarly, specialized service at region level saw a decreased number of case, as more people could be handled at decentralized level.

Lessons learned from this action-research are the importance of close supervision and the full implication of community

actors; the need to strengthen capacities according to actors and their specific role in the system; and the importance of quality data collection.

This action-research was a fruitful experience which could be replicated in order to accelerate MHC decentralization process in Niger. Providing these services at the operational level will help reducing the gap in mental health care in Niger.

5P77

Health system preparedness and access to medicines for non-communicable diseases at primary care: experience from a south Indian district

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INTRODUCTION Non-communicable diseases (NCD) have become a major public health challenge worldwide. Like many other low and middle-income countries, India is struggling with a huge NCD burden with 60% of all its deaths attributable to NCDs. However, India's public health care system especially at the primary care level, continue to largely focus on communicable diseases, almost to the exclusion of non-communicable diseases.
AIM To assess the health system preparedness including access to medicines for NCDs at primary health centre (PHC) level in a district level local health system.
METHODS This is part of a mixed methods research study on improving equitable access to medicines for people with NCDs (2013-2016), conducted in Tumkur, Karnataka, India. The quantitative component of the study included NCD household and health facility surveys, and the qualitative part included focus group discussions with the community and health workers, in-depth interviews with NCD patients, PHC personnel, and state and district health officials. This paper draws mostly from the qualitative data, analysed using Bigdeli et al[1] framework on access to medicines.
RESULTS Lack of laboratory facilities, medicine stock outs and lack of counselling services for NCD were common in PHCs. 90% of the survey households *depended on private facilities for NCD medicines. Lack of trust in Government medicines was noticed among community and health workers.* The district and sub district governance structures were found to neglect the importance of NCD management at primary care. Financial and managerial resource allocation for NCDs was found to be relatively very low. The national programme for control of NCDS (NPCDCS) placed less importance on primary care management of NCDs and the activity under PHCs was limited to sporadic screening camps.
CONCLUSION Though NCD is an important topic in the global as well as national health debates, the local health system acknowledgement of this epidemiological transition appear to be limited. The health governance structures need to highlight the role of primary care in NCD management. The national NCD control programme needs to focus on health promotion activities, continuous care, follow up and other required services for long-term management of NCDs at primary care.
REFERENCE

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5P78

The global point prevalence survey of antimicrobialconsumption in one Costa Rican hospital

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INTRODUCTION The knowledge of antimicrobial consumption is critical in all medical centers. It gives the information of how well the prescriptions are made as well as the clues to establish different programs that can correct the course of bacterial resistance and nosocomial infections.
AIM To establish the prevalence of antimicrobial consumption in Hospital Mexico during the period of time between February 14-15, 2015, and to give clues on how to improve it.
METHODS The information was collected retrospectively in February, 2015 using the standardized and validated paper forms. Detailed data was collected for all inpatients receiving at least one antimicrobial treatment on the day of the survey and completely anonymously entered online using a web-based tool for data-entry, validation and reporting as designed by the University of Antwerp (www.global-pps.com). Denominator included all admitted inpatients, collected at ward level.
RESULTS Data included 438 patients who were admitted in our hospital. Overall antimicrobial prevalence rate was 37.7%, which is higher to the one reported from East Europe (27.4%), but lower when it's compared with North America (38.6%). From the 133 treated patients reported, 25.4% were prescribed for medical/surgical prophylaxis; the nosocomial infections were 46% (n = 60), and the community acquired were 28.4% (n = 37). Excluding prophylaxis, 45% (n = 60) of the treatments were empiric and 54.1% (n = 72) were targeted. The use of biomarkers was 90.7% (n = 88) of all the treated patients (n = 97). The beta-lactams were the most common antibiotic used in our hospital, from which the third-generation cephalosporins represented the 39%.
CONCLUSION We identified several targets to improve: number of nosocomial treatments that could be prevented, number of empiric treatments that could be overtreated and the excess of selective pressure made to our microorganisms with the third-generation cephalosporins. We aim to make policies from these three important issues in order to improve antibiotic prescribing and reduce hospital acquired infections.

Abstracts

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Strengthen digestive surgical emergency care: Experience of an action-research in Zinder National Hospital, Niger

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INTRODUCTION Digestive surgical emergency care in Zinder national hospital is facing various dysfunctions which affect integration and continuity of care (low level of reference, delay in care, high mortality). An action-research is being conducted to verify if a better counter-reference is a good leverage to indirectly strengthen the primary health care professionals' skills, enabling them to better refer and reduce the delay to ensure effective care by the surgical team.
AIM The first step of that action-research consisted in setting up a quality circle in the hospital to boost the surgical team and identify together ways to improve the quality of digestive emergency care. The first activity was the professionals' skills strengthening in health care quality insurance and case management. Then the quality circle decided to counter-refer patients to the health facility of origin more systematically. They also created a network of providers between the hospital and the integrated health centers, the objective of their list of contacts is to accelerate the emergency care. Routine data were analyzed to describe the base line situation (2013-2015) and to document the process during the year 2016.
RESULTS For the period 2013-2015, before the creation of the quality circle, digestive surgical emergency reference rate was 33.2% (313/943) and the counter-reference 2% (6/313). Since the beginning of the intervention, reference rate is not changing much (34%; 155/459) but the counter-reference increased considerably to 39% (61/155). The average delay before surgical intervention decreased from 8.5 h before the intervention to 6.5 hours.
CONCLUSION The first step of that research-action allowed to boost the digestive surgical team which communicates more effectively since then and increased considerably the counter-reference rate even if more efforts have to be done. A second step is analyzing the patient pathway inside the hospital to identify other bottlenecks and enhance the digestive emergency care.

5P81

Preventing infectious disease by sensitization

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INTRODUCTION Aware of the fragility of Burkina Faso health system and in the context threatening with of Ebola outbreak, OCADES Caritas Burkina developed a contingency plan centred on promotion of best access to health care servicefor population and educate people to have good hygienic pratice.
AIM Strengthening to the capacity building of the sanitary and school structures capacity to fight against the infectious diseases in Burkina Faso
METHODS From January 2015 to June 2017, 23 health structure with 354 health workers, 70 schools with 12500 pupils, and 140 educative mothers are concerned by the project. Concerning health structures, some activities were done: building of incinerators, drillings, water towers, water convenyance, production of bleach, training on hospital hygiene. Concerning schools, the activities were: bring of safe water, building of dumpster, sensitization on the wash of hands, the hygiene at the school and environemental education, bulding human ressources capacity.
RESULTS At April to December 2016, we note a change of behavior with pupils and health workers. Then according to the indicators of the project, we note positive change, 83% (vs 83% at April) of health workers apply the measure of hygiene, 70% (vs 41%) of the schools have functionnal wash-stand and assure their netoyage. 60% (vs 40%) of the educative mothers adopt a good behavior in their home. However, the number of patients and prenatal consultations were decreasing.
CONCLUSION The promotion of the hygiene in school structures and improvement of health services in sanitory structures are central to prevent infectious diseases and build system for emergency response.

5P82

Issues and challenges of integrating essential packages of high-impact services into the prevention, surveillance and adequate management of cases of neglected tropical disease in Guinea

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The results of studies on the prevalence, knowledge and practices of communities and health workers concerning neglected tropical diseases in Guinea show the value of integrating the packages of essential interventions. However, the Ministry of Health remains confronted with the integration of services. There are ten neglected tropical diseases in Guinea. Three of them have been the subject of specific programs (African human trypanosomiasis, leprosy, buruli ulcer) and interventions for other pathologies are carried out by the interveners and often without coordination. These are mainly: geohelminthiasis, schistosomiasis, trachoma, lymphatic firaliosis.

In place of specific vertical programs, a national program of tropical diseases would facilitate integration of essential services packages, coordination and resource mobilization. For example, a policy, a strategic plan for service development and a monitoring and evaluation system with relevant indicators to be reported regularly will be developed with input from all stakeholders.

To this end, the leadership of the Ministry of Health must be translated into a strong commitment to institutionalize the process and to organize in order to achieve alignment of partners and community participation. Such a system will require survey data to better understand expectations, potentials, prospects and bottlenecks in order to redefine strategic interventions with high impact on reducing disease burden and mortality Attributable to neglected tropical diseases. Therefore, obtaining current and reliable information on neglected tropical diseases is a priority in order to develop specific interventions for communities to increase the level of surveillance, prevention and integrated management of diseases in Guinea.

The momentum has already begun because a national program has been in place since 2012 dedicated to blindness and concomitantly to neglected tropical diseases in Guinea.

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Community engagement, personal responsibility and self help in Cuba's health system reform

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INTRODUCTION In 2011 the Cuban public health system began a deeply process of reforms. Some stakeholder considerer this is a good opportunity to discuss the importance to include community engagement, personal responsibility and self-help in the actions of system reforms development by Cuban Ministry of Public Health.
AIM To analyse from several social actors' perceptions, how community engagement, personal responsibility and self- help are approached (or not) in currently Cuba's health system reform.
METHODS We conducted semi-structured interviews with stakeholders representative of health sector, academic institutions and civil society. Interviews were transcribed and analysed qualitatively using NVivo 10. Quantitative codes were applied and descriptive statistics are reported alongside qualitative findings.
RESULTS Community engagement, personal responsibility and self-help emerging as important topics to reorientation in the context of the health system reform under way. They are consistent with the objectives and actions of system reforms proposed and been ethically justified according to principles of the beneficence as responsibility and justice as solidarity. But, a new sense of personal responsibility had to be assume, far away of neoliberalism discourse characterized by an inappropriate government cuts to health services and self-blame or stigmatization for those who cannot meet the high standards of 'healthism' and 'good citizenship'.
CONCLUSION Health system reforms currently under way in Cuba, need the contribution citizen can make through their personal responsibility for the care and protection of individual and collective health, through public mechanisms of empowerment that assure the sustainability of healthy public policies, intersectoral action and social protection of health, based on the principles of solidarity and responsibility.

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Improving prison health governance: the Zambian prisons health system strengthening (ZAPHSS) project

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INTRODUCTION Prison health and health services in Zambia exist in a state of 'chronic emergency'. In 2013, the Zambian Correctional Service (ZCS) partnered with Centre for Infectious Disease Research in Zambia on the ZaPHSS project, seeking to tackle structural, organisational and cultural weaknesses within the prison health system.
AIM We present findings from a nested evaluation that was guided by a modified realist framework, seeking 'context-mechanism-outcome' configurations.
METHODS Mixed methods were used including document review, in-depth interviews with Ministry (11) and prison facility (6) officials, focus group discussions (12) with male and female inmates in six prisons, and participant observation during project workshops and meetings. Ethical clearance and verbal informed consent were obtained for all activities. Analysis incorporated deductive and iterative inductive coding.
RESULTS *Outcomes*: Improved knowledge of the prison health system and service needs among key stakeholder groups was translated into stronger political and bureaucratic will. This found expression in a tripartite Memorandum-of-Understanding between Ministry of Home Affairs, Ministry of Health (MOH) and Ministry of Community Development, and in the appointment of a permanent liaison between MOH and ZCS. Capacity building workshops for members of ZCS Health Directorate and Command resulted in strengthened health planning and management outcomes including: doubling the ZCS health-professional workforce from 37 to 78 between 2014-16; introducing pre-service basic health training for all incoming ZCS officers, and formalisation of facility-based Prison Health Committees with a mandate for health promotion and protection (11 committees trained/appointed by 2016). *Mechanisms*: continuous and facilitated communication among major institutional stakeholders and the emergence of strong inter-organisational trust were critical to the project's iterative successes. Enabling *contextual factors* included a permissive political environment; a shift within ZCS from a 'punitive' to 'correctional' organisational culture; and prevailing political and public health concerns about the spread of HIV and TB in prisons.
CONCLUSION Findings demonstrate how a "systems" approach to seemingly intractable problems of weak governance in the Zambian prison health system enabled both short-term 'tactical' and long-term 'strategic' progress. Many challenges remain but context-sensitive application of these principles to other settings may yield positive outcomes.

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"From Helsinki with love"- an evaluation of health in all policies strategy in Kenya

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INTRODUCTION Health in All Policies (HiAP) is an intersectoral approach that facilitates decision making among policy makers to maximize positive health impacts of other public policies. Health is a devolved function in Kenya with policies drafted at national government level but implemented at county government level. Kenya has committed to implement HiAP in the policy document for 2014 to 2030 with no specific strategy on how it will be implemented at the counties.
AIM The aim of this ongoing PhD study is to find out how best HiAP can be implemented in Kenya especially at county level
METHODS This is a qualitative study with data being collected through interviews and policy documents review.
RESULTS So far 40 interviews with key informants from government, academia, development partners and NGOs in Kenya has been conducted. Policy documents have also been collected from the current 20 Ministries of Kenya. Preliminary results indicate that HiAP implementation is in its early stages in Kenya with the draft frameworks in place. It is viewed

favourably by most of the key informants however it is not known much beyond the health sector. The multi-sectoral concept is evident in the national development policy framework (the Vision 2030) and various policy documents. There are also multi-sectoral units at county level both in the government and in the civil society that can be potential units for HiAP implementation in Kenya.

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Understanding factors that influence the implementation of the performance-based financing scheme at community level for nutrition services in Burundi

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INTRODUCTION Since October 2015, the government of Burundi decided to implement a pilot project which consists in integration of nutrition services within the performance-based financing (PBF) scheme. The hypothesis behind the project is to find out if by contracting nutrition services, it will lead to a decrease of malnutrition rate in Burundi through better knowledge of child's care practices, early detection of malnutrition and better malnutrition management.

The PBF applied to nutrition services encompasses two levels: health facility level and community level. This paper is focussing on the community level.

Aim of the study: The aim of the study was to understand which factors hampered PBF-Nutrition implementation where irregularities were detected and which factors boost PBF-Nutrition implementation where the project was being correctly run.
METHODOLOGY This was a qualitative study conducted in March 2016, using semi-structured interviews. We did a purposive sampling targeting community health workers (CHW) group leader and their health professional supervisors. The flow of CHW's leader choice was done as follow:

A. Analysis of routine data: CHW's group report activities, monthly payment for each of CHW group

B. Categorization of the CHW groups according to the case definition done a priori (good, suboptimal and bad implementation group).

Thereafter, the choice of the health professional was done according the CHW group of interest.

Data were recorded, integrally transcribed and analyzed following techniques from thematic and framework analysis. The first stage of analysis used an inductive thematic analysis method which allowed the development of themes grounded in the original data.
RESULTS Key hindering factors were uneffective project preparation phase (misunderstanding of the project by the local authorities, the community, and lack of teaching material); context specific issues (prevailing of the poverty context, shortage of the personnel at health centre level, community lifestyle); slowness of administrative procedures. The factor which positively influenced the PBF-nutrition implementation was an effective mentoring system in some areas.
CONCLUSION We recommend the policy makers in the health sector to consider the hindering factors highlighted by the present study and to adjust for as well as to strengthen the mentoring system for the project to be effective.

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Stakeholders schematic mapping for implementing a policy to improve Healthcare Worker's distribution to rural area in a sub-national area in Nigeria

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INTRODUCTION Globally, distribution of healthcare workers to rural areas is a big issue which is far worse in developing countries who also suffer from critical shortage of health workers. This mal-distribution is due to a range of financial and non-financial issues which are largely amenable to some policy implementation. However, moving evidence-based interventions to practise and policy in such areas are at times difficult as key stakeholders are not properly engaged by developmental partners, academia, civil based organisation amongst others.Stakeholder analysis is a potentially useful tool in health policy and systems research to improve understanding of policy stakeholders and increase the likelihood of knowledge translation into policy and practice.
AIM To conduct stakeholder analysis in a sub-national area-Ebonyi state- of Nigeria in order to assess the key important stakeholders needed to be engaged in improving the distribution of human resource for health to rural area in the state.
METHODS The analysis was carried out based on Varvasovszky and Brugha framework for stakeholder analysis in the background of the Walts and Gilson policy analysis triangle.Data was collected using multiple sources including:1) review of media publications 2) thirty key informant interviews with policymakers, stakeholders, policy experts, health workers, development partners officials and politicians; and 3) review of the sub-national government documents and publications.Data was analysed using thematic analysis and content analysis.
RESULTS The Stakeholder analysis developed has identified the major key stakeholders in this issue to be the Governor of the state, developmental partners and the central government and the heads of their tertiary health institutions in the state.Other stakeholders who can exert varying degree of influence on the prime stakeholders are-policy makers (State Ministries of Health, non-health sector Ministries and Parliament, political elites), Health workers and their union, the media (print and social), universities, religious and traditional leaders, pressure groups, rural dwellers and their urban relatives. The schematic mapping visually presented the different interactions between the prime stakeholders and other stakeholders.
CONCLUSION This could serve as a future reference for other public health projects partners seeking for the translation of evidence based interventions and knowledge into practise and policy in other similar low middle income countries.

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Strategies to institutionalise patient engagement in the public health sector

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INTRODUCTION Patient engagement is indispensable in health service delivery. Unfortunately, in low-and-middle-income countries (LMICs), patient perspectives are often presented by researchers, policy makers and healthcare professionals rather than by patients themselves.
AIM To formulate institutional mechanisms to mainstream patient engagement in the public health sector.
METHODS We conducted literature review; qualitative interviews with patients, patient groups and Philippine Department of Health personnel; and non-participatory observation of a patient group in action, a healthcare facility, and two local government units in the Philippines.
RESULTS Patient engagement at the individual level involves a series of phases that educates, arouses and activates patients to become capable of participating in their healthcare and make informed decisions about their health. The same phases are evident for patients to become involved in a collective manner and ultimately become partners with health organization administrators and policy-makers. In the Philippines, there are no formal or structured patient engagement programs in the public health sector. Patient education, arousal and activation initiatives depend on local government units. Undertakings of the national government related to patients and patients' groups are mostly informative. Aside from sporadic occurrences in the grassroots level, there are limited formal mechanisms by which patients are involved and participate in decision-making, and there are no regulatory mechanisms by which to enforce such. Publications on experiences in high-income countries showed varied levels of involvement of patients in healthcare and public health, at degrees beyond individual or collective education/arousal. There were no publications found from LMICs.
CONCLUSION We propose a roadmap to institutionalize patient engagement, applicable to the Philippines and countries with similar contexts, consisting of seven strategies: (1) education, empowerment and enablement of patients and their families to be engaged in healthcare; (2) preparation of direct care providers and health facility administrators for patient engagement in healthcare; (3) creation of First Line Care Teams; (4) monitoring and evaluation, including transparency and accountability; (5) legislation and regulation; (6) partnership in health facility governance; and (7) partnership in public policy, including research/production of evidence for policy and HTA. We also suggest pragmatic methods for operationalization of each of these seven strategies.

Commissioned by Medicines Transparency Alliance Philippines and the World Health Organization Philippines.

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Healthcare think tanks in India: Challenges, needs, and recommendations

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INTRODUCTION India has one of the highest numbers of think tanks in the world, but the impact of these on policy, is much less studied. Think tanks can play an important role in agenda setting and informing policy, and the need to generate quality evidence towards informed policymaking have perhaps never been more relevant for India, as the government undertakes significant health sector reforms in the country.

This review presents a landscape view of think tanks working on health research and policy in India, study their current capacities, and document the institutional and environmental barriers they may face in informing policy effectively. It presents recommendations on enhancing think tank capacity to inform policy.
AIM Strengthen the capacity of think tanks working on health in India in informing policy.
METHODS A snowball approach was used to identify and generate a master list of think tanks, using online Google searches, policy documents and existing directories of organizations working on health in India, and lastly inputs by key informants. Representatives of think tanks, policymakers, media, and researchers were interviewed using a semi-structured questionnaire.
RESULTS Almost 30% of think tanks were established between 2000 and 2010, the majority in the northern and southern states of India. Finances emerged as an important challenge, affecting a think tank's ability to survive, attract and retain qualified personnel, and ability to work on issues relevant to the local context. Capacity constraints included the challenge of producing quality, relevant research and in using communication strategies to disseminate research, enhance influence and visibility. There also emerged a need to strengthen the policy maker's ability to access, understand, and use evidence for policy.
CONCLUSION Our analysis revealed three pillars fundamental to building strong, effective, think tanks: financial sustainability, capacity, and visibility. Equally important was to create a demand for evidence for policy. Funding models, including long term funding opportunities will enable capacity building for think tanks and their audiences, allow more context-relevant research; develop collaborative platforms to enhance the use of existing resources, and create opportunities for nesting, partnerships and mentoring at the state level.
REFERENCE

1. Report *Healthcare Think Tanks in India: Challenges, Needs, and Recommendations* has been submitted to the donor – the Bill and Melinda Gates Foundation.

5P90

Knowledge, attitudes and practices towards schistosomiasis among school-aged children in Kisantu health zone/democratic republic of Congo

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INTRODUCTION Schistosomiasis is public health problem in Democratic Republic of Congo but estimates of its prevalence

vary widely. School-aged children suffer the most from this infection in Sub Saharan Africa due to poverty and limited sanitary conditions.
AIM To determine prevalence of *Schistosoma mansoni* and assess knowledge, attitudes and practices (KAP) on schistosomiasis among school-aged children between 10–18 years old in Kisantu health zone.
METHODS A cross-sectional study was carried out in 4 health areas of Kisantu health zone. 388 children randomly selected were screened for *S. mansoni* using Kato Katz technique and were interviewed using a pre-tested questionnaire to collect information about the socio-demographic information and their KAP regarding schistosomiasis.
RESULTS The prevalence of *S. mansoni* was 26.5%. Slightly more a quarter, 28.6% had heard about schistosomiasis and the main source of information was home 68.5%. Only 0.5% knew cause of schistosomiasis and 11.9% identified contact with water polluted by faeces/urine as a risk factor for contacting schistosomiasis, only 10.3% knew that avoid direct contact with river/lake was preventive measure against schistosomiasis. 24.2% always swim/take bath in the river/lake while 21.6% sometimes. 24.7% reported rarely urinate/defecate in water while 9.8 always. Just over a quarter, 27.6% reported never use water from river/lake for domestic use. 94.8% reported never use protective waterproof clothes when in contact with water. Significant association between schistosomiasis knowledge and age ($P < 0.001$), attitudes towards schistosomiasis with age ($P < 0.001$) and educational level of school-aged children ($P = 0.04$) and father ($P = 0.003$). Schistosoma presence was significantly associated to age ($P = 0.005$), educational level of school-aged children ($P = 0.001$) and father ($P = 0.02$), defecate outside the latrine ($P = 0.002$), habits to swim/take bath in river ($P < 0.001$) and using water from river for domestic use ($P < 0.001$).
CONCLUSION *Schistosoma mansoni* infection still remains a public health problem in these areas. There is a need to incorporate in the school curriculum and community-based health education regarding schistosomiasis for the aim of increasing knowledge and promoting behavioral changes in school-aged children to improve disease control.

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Contribution of community health workers towards estimating the global mortality rate in rural Eastern DR Congo: a household-based survey

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INTRODUCTION In developing countries, accurate global mortality estimates are hardly available due to the dysfunction of public record systems. This is likely the case of Mulungu (cris and instability) and Idjwi (stable and security), two eastern DR Congo health zones with respectively 0.5 and 0.6 doctors, 4 and 6 nurses; and 0.8 and 1.2 hospital beds per 1000 inhabitants.
AIM This study aimed at evaluating the capacity of community health workers (CHW) to provide accurate estimates of deaths occurring in a community through a household survey in a post-war region.
METHODS This retrospective cross-sectional survey was conducted in two rural health zones in South-Kivu province (Mulungu and Idjwi) between 20th January and 15th February 2016. Community health workers primarily enrolled in a mosquito net distribution campaign were trained to collect global mortality data on the number of deaths occurring between January and December 2015, using a semi-structured questionnaire. We used stata 13 to generate prevalence estimates and odds ratios using the "cci" command.
RESULTS Overall, 23810 (77.7%) households were surveyed in Mulungu (total population = 139964) and 36058 (92.9%) in Idjwi (total population = 197305). The CHW were able to identify up to 1800 deaths in Mulungu with a global mortality rate of 12,86 per 1000 inhabitants and 1743 deaths in Idjwi equivalent to a global mortality rate of 8.83 per 1000 inhabitants. Bivariable analysis showed that the odds of death were 45% higher in Mulungu than in Idjwi (OR = 1.45, 95% CI: 1.36-1.55; $P < 0.001$).
CONCLUSION In instable Eastern DR Congo regions still recovering from war effects on the health systems, mortality rate remain higher compared to that in more stable areas. CHW involved in a number of public health interventions in the region can contribute substantially to collecting mortality data in their health zones.

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Interdisciplinary team work in primary health care: Experience of Belgian community health center

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INTRODUCTION Interdisciplinary team work (ITW) responds to the increasing demand for chronic care in a context of medical shortages. But it is not easy to build an ITW. There are no steps validated in the literature. With their long experience in ITW, community centers in Belgium are adequate field of analysis. We aim at analyzing the process of ITW and its quality in these structures, targeting the physician-nurse relationship particularly.
METHODS The process of building ITW was analyzed using focus groups discussions with the staff of 4 community centers.

The quality of the ITW was assessed by health workers using the IPC65 questionnaire and by individual interviews with patients.
RESULTS The critical steps for building effective ITW were identified: having a common interest for ITW, defining areas and objectives of collaboration, clarifying the roles of team members, formalizing the process with interdisciplinary guides and protocols, and making regular assessment. The ITW should be supported by organizational, administrative and management mechanisms.

The existing ITW enables satisfying care integration. Some management aspects need to be improved.. Patients support physician-nurse collaboration, as long as relational continuity and care quality are maintained and roles are separated.
CONCLUSION ITW enables quality gains for health professionals and patients but requires learning and organization. The identified processes can be transposed to other teams but require an individual adaptation.

Abstracts

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Development of an international external quality assurance (EQA) scheme for malaria nucleic acid amplification techniques (NAAT)

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INTRODUCTION With the expansion of molecular methods for malaria detection and new emphasis on malaria elimination; in 2014, the WHO recommended establishment of an international External Quality Assessment (EQA) scheme for malaria Nucleic Acid Amplification (NAA) assays to ensure that data forming the basis for policy development was reliable and comparable.

UKNEQAS is a public service providing EQA schemes for a large variety of analytes, including the first international Malaria Molecular EQA scheme targeting European clinical laboratories.
AIM WHO and UKNEQAS have collaborated to launch Malaria NAA EQA scheme targeting clinical as well as research labs in both low- and high- malaria transmission and resource settings.
METHODS A repository of malaria NAA EQA materials sufficient to sustain the scheme for 60 participating labs for a minimum of 2 years was established.

The positive samples range in parasitaemia from a maximum of 2×10^6 p/mL to a minimum of 10p/mL. The specimens are stored as 500uL aliquots of freeze dried (FD) samples and as 50uL dried blood spots (DBS).

For internal quality control, specimens were analysed by 3 independent reference labs.

Two distributions of EQA material are scheduled annually containing 10 specimens including positive and negative samples in FD and DBS formats.

The distribution was sent to 53 participating labs and the initial results are presented here.
RESULTS Initial analysis of data showed following trends:

1. Generally results obtained by participants were in good agreement with intended results.
2. Freeze dried specimens performed better compared with DBS specimens.
3. A higher percentage of labs correctly identified Pf and Pv compared to Pk.
4. A higher rate of false negatives was observed when parasitaemia was lower.
5. False negatives were observed in all samples with the rate of false negatives being higher for DBS compared to FD.
6. False positives were observed in all samples with the rate of false positives being higher for FD compared to DBS.

CONCLUSION WHO has established an EQA Scheme for Malaria NAA assays. Initial results have highlighted problems with reporting of false positives and false negatives particularly when assaying specimens containing low parasitaemias or specimens containing non *P. falciparum* species (especially *P. knowlesi*).

5P94

Assessment of quality of health care in 4 health districts of south Tajikistan

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INTRODUCTION The 'Enhancing Primary Health Care Services – Tajikistan' (Project Sino) aims that men, women and children benefit from better health thanks to better health care services, including good access to and high quality of care, which improves patient's trust in and utilisation of primary health care services.
AIM This study repeatedly assessed the quality of health care to track progress made in districts supported by the project.
METHODS A standardised quality evaluation tool on facility infrastructure, maintenance and basic equipment; interpersonal and technical aspects of patient consultations; and patient satisfaction was developed and validated. Assessments were conducted by the Republican Centre for Family Medicine and overseen by Project Sino in 2 districts in 2012 and another 2 in 2013, and repeated in 2016. The sample included 40 randomly selected rural health centres (10 per district) and the 4 district health centres. 5 or more patient consultations were observed per facility.
RESULTS Structural attributes of quality improved for cleanliness of facilities, functional water sources and for washing points in examination rooms. Many sanitation facilities were yet not equipped with a nearby washing point with soap and water. Patient consultations were observed with 172 family- and medical doctors in the pre- and 85 in the post-assessment. Technical aspects, e.g. asking for prescriptions taken, providing adequate prescription and explanations on the treatment improved, but patient history was not always taken. Infection prevention measures (hand washing and decontamination procedures) were poorly applied. Privacy of patients could sometimes not be ensured because of shortage of space in the facilities. Satisfaction of 343 interviewed clients was high and better in the post-assessment for having the opportunity to ask questions and receiving advice on health issues.
CONCLUSION Effects of project interventions were clearly demonstrated, but with non-systematic disparities across the districts. Areas requiring further progress include for structural attributes the availability of washing points in each examination room, cleanliness of sanitation facilities and nearby washing points with water and soap; for interpersonal and technical aspects ensuring privacy and taking the patient history, and for infection prevention following a systematic application of decontamination measures.

Abstracts

5P95

Global point prevalence survey on antimicrobial use and resistance (global-PPS): implications for antibiotic stewardship programme for Komfo Anokye teaching hospital in Ghana

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INTRODUCTION Antibiotic use may be abused in a developing economy such as Ghana where state-of –the-art diagnostics are difficult to come by. Komfo Anokye Teaching Hospital (KATH) took part in the 2015 Global Point Prevalence Survey of Antimicrobial Consumption and Resistance (www.global-pps.com).
AIMS Monitor quantity and quality of antimicrobial prescribing in hospitalized patients admitted to 4 main Directorates of clinical care at KATH.
METHODS The PPS was conducted across adult and child Directorates and Units in April 2015. Detailed information was collected for inpatients "on antimicrobial agents" at 8 am on the day of survey.
RESULTS Out of 386 inpatients, 64.0% were treated with at least one antimicrobial. Highest prescribing rates were seen in adult medicine (76.7%) and surgical wards (69.8%) followed by neonatal wards (68.8%). Top 2 reason to prescribe antibiotics in adults was prophylaxis for obstetrics-gynaecology (23.4%) and pneumonia (12.3%). The most often reported reason in children was sepsis (35.5%). Of all antimicrobials, antibiotics for systemic use (81.0%) and drugs to treat tuberculosis (10.3%) were most frequently reported. Among antibiotics, cefuroxime (23.8%) and ceftriaxone (15.1%) were most frequent prescribed, often in combination with metronidazole (18.6%). Empirical use of antibiotics prevailed (85.4%). In medicine wards, antibiotic prescriptions were based on biomarker results (35.1%). Local guidelines were available in 70% of prescriptions; of which 74.8% were prescribed according to these guidelines. 90% of all antibiotics for surgical prophylactic use was prescribed for >1 day.
CONCLUSIONS Antibiotic stewardship is needed to control the high amounts of antibiotics prescribed in adults and children. Stewardship programs should target prolonged use of antibiotics for surgical prophylaxis. Diagnostic tools would be very helpful to guide clinicians in their decision to start and continue antibiotic treatment.

5P96

Towards improved health service quality in Tanzania: An approach to strengthen routine supportive supervision

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INTRODUCTION Effective supportive supervision of healthcare services is crucial for improving and maintaining quality of care. However, this process can be challenging in an environment with chronic shortage of qualified human resources, overburdened healthcare providers, multiple roles of district managers, weak supply chains, high donor fragmentation and inefficient allocation of limited financial resources. Operating in this environment, we systematically evaluated an approach developed in Tanzania to strengthen routine supportive supervision of primary healthcare providers through their Council Health Management Teams. Part of this approach was a systematic quality assessment at health facilities, using the "electronic Tool to Improve Quality of Healthcare (e-TIQH)". Afterwards, the findings were discussed at council level with all relevant stakeholders, which provided inputs for the annual planning and budgeting process.
AIM Compare the new supportive supervision approach with routine supportive supervision as it is currently implemented.
METHODS A mixed method approach was used. Qualitative data was collected through in-depth interviews in three councils. Observational data and informal personal communication as well as secondary data collected during the field work complemented the data set. Additionally, an economic cost analysis was carried out in the same councils.
RESULTS Compared to routine supportive supervision, the new approach increased healthcare providers' knowledge and skills, as well as quality of data collected and acceptance of supportive supervision amongst stakeholders involved. It also ensured better availability of evidence for follow-up actions, including budgeting and planning, and higher stakeholder motivation and ownership of subsequent quality improvement measures. The new approach additionally reduced time and cost spent during supportive supervision. Main cost driver was the time spent conducting the assessment.
CONCLUSION The new approach increased feasibility of supportive supervision and hence the likelihood of its implementation. It made supportive supervision more effective and efficient and therewith also more sustainable. Moreover, the new approach not only addressed specific challenges of routine supportive supervision in Tanzania but also provides informed guidance to overcome several problems of supportive supervision and healthcare quality assessments in low- and middle income countries. Thus, it should prove useful for enhancing quality of care in such settings.

5P97

Perceived quality of care: clients' aspect upon antenatal, delivery and postnatal care at health facilities in primary health care level

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INTRODUCTION It is important to understand what good quality of care means to clients as to contribute in decision making for improvement of maternal and neonatal health services.
AIM To explore mothers' perception towards quality antenatal, delivery and postnatal care and mothers' view upon the care they received.
METHODS A cross-sectional descriptive study was conducted in Dedaye Township, Ayeyarwady Region, Myanmar during 2016-

2107. Face-to-face interviews using semi-structured questionnaires were conducted with 143 pregnant women and 199 mothers who had delivered within 6 months prior to data collection who received care at all level of government health facilities at primary health care level.
RESULTS Most clients described quality of antenatal care, delivery and postnatal care services as having adequate medicines, equipment and competent providers, receiving appropriate treatment, receiving sufficient information about their pregnancy, health education and the prescribed treatment and good provider-patient relationship. During ranking exercise, physical access to care, availability of medicines, appropriate treatment and provider competency were selected as most important characteristics of quality care while waiting time and client-centeredness were ranked as least important aspects. Although good provider-patient relationship was indicated as one of the criteria for quality of care, less attention has been paid on it as an important characteristic to be improved. Respondents largely perceived that the quality of care they received was satisfactory. Privacy and client-centeredness issues were not included while defining quality of care in clients' perceptive. In addition, assessment on current availability of services resulted only 36.4% of examination rooms and 25.6% labour wards have audio and visual privacy and only three quarters of clients perceived that they were always allowed to involve in decision making process.
CONCLUSION The services least satisfactorily available (privacy, client-centeredness) were not expected by the clients as important components of quality of care as well. Physical access to care, availability of medicines and good care and provider competency were denoted as the most important aspects since the respondents were living in a resource limited setting with geographic barriers and less likely to be acquainted with the other standards of care.

5P98

Accreditation at district level in Cote d'Ivoire: Are the actors informed enough to mobilize their capacity?

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INTRODUCTION Commonly, the accreditation is known as a health continuous improvement approach. In order to improve the rather insufficient performance of the health districts in Côte d'Ivoire, the authors opted for the accreditation. Because a model of such accreditation does not exist, they built one, based on the existing models, like hospital and laboratory accreditation. A study was conducted in the four health districts of the medical region of Gboklè-Nawa-San Pedro in September 2014.
AIM In order to detect potential obstacles and constraints related to the implementation of a such approach, the authors deemed relevant to study the level of knowledge of the actors as a sub-dimension of their representation about the health district accreditation.
METHODS The approach performed for this study is an exploratory qualitative method. A sample of 76 people representative of the potential key actors of this accreditation process was selected in the four health districts of the medical region. They were composed of the administrative and technical managers and also medical and paramedical care providers. They were submitted to individual structured interviews. A univariate analysis was performed to determine proportions of true and false responses with SPSS 20.
RESULTS The study found that the majority (59.21%) of actors interviewed heard about the accreditation through various channels which are meetings, trainings, the national reference guide of health districts accreditation, exchanges between colleagues, workshops and the media. But many (71.05%) of them do not know the definition. The majority argues that they do not understand this approach meaning (60.52%) and do not know how it is performed (68.4%). Moreover, we noted that the different supports (55.27%), tools (47.37%), criteria (60.05%) and mechanisms (64.5%) used to implement this approach process are not fully known by the actors.
CONCLUSION Overall, it is observed that the level of knowledge of potential key actors is insufficient. Considering the importance of initial knowledge as a factor that can boost commitment and motivation of the actors in the establishment of such approach, this study suggests the need to reinforce their knowledge about the health district accreditation in order to ensure them.
KEY WORDS Knowledge, actors, accreditation, health districts, Côte d'Ivoire.

5P99

Integrated eDiagnosis approach: Assessing the quality of the management of children illnesses in Burkina Faso

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INTRODUCTION In Burkina Faso the high mortality rate of children under five is mostly explained by constraints of the implementation of Integrated Management of Childhood Illnesses (IMCI) especially insufficient coverage and poor adherence of IMCI-trained staff to guidelines. As result, the Integrated eDiagnosis Approach (IeDA) that mainly includes consultation by healthcare workers with automated IMCI guidelines on tablets and the coaching of healthcare workers by the District Management Team, was implemented.
AIM To evaluate the quality of disease management for under-five children using IeDA in primary health care in Burkina Faso.
METHODS We conducted four steps of the stepped-wedge trial from September 2014 to October 2016 in 10 randomly-selected primary healthcare centers in each of the 8 districts of two regions of Burkina Faso (Boucle du Mouhoun and Nord) using IeDA as intervention. Data on 1,805 child consultations were collected through direct observation of consultations. The same children were then reexamined by an IMCI expert to obtain a "gold standard" assessment of the child's IMCI classifications and treatment. Results of the two consultations were compared for analysis.
RESULTS Among 53 children identified by the expert as having at least one danger sign, 38 children were identified by the

healthcare workers (75% in intervention districts vs. 71% in control districts). Among 100 children needing referral or hospitalization, according to the health worker's classification, only 58 (58%) were referred or hospitalized with a higher proportion of correct referrals in intervention districts (67% vs. 55%). Overall adherence to IMCI protocol for clinical assessment (pneumonia, malaria, diarrhea, malnutrition and anemia) was lower in control districts (48% vs. 68%). Overall, 47% of children were correctly classified with a better performance in intervention districts (54% vs. 46%). Healthcare workers made prescriptions consistent with their own classifications for 69% of children with marginally better performance in intervention districts (71% vs. 69%). Healthcare workers made prescriptions consistent with the expert's classifications in 57% of cases with slightly better performance in intervention districts (61% vs. 57%).
CONCLUSION There are some early indications of improvements in the overall quality of the management of children illnesses following the implementation of IeDA.

5P100
Inventorying and accuracy assessment of HIV/AIDS rapid diagnostic tests in DR Congo

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BACKGROUND Diagnosis of HIV / AIDS infection in short-income countries is made through rapid diagnotic tests (RDTs). World Health Organization (WHO) recommends a regularly assessment of RDTs accuracy which are locally implemented in the algorithm of diagnostic. In DR Congo three RDTs namely Determine HIV1 / 2, Uni-gold HIV and Double check gold are implemented in the diagnostic algorithm. However, there is a challenge about accuracy of some unknown and non-implemented RDTs in usual in certain healthcare channels.
AIM Give a stock list of main RDTs implemented or not in usual, determine their supply chain in order to assess their accuracy.
METHODOLOGY From March 2015 to November 2016, we carried out a cross-sectional study divided into two parts: on the one hand, we inventoried the main RDTs used by the providers of five cities in the DRC. Therefore a pre-established sheet identified the main implemented and non-implemented RDTs and their supply chains. On the other hand, diagnostic accuracy of three main RDTs (Determine, HIV1 / 2, Uni-gold HIV and Vikia HIV), was evaluated using a panel of 400 samples (200 seronegative and 200 seropositive) tested by two different ELISAs and PCR.
RESULTS A total of 326 providers were surveyed from five cities: Bukavu, Kinshasa, Gemena, Mbandaka and Moanda. The present study noticed that 66.9% of the respondents appealed to impemeneted RDTs for algorith diagnostic of HIV meanwhile 33.1% appealed to non-implemented RDTs Determine Combo HIV 1/2, Vikia HIV, Capillus, Oraquick advance and Immunocomb. Depending on their availability, three of these non-implemented tests that are: Determine HIV1 / 2, Uni-gold HIV and Vikia HIV were assessed for accuracy. A sensitivity of 100%, 98.0% and 98.5% and a specificity of 98.0%; 100%; and 99.0%.were respectevely found for Determine, Uni-gold and Vikia.
CONCLUSION This study showed RDT used for HIV diagnosis in DRC have a good performance (sensitivity and specifity). This study showed also that non implemented RDT tests are also used in DRC HIV settings.
KEYWORDS HIV, TDR, Performance, Diagnosis.

5P101
Regulation of medicines storage for health system resilience in Nigeria

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INTRODUCTION In developing countries, there is a need to emphasize on the importance of proper storage of medicines in health facilities and pharmacy outlets till it reaches the consumer. Continuous regulation of this storage facilitates in supporting and strengthening a resilient and responsive health system. The loss of potency and expiration during storage may influence the efficacy and safety of medicines. Pharmaceutical products require controlled storage and transit conditions in order to ensure that their quality is retained without compromise. Environmental controls such as proper temperature, light, humidity, sanitation and ventilation must be maintained wherever drugs and supplies are stored in the premises.
AIM To assess the extent of medicines storage condition in health facilities and pharmacy outlets, and to examine the level of compliances with regulations among these facilities and outlets owners.
METHODS This cross-sectional study was conducted between July and September 2015 in Zaria-Nigeria. A purposive sampling was used in selecting four categories of facilities including public (20) and private (20) hospitals, pharmacy outlets (20) and patent medicine stores (20). Data was collected using an interviewer administered questionnaire with observation form (checklist). The data was descriptively analyzed by frequencies, charts and cross tabulation with the aid of Statistical Package for Social Sciences (SPSS version 20).
RESULTS In total, out of the 80 health facilities and outlets visited, 16.2%, 43.5%, 33.8% and 6.2% of them were rated "excellent", "very good", "good" and "moderate" in their storage conditions, respectively. 77.5% of the facilities and outlets had store but only 45% of them had control cupboard. 87.5% of the facilities and outlets had refrigerator. However, only 26.4% of them had temperature chart. In the record storage, most of the facilities and outlets used the first-expired-first-out (FEFO) in sorting drugs.
CONCLUSION Pharmacy outlets had the most properly organized storage conditions followed by the private hospitals, public hospitals and the patent medicine stores. However, there is a need to enforce regulations on cold-chain storage condition, especially the use of cold-boxes and temperature charts, all which gears towards a resilient and responsive health system for medicines.

Abstracts

5P102
Use of drugs in management of uncomplicated malaria in Public Health facilities in DRC

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INTRODUCTION Malaria is the first cause of death in the Democratic Republic of the Congo (DRC). Interventions to reduce the burden of Malaria worldwide have produced tremendous drop in malaria morbidity and mortality. However, progress is slower in DRC which is still among the 15 countries carrying 80% of Malaria burden and in which the reduction of Malaria incidence has been the lowest. in addition, DRC shares with Nigeria, 39% of deaths related to Malaria globally. Inappropriate use of drug may be one of the factors of this below-average performance.
AIM To assess the use of drugs in the management of uncomplicated malaria in Public Health Centres and General Hospital of DR Congo.
METHODS In each of the former 11 provinces of DRC, one Rural Health Centre, one Urban Health Centre and one General hospital were selected. In each of them, 100 patient's files containing treatment with antimalarials were randomly selected among the files of patients treated from January to December 2013. Among them, all of the files with diagnosis of uncomplicated malaria were selected. Descriptive statistics were used to describe usual prescription habits for malaria case management.
RESULTS A total of 3254 (98.6%) files were usable, of which 2300 (71%) concerned uncomplicated malaria. Biological confirmation of malaria was requested in 63% (1448/2300) of cases. Malaria treatment was initiated following negative results in 11% (252/2300) and positive results in 52% (1185, /2300) of cases. Thirty-one different treatment regimen were used. The drugs recommended by National Malaria Control Program (Artesunate-Amodiaquine or Artemether-Luméfantrine) were used in 55.1% (1267/2300) of cases. A part from antimalarial, 7143 drugs (average of 3.1 drugs per patient) were prescribed, among which antibiotics including Chloramphenicol, antalgics and NSAIDs including Dipyrone, vitamins, antihelminthics, corticosteroids, iron, and blood transfusion. Indication for theses concomitant medication was not available in 51.4% (3672/7143) of cases.
CONCLUSION Management of uncomplicated malaria in DRC is characterized by numerous treatment regimen with low adherence to treatment policy and abundant concomitant polymedication. Determinant and consequences of this irrational use of drugs need to be assessed.

6P1
Gender equality in healthcare access during international health crises

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INTRODUCTION Health outbreaks are usually given in developing countries where there is not enough capacity to confront it, and there is a high risk of spreading and become a global threat. After the experience of Ebola, the United Nations (UN) and the World Health Organization (WHO) created the Global Response to Health Crisis and the Health Emergencies Program respectively, in order to lead the creation of rapid responses and collaborate to strengthen health systems for future health outbreaks with humanitarian consequences. However, evidence shows that gender inequality increases during the outbreak situating women at higher risk.

So, this study aims to make a systematic review of the research generated in relation to the gender inequalities in healthcare access during the last epidemic outbreaks that were considered as Public Health Emergencies of International Concern: Ebola and Zika. I will compare both outbreaks considering that Ebola was the breaking point for the improvement of the rapid responses among the international institutions and governments, and that Zika affects directly to pregnant women and newborns. This comparative analysis will give a panorama of how health access and care was considered for women– or not – in the rapid response.
AIM I aims to answer how well are rapid responses considering gender inequalities in access to healthcare during health emergencies?
METHODS It is a Systematic Review with a configurative (qualitative) and aggregated (quantitative) approach. This methodology provides evidence to help policy makers and practitioners in their decisions as it systematize all the information that already exists. It helps establish what is already known and what is not known from research. The inclusion criteria is:

1. Population: women in reproductive age.
2. Setting: countries or regions affected by Zika and Ebola.
3. Intervention: All the interventions implemented to increase healthcare services from women.
4. Research Methods
5. All research methods.
6. Dates: 2013 and after.
7. Language: English, Spanish and/or French.
8. The exclusion criteria for exclusion of studies:
9. All research that include biomedical analysis.

RESULTS AND CONCLUSIONS Results and analysis will be concluded in August as a dissertation project for a Msc. Social Policy and Social Research.

6P2
Improving emergency medicine training in resource-limited settings, experiences from a pilot project in Zanzibar

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INTRODUCTION Basic emergency care is the corner stone of hospital medicine. Yet in many hospitals in resource-limited

settings dedicated emergency services are not fully developed. As a consequence, training in emergency care is often unstructured, or even non-existent, and the ABCD approach to the acutely unwell patient is often not followed for a variety of reasons, chief among them being lack of appropriate training.
AIM To improve emergency care through training doctors in ABCD assessment & management of acutely unwell patients in Mnazi Mmoja Hospital, Zanzibar, Tanzania.
METHODS We piloted a new WHO-designed Basic Emergency Care course with the staff of the Emergency Department in Mnazi Mmoja Hospital in Stone Town, Zanzibar. The course teaches how to apply an ABCD approach to the acutely unwell patient in a resource-limited setting. Our team trained 20 doctors and clinical officers, and then trained seven local doctors to be trainers of this course. Finally, we supported the local doctors to run their own Basic Emergency Care course.
RESULTS All 20 clinicians trained in Basic Emergency Care, passed the final course assessment. We then audited emergency doctor assessment of patients in Mnazi Mmoja Hospital Emergency Department and found dramatic improvement in ABCD assessments and management. Finally, our "train the trainers" course produced a local faculty of trainers who could continue to train local clinical staff without external support.
CONCLUSION We have demonstrated that a new course, targeted at clinicians in resource-limited settings, can dramatically improve Emergency care of acutely unwell patients. Furthermore, we have demonstrated that, through collaboration with local clinicians, it is possible to successfully train a local faculty of trainers, thus developing local capacity to continue training clinicians without dependence on foreign faculty.

6P3
Evolving governance options to enhance equitable data sharing

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INTRODUCTION The WorldWide Antimalarial Resistance Network (WWARN) was established with the aim of generating new evidence to optimise antimalarial treatment through pooled analysis of individual patient-level data. Its success has been driven by the willingness of the research community to collaborate in the analysis of research questions of relevance to their patients. Despite the perceived benefits and the success of models such as WWARN, the recent imposition of mandatory sharing of clinical data from funders and publishers has triggered concerns for researchers and research participants alike. Notably, the benefits of increasing access to data may be not be equally shared by patients or researchers in lower resourced countries.
AIM To address potential inequities, WWARN has evolved its technical, governance and ethical framework to offer two models of data access, protecting the interests of researchers and participants while improving the efficiency of data sharing to improve health outcomes.
METHODS WWARN now offers two models for data access – the original model used by WWARN to date whereby data held within the WWARN Data Platform can only be accessed with the permission of the data contributor, and now a governed access model whereby decisions on data access can be delegated by the data contributor to the newly established independent Data Access Committee. Led by TDR, the Special Programme for Research and Training in Tropical Diseases, the Committee assesses requests for data access to ensure that they are ethically and scientifically sound, before releasing the data to researchers who agree to a framework which protects the rights of both researchers and patients.
RESULTS AND CONCLUSION The establishment of WWARN's data access models enables researchers to maximise the use of existing data to further improve public health while ensuring that data generators receive due credit for their contribution to the research output and the identities of participants are protected. These models aim to increase cross collaboration between those who generate the data and those who request to use it for secondary analysis.

6P5
NCD monitoring: a challenge and a chance for global public health cooperation

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INTRODUCTION Non-communicable diseases (NCDs) are the major cause for death worldwide. Cancer, diabetes, cardiovascular and respiratory diseases account for over 80% of all NCD mortality. Smoking, physical inactivity, harmful alcohol consumption and an unhealthy diet increase the (avoidable) risk to die from NCDs.[1] NCD mortality has continuously increased over time. The UN Political Declaration of 2011 underlined the importance of NCD prevention and control on the global health policy agenda.[2] Guided by the WHO Global action plan (2013-2020), considerable efforts are being undertaken to improve prevention and treatment of NCDs worldwide. Low- and middle-income countries bear three quarters of the global NCD mortality burden. Still, they often have limited capacities and infrastructure for NCD monitoring and reporting.[3]
AIM To strengthen the evidence-base for policy programs for the prevention and treatment of NCDs also in low- and middle-income countries by promoting bi- and multilateral knowledge exchange and capacity building.
METHODS Over the past two decades, a shortlist of European Core Health Indicators (ECHI) has been developed, measuring health status, health behavior, health determinants and (access to) health care. Over 60 of them are implemented for national health reporting and for European comparative analyses. A prime data source for the ECHI is the compulsory European Health Interview Survey (EHIS). The ECHI will be a key component of a planned sustainable European structure for health monitoring and reporting, focusing on NCDs and public health. As national public health institute (NPHI) with a special expertise in health monitoring and reporting, the Robert Koch-Institute (RKI) has, for many years, made substantial contributions to the development and implementation of the ECHI.
RESULTS RKI expertise in indicator development, survey design and implementation at national and European levels may contribute to relevant knowledge exchange and capacity-building projects in the area of health monitoring and reporting for NCDs also in low- and middle income countries.
CONCLUSION NCD programs worldwide need a solid data base. Supporting the development of health information systems is a challenge and a chance for global public health cooperation.

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Networking between NPHIs to assess needs and capacities can be a first step towards tackling this challenge.

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6P6

Cooperation between biomedical training programs, a challenge for healthcare

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Introduction The lack of recognition, biomedical professionals are facing today, is a major challenge to the strengthening of healthcare in developing countries. Accordingly, biomedical training programs are still very limited. In the aim of stimulating international cooperation for health development, the NGO Humatem conducted a study on partnerships between biomedical training programs in France and francophone Africa.

Aim The purpose of this study is to identify the existing partnerships between biomedical training programs in France and francophone Africa, and to better understand the different factors that lead to or prevent the establishment, success, and growth of such partnerships, as well as the impact on students, instructors, and mostly on the quality of healthcare.

Methods In order to acquire data, we created a survey that we shared with biomedical training programs. It gathered information from existing partnerships, such as successes and challenges, motivations, types of projects, impact, and also incentives and barriers to the creation of new partnerships.

Results There is a great variety of existing partnerships between training programs around Europe and Africa, mostly involving student or instructor exchanges. Among the 22 French and 15 African programs that took part in the survey, only 12 percent are in partnership with another institution locally or internationally.

Motivations that appear to drive their creation and success are the need for knowledgeable and experienced instructors, opportunity for shared facilities and adequate equipment, local and international visibility, and intercultural exchange. The impacts observed from existing partnerships seem to strongly match those initial motivations, though the biggest one to note is the benefits on healthcare from higher quality of training.

Conclusion The value and potential impact of partnerships appears to be well known. There are already existing and successful ones and a great potential for creating new ones. Unfortunately, motivation and enthusiasm are often insufficient for such projects to come to life, and this study identified the gaps that need to be filled in order to strengthen the quality of such partnerships. This study highlights the importance of supporting and facilitating the creation and implementation of new partnerships between training institutions, which Humatem intends to prioritize in the upcoming years.

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Measuring behavioral outcomes in development aid: a call for standardization to improve the evidence synthesis

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Introduction Handwashing and improved sanitation have been shown to significantly reduce the risk of diarrhea. Despite this benefit, the intended health impacts of Water, Sanitation and Hygiene (WASH) interventions were generally not attained and the Millennium Development Goal sanitation target in 2015 was missed.

Aim As part of a systematic review on the effectiveness of WASH promotion programs on behavior change in low- and middle-income countries, we aimed to assess the level of standardization of WASH behavior outcomes in individual studies.

Methods Via systematic screening of 12 databases/24 websites, studies investigating the effect of WASH promotion programs on the following behavior change outcomes were included: handwashing (at critical times), latrine use, safe faeces disposal and open defecation practices. Methodology of outcome assessment was evaluated by (1) type of data (binary versus continuous data), (2) timing of assessment (uptake (during implementation) versus adherence (within 1 year after end of implementation) versus longer-term use (>12 months after end of implementation) and (3) study design (experimental versus quasi-experimental/observational studies).

Results We identified 35 studies (28 experimental studies and 7 quasi-experimental/observational studies) assessing 87 handwashing and 39 sanitation outcomes. When stratifying the outcomes by type of data, timing of assessment and type of study design, it was so diverse that the ability to synthesize outcomes via meta-analyses was not possible. Only handwashing after defecation/before cooking/before eating (figure 1) and open defecation practices were assessed ≥3 times via uniform methodology (i.e. collection of binary data during implementation in experimental study designs).

Conclusion Systematic and uniform definitions and monitoring of standardized WASH behavior outcomes is needed to improve use of evidence and conduct of evidence synthesis. This would help governments and international bodies to formulate clear and more robust recommendations.

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Continued agents of change? Follow-up of graduates from MPH program

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INTRODUCTION In order to contribute to the alleviation of the severe lack of human resources for health in Low and Middle Income countries, the Royal Tropical Institute organises a yearly Master of Public Health (MPH)/ International Course on Health Development. Data from 2011 showed that graduates act as an agent of change, upon returning to their respective home countries. As the public health field changes, recent information on the effect of the MPH program on graduates, their workplace and society is essential for improving curricula.
AIM To identify the influence of the MPH program on recent graduates regarding their career, competencies, performance at workplace and society.
METHODS A self-administered questionnaire was sent to graduates from 2011–2014. For 23 competencies, 26 potential impacts on workplace and 10 impacts on society graduates indicated to what extent they attributed this to the program.
RESULTS The response rate was 40%. Graduates reported change in leadership (79%), in technical position (77%), acquiring new responsibilities (86%), and increased remuneration (68%). They asserted that the MPH program 'contributed significantly' to this. Regarding competencies the attribution varied between 38% and 78%. Thirty-eight percent of respondents attributed their ability to "Participate in developing context sensitive policies and strategic plans and translate them into action" substantially to the MPH program. Their ability to "Incorporate a Social Determinants of Health approach to Public Health needs" was attributed to the MPH by 78%. Graduates attributed the effect they had on their workplace substantially to the MPH program; ranging from 27% to 65%: "created evidence for decision making". Graduates attributed the effect they had on society substantially to the MPH program; ranging from 31% to 65%. These data are similar to the results of the 2011 alumni survey.
CONCLUSION An MPH program geared towards public health in Low and Middle Income countries and delivered in a high income country influences the career of their graduates significantly. Graduates continue to exert changes upon return and attribute this to the MPH program. The MPH program has adapted itself overtime to relevant changes in the field and appear to remain relevant to graduates, workplace and society.
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6P9
HERACLES collaborative and translational project on cystic echinococcosis funded by the European Commission

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INTRODUCTION Cystic Echinococcosis (CE) is one of the most important zoonotic diseases and was recently assigned to the list of the Neglected Tropical Diseases prioritized by the WHO. Tools for its diagnosis and treatment are currently not standardized, partly due to the complex and chronic evolution of CE and lack of funding to support prospective multicenter clinical trials, which in turn make data on this infection poorly framed and evidence supported, resulting in yet more neglect. HERACLES is a EU funded collaborative project (2013–2018) that offers for the first time a reasonable amount of funding and a real chance to break this vicious circle, promoting prospective studies on CE.
METHODS AND MATERIALS The main goals of the HERACLES cooperative project are to: Identify the population affected by CE in Bulgaria, Romania and Turkey by ultrasound screening; create the European Register of CE (ERCE); establish the Echino-Bio-Bank from animal and human CE patients; set-up and validate new molecular-based PoC-LoC kits based on recombinant antigens; identify cyst stage-specific biomarkers associated with CE response to therapy or lack thereof, through "omic" studies; increase drug bioavailability of benzimidazoles; train experts working in Eastern European countries, as they are crucial to fight this disease.
RESULTS Current core achievements are: 1) creation of the HERACLES Extended Network with more than 45 centres from Europe and Asia (http://www.heracles-fp7.eu/interactive_map.html); 2) completion of the biggest research-based cross-sectional study (ultrasound-based) ever done at global level (N = 24,696); 3) creation of the European Register (N = 1,034) as a case series for data analysis on clinical management (http://www.heracles-fp7.eu/erce.html); 4) patent obtainment of anti-parasitic soluble benzimidazole-like drug; 5) creation of the Echino-BioBank repository to sustain experimental and clinical research in this field (N ≈ 2,000 samples); 34 scientific papers currently published in peer reviewed journals.

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CONCLUSIONS The results from HERACLES will support governments, organizations (WHO), European Commission, related European agencies (ECDC, EFSA) and the Global Burden of Disease study (IHME) to harmonize data collection, monitoring and reporting of CE. We see this as breakthrough in the current scenario of CE The research was funded from the European Community's FP7 under the grant agreement 602051 (Project HERACLES; http://www.Heracles-fp7.eu/).

6P10

Extended ultrasound surveys for cystic echinococcosis in Bulgaria, Romania and Turkey: results from HERACLES project

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INTRODUCTION Cystic echinococcosis (CE) global prevalence is estimated at 2–3 million human cases with a burden of 1 million DALYs accounting for underreporting. However, clinically diagnosed cases represent only a small proportion of the total number of real infected people. For these reasons, extended ultrasound (US) surveys on human populations are needed to quantify asymptomatic carriers and allow a more precise estimate of CE burden. Such efforts are crucial to assess, compare and prioritize interventions in limited resource settings.
MATERIALS AND METHODS A study of prevalence of abdominal CE was undertaken in Eastern European (EE) and adjacent countries (AC) under the framework of HERACLES project (http://www.heracles-fp7.eu/). Sixteen US surveys were conducted in association with resident partners and public health centres: Hospital of Infectious and Parasitic Diseases 'Prof. J. Kirov' (Sofia, Bulgaria), Colentina Clinical Hospital (Bucharest, Romania), Hacettepe University Hospital (Ankara, Turkey). Ethical approvals and informed consents were obtained accordingly. Each suspected case was examined independently by 2 clinicians and patients were assigned to treatment according to WHO-Informal Working Group on Echinococcosis Expert Consensus.
RESULTS 24,696 people (8,602 in Bulgaria, 7,470 in Romania and 8,624 in Turkey) were screened during 2014 and 2015, with 249 individuals identified with CE. Among these patients, 119 were identified by imaging as having identifiable abdominal CE and 130 reported a history of treatment for CE but didn't have identifiable CE cysts on US at the moment of screenings. A total abdominal CE prevalence of 0.48% (by imaging) and 1% (when considering also past history of CE) has been detected in the rural endemic areas of these three countries. A model of the total number of people affected by CE in rural endemic areas is under construction.
CONCLUSIONS Collection of accurate epidemiological and clinical data will give a reliable picture of the burden of this disease, providing a statistically supported case series for future evaluation of efficacy and effectiveness of interventions. This is the largest US survey (research-based cross-sectional study) on CE from a single community-based study. The research was funded from the European Community's FP7 under the grant agreement 602051 (Project HERACLES).

6P11

Building training and research capacities in Ebola affected countries: the case of the Belgian Cooperation in Guinea

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INTRODUCTION In the wake of the 2014/2015 Ebola outbreak in West Africa, it has been called for strengthening health systems in countries most affected.
OBJECTIVE To describe and discuss an innovative holistic training and research capacity building program supported by the Belgian Development Cooperation in Guinea.
METHODS Program documents will be used to describe and present the main activities, preliminary results and the potential effects of the program.
RESULTS Following an initial needs assessment involving all stakeholders in Guinea (April 2016), a scientific collaboration program (2017–2021) was developed between the Maferinyah National Training and Research Centre (Guinea) and the Institute of Tropical Medicine (ITM) of Antwerp (Belgium). First, Maferinyah Centre's training capacities will be improved through eLearning Courses for young health professionals. Second, the research capacities of Maferinyah Center are strengthened through a "learning by doing" approach Reproductive Health, Human Resources for Health, Management of febrile illness and Patient Centred Care. Third, the Centre's management capacities are strengthened and its young staff trained (at least two PhD). A synergy with a local NGO (Fraternite Medicale Guinée) has been developed within the training and research components of the Program. The development and running of three e-Courses (Primary Health Care, Sexual and Reproductive Health and Antiretroviral Therapy) is on-going. The process along with preliminary results of the program will be presented.
CONCLUSION This innovative Capacity Building Program is likely to make Maferinyah as the leader in continuing medical education and research in Guinea.
[1]The Program is funded by the Belgian Directorate-General for Development Cooperation and Humanitarian Aid (DGD) and additional funding from the Belgian Technical Cooperation (BTC) supports e-Courses development and running.

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7P1

Rates and causes of death in women of reproductive age (12–49 YEARS) in 12 rural communities from Maputo and Gaza province, southern Mozambique

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INTRODUCTION In Mozambique the data on rates and causes of death in women of reproductive age (WRA) are scarce, particularly in rural areas, where the health system has limited coverage. The only comprehensive and recent data come from post-census mortality survey from 2007–2008.
AIM The aim of this study is to estimate the mortality rate and identify causes of mortality among WRA using verbal autopsy (VA).
METHODS This is a descriptive study to assess mortality rates and causes of death in WRA (12–49 years) using data from a census conducted in 2014 in 12 rural communities located in Gaza and Maputo provinces, Southern Mozambique. This census included household registration to identify women of reproductive age, death registration and VA data collection. Causes of death and death rate were calculated from the total number of deaths in WRA. Rate of specific causes of death were computed among three age groups: 12–19, 20–34 and 35–49 years with the underlying cause of death determined using InterVA4. Description on maternal related cause of death were excluded because they were published elsewhere.
RESULTS A total of 80,483 WRA were identified for this study. Of the 246 deaths (3.0 per thousand) reported in the previous 12 months, 216 (87.8%) were non-maternal, 23 (9.35%) were maternal and 7 (2.8%) without VA information. Communicable diseases, non-communicable disease and road traffic accident (RTA)/trauma were responsible for 68.9%, 14.7% and 8.7% of deaths, respectively. The top three causes of death in the total population were HIV/AIDS (41.6%), TB (14.1%), and RTA/trauma (7.1%). However, age-related differences in top-three causes were observed [malaria (7.7%) at age 20–34 and acute respiratory infection including pneumonia (4.7%) at age 35–49].
CONCLUSION This study shows that HIV/AIDS remains the most important cause of death in these rural communities. The study finding also reveal the contribution of non-communicable disease and RTA/trauma which is typical in urban areas suggesting a transition of diseases burden. Strategic public health interventions targeting poor and rural population including HIV care is crucial to save lives in rural Mozambique.

7P2

The impact of urbanization and population density on childhood plasmodium falciparum parasite prevalence rates in Africa

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BACKGROUND Although malaria has been traditionally regarded as less of a problem in urban areas compared to neighbouring rural areas, the risk of malaria infection continues to exist in densely populated, urban areas of Africa. Despite the recognition that urbanization influences the epidemiology of malaria, there is little consensus on urbanization relevant for malaria parasite mapping. Previous studies examining the relationship between urbanization and malaria transmission have used products defining urbanization at global/continental scales developed in the early 2000s, that overestimate actual urban extents while the population estimates are over 15 years old and estimated at administrative unit level.
METHODS AND RESULTS This study sought to discriminate an urbanization definition that is most relevant for malaria parasite mapping using individual level malaria infection data obtained from nationally representative household-based surveys. Boosted regression tree (BRT) modelling was used to determine the effect of urbanization on malaria transmission and if this effect varied with urbanization definition. In addition, the most recent high resolution population distribution data was used to determine whether population density had significant effect on malaria parasite prevalence and if so, could population density replace urban classifications in modelling malaria transmission patterns. The risk of malaria infection was shown to decline from rural areas through peri-urban settlements to urban central areas. Population density was found to be an important predictor of malaria risk. The final boosted regression trees (BRT) model with urbanization and population density gave the best model fit (Tukey test P value <0.05) compared to the models with urbanization only.
CONCLUSION Given the challenges in uniformly classifying urban areas across different countries, population density provides a reliable metric to adjust for the patterns of malaria risk in densely populated urban areas. Future malaria risk models can, therefore, be improved by including both population density and urbanization which have both been shown to have significant impact on malaria risk in this study.
QUESTIONS As a Post-Doctoral Fellow, the ASTMH conference is an excellent opportunity not only share my research work but also to learn from evidence driven research from across the globe. Sub-saharan Africa, like other less developed countries, bears the highest burden of disease among an impoverished population burdened with poverty and poor uptake of evidence-based research. By attending the ASTMH annual conference, I am confident I will gain enhance my research capacity by connecting and participating in networks

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that can improve the research agenda in my country and the continent as a whole.

My broad research interest is in evaluating spatial and temporal aspects of disease epidemiology to support evidence-based implementation of intervention strategies. I have close to 10 years of experience evaluating within spatial frameworks, the factors that influence disease transmission, the application of population and urbanization mapping for disease burden estimation as well as evaluating the impact of control interventions on transmission. My work currently focuses on mapping and understanding changing malaria transmission patterns within urban settings in Africa, estimating populations at risk of malaria infection within these settings and their access to key interventions. An opportunity to participate in the ASTMH conference will be an honour and will strengthen my resolve to be involved the ASTMH conference that is in the frontline of raising awareness on pertinent health research.

Publication in the International Journal of Health Geographics*. From world reknown scientists my research to drive change in my country the factors that influence disease transmission, the application of population and urbanization mapping for disease burden estimation as well as evaluating the impact of control interventions on transmission. Caroline is driven by the desire to be at the frontline of integrating technological innovation to inform evidence-based implementation of interventions to improve the health and wellbeing of populations in Africa.

7P3

Urban health interventions and vector-borne and other infectious diseases of poverty: an international collaboration to analyse knowledge gaps

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INTRODUCTION Urban settings are areas where poverty, inequality, and health risks, including vector-borne diseases (VBD), are concentrated, resulting in major public health challenges. Following a call from the Special Program for Research and Training in Tropical Diseases (TDR), we assembled an international consortium (VERDAS), of 22 researchers across 5 countries (Canada, France, Spain, Colombia, Brazil) to generate knowledge on urban health interventions for the prevention and control of vector-borne and other infectious diseases of poverty.

AIMS
1 Identify needs and strategic areas to perform reviews
2 Conduct 6 comprehensive scoping reviews
3 Identify research gaps and priorities

METHODS We used a 3-round eDelphi survey to select 6 topics considered of highest priority by a panel of 109 international experts (43% researchers; 52% decision-makers; and 5% private sector). We conducted the 6 scoping reviews. At the end, we held a workshop where VERDAS researchers (n = 14) and decision-makers (n = 8) collaborated in a concept mapping exercise to identify research gaps and priorities and writing a series of policy briefs.

RESULTS We conducted 6 scoping reviews focused on VBDs in urban context on these summarized topics:
1 Low-cost, simple and rapid diagnostic technologies (mean score 4.27 ± 0.86; rated 4 or 5 by 85.4% of participants) (n = 180 articles included)
2 Surveillance systems and translating data into action (4.29 ± 0.91; 4–5 by 87.8%) (n = 79 articles included)
3 Impact, cost-effectiveness and sustainability of integrated vector management (4.08 ± 0.71; 4–5 by 79.2%) (n = 42 articles included)
4 Transmission dynamics, vectorial capacity and coinfections (3.90 ± 0.92; 4–5 by 75.5%) (n = 51 articles included)
5 Containment measures (4.00 ± 1.02; 4–5 by 71.43%) (n = 31 articles included)
6 Preventive interventions focused on housing and sanitation (3.88 ± 1.07; 4–5 by 63.3%) (n = 44 articles included)

CONCLUSION The reviews conducted simultaneously resulted in a broad coverage of the topic of prevention and control of VBDs and implications of the findings for future research and for public health practice were highlighted in each review. Concept mapping show that major research needs are about adequate evaluation of interventions' effectiveness and impacts and a better integration of dimensions such as social determinants, equity and community participation.

7P4

Prevalence and management of acute pesticide poisoning in public and private hospitals in Kampala, Uganda

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INTRODUCTION In Uganda, majority of the victims of acute pesticide poisoning do not attend hospital and of those who do so, records cannot be easily traced. Medical management is difficult due to lack of enough evidence to determine the best strategies for diagnosis and treatment, there is also often intermittent supply of antidotes.

AIM This study was aimed at assessing prevalence and management of acute pesticide poisoning in public and private hospitals in Kampala.

METHODS We carried out a retrospective cross sectional study that involved reviewing of 739 patient records from 5 hospitals in Kampala. Descriptive analysis was carried out to assess prevalence, diagnosis, treatment and outcomes of pesticide poisoning. Crude and adjusted logistic regressions were carried out to obtain odds ratios and 95% CI to identify demographic and poisoning characteristics associated intentional poisoning.

RESULTS Out of the 739 patients involved in the study, 28.8% (212/739) were due to pesticide poisoning giving a prevalence rate of 28.8. Majority of the cases were due to organophosphate poisoning 91.4% (191/210) taken intentionally 63.3% (133/210) by ingestion 98.1% (206/210). Males were (AOR 2.60; 95% CI 1.11–6.09) were 3 times, person aged 13–19 year olds (AOR

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9.35; 95% CI 2.24–38.93) were 9 times; 20–30 year olds (AOR 13.40; 95% CI 3.63–49.51) were 13 times; 30 years above (AOR 6.57; 95% CI 1.67–25.91) were 7 times more likely to suffer from intentional pesticide poisoning. Diagnosis was based on poisoning history 91.2% (187/205), blood pressure 94.1% (192/204), airways, breathing and circulation tests 48.0% (95/198). Common signs and symptoms used were nausea and vomiting 42.9% (91/212) muscle weakness 29.7% (63/212), excessive salivation 23.1% (49/212) confusion 20.3% (43/212) and diarrhoea/stomachache 17.9% (38/212). More than half of the patients admitted were treated using atropine 52.3% (113/212) and almost all patients recovering fully 95.8% (183/191).
CONCLUSION The prevalence of acute pesticide poisoning was high among cases admitted to hospitals in Kampala with majority being managed based on physical and clinical examination. Diagnosis and treatment could be improved by laboratory analysis and use protocols for pesticide management.

7P5

Climate change and schistosomiasis: a global synthesis of research findings, knowledge gaps and new research directions

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INTRODUCTION The life cycles and transmission of most infectious agents, particularly those transmitted by an invertebrate vector or intermediate host, are inextricably linked with climate. Yet, determining the exact effects of climate change (CC) on human infectious diseases, despite a growing interest in the scientific community, has proven difficult and the debate about the potential health outcomes remains polarized.

The exact outcome of CC on human schistosomiasis, a blood-fluke affecting more than 200 mill. people, is likely to vary with the snail-parasite species investigated, the spatio-temporal scale of investigation and geographical location. Although, studies that explicitly investigate the CC-schistosomiasis relation are relatively rare, a wealth of studies use the known, estimated or observed correlation with climatic factors, to predict the current risk and distribution. Such studies can implicitly give indications about the expected direction and outcomes of CC on schistosomiasis given changing climatic conditions.
AIM Here, we provide an updated synthesis of current knowledge about the climate change-schistosomiasis relation. Specifically this review is driven by asking the following questions: 1) what is the current scientific "evidence" (if any) about the effect and direction of CC on schistosomiasis? and 2) is there consensus about the CC-schistosomiasis relation across parasite-snail-species, spatial scales, geographical location and applied methods?
METHODS A systematic search was conducted to identify studies reporting on the relationships between climatic factors and/or impacts of climate change on the agents of schistosomiasis via ISIS Web of Science and PubMed.
RESULTS Most investigations of the impact of CC on schistosomiasis are associated with the impacts of temperature; with few observations of the effects of changes in precipitation, land use or land cover. The volume and type of evidence associated with CC responses is variable across geographical regions and snail-parasite taxonomic groups, with predominance of evidence derived from the species *Schistosoma mansoni* and intermediate host snail *Biomphalaria glabrata*.
CONCLUSION Based on the identified geographical biases and gaps in knowledge about the CC-schistosomiasis relation, we propose new research directions to close gaps and align efforts with the areas considered to be the most vulnerable to climate change.

7P6

Responsive to who/what?: a review of conceptualisations of 'responsiveness' in health systems literature

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INTRODUCTION Responsiveness is considered to be one of three intrinsic goals of the health system. A substantial amount of available literature explores mechanisms to gauge public/patient preferences, to improve responsiveness or to measure responsiveness. However, much of this literature is informed by a narrow definition of 'responsiveness' that is in keeping with global guidance, and allows for simple indicators and ease of measurement.
AIM The aim of this research is to explore common conceptualisations of responsiveness, map the available evidence of mechanisms for measuring and improving responsiveness and gauging public preferences, and evaluate the scope (both realised and potential) for an expanded conceptualisation of responsiveness.
METHODS We conducted a systematic review of health systems literature including academic literature and global policies and guidelines. The search strategy included terms relating to responsiveness and bottom-up or community accountability. Review materials were categorised according to a typology that distinguishes between mechanisms or interventions informed by an understanding of responsiveness that applies only to health services and the relationship between patients and providers, from those informed by a systems- and community-focused understanding of responsiveness.
RESULTS Much of the literature assumes a narrow definition of the term, and the influence of the World Health Organisation's 1999 Framework for Health System Performance Assessment (1) is clear. However, there is also a significant amount of literature either directly countering the WHO definition, or reporting or developing mechanisms for public involvement in health systems decision-making. There is also some literature exploring qualitative methodologies for the development of culturally specific understandings of the principals underlying responsiveness.
CONCLUSION Social norms and values can both shape, and be shaped-by, social systems. While this is commonly accepted, there is very little theoretical or applied research to support the realisation of this potential. Global health systems guidance on building responsive systems must take seriously the role of health systems in creating social value, and research to support this is vital.
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Expanded access to second-line tb treatment at risk in Eastern Europe and central Asia (EECA) as global fund policies accelerate transition to national funding

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INTRODUCTION The majority of the countries in the Eastern Europe and Central Asia (EECA) region are included in the WHO list of high burden multidrug resistant tuberculosis (MDR-TB) countries. National TB Programmes rely on the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) for key interventions such as procurement of quality assured second-line TB drugs for the treatment of drug resistant TB (DR-TB). Overall reductions in funding and changes in GFATM policies and funding allocations have resulted in plans for the region to accelerate the transition of procurement of key TB commodities and financing of other key interventions according to timelines based on income classification, rather than disease burden and other context specific criteria.
AIM To assess the GFATM policies, allocation of funding, and potential implications for the scale-up of affordable quality second-line TB treatment, including with new and better drugs.
METHODS Semi-structured interviews were conducted with Médecins Sans Frontières (MSF) country teams and key informants. Strategies, policies and grant documents including GFATM policies, national strategic plans, GFATM concept notes and agreements were analysed for seven EECA countries; Armenia, Belarus, Georgia, Kyrgyzstan, Tajikistan, Ukraine, and Uzbekistan.
RESULTS The majority of countries studied are facing significant reductions in funding allocations from GFATM and are scheduled to take on more than 75% of the procurement of second-line TB drugs with national funding before the end of 2018. The rapid timeline poses risks to affordability, quality and accessibility of optimal DR-TB treatment.
CONCLUSION The GFATM is overly-reliant on income classification for determining funding allocations and transition plans in the region compared to other criteria. We strongly recommend that the GFATM carries out an independent risk assessment of the impact of funding and policy changes on procurement, and treatment scale-up for the grantees in the EECA region and adjust the plans for progressive national co-financing of key interventions including procurement of TB commodities, as necessary, in order to allow for expanded access to affordable and quality treatment in the region.

7P8

Travel-related leptospirosis in The Netherlands 2009–2016

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INTRODUCTION Leptospirosis is a widespread zoonotic disease causing potential severe illness. It has a broad spectrum of clinical presentations and exposures; traditionally risk is linked to water-related incidents or activities (e.g., floods, rafting), but often no clear exposure risk is identified. Since the 1950's, an increasing incidence of imported leptospirosis has been observed in the Netherlands; from 2005–2008, 51.3% of all cases was imported.
AIM To characterize the epidemiological characteristics of returned travellers with leptospirosis in the Netherlands in the period 2009–2016, and to describe the clinical profile of returned travelers with confirmed leptospirosis presenting at a tertiary referral center in the Netherlands (AMC) in the same period.
METHODS A retrospective cohort study was performed. In the Netherlands, leptospirosis is a mandatory reportable disease; the Leptospirosis Reference Center (NRL) confirms ~99% of all suspected cases in the Netherlands. Epidemiologic and diagnostic data of all import cases diagnosed at the NRL between 1 January 2009 and 1 September 2016 was analysed; clinical features of patients diagnosed with travel-related leptospirosis at the AMC were retrieved, anonymised, and analysed. The data is currently being updated to cover the whole of 2016.
RESULTS Out of 344 cases of leptospirosis diagnosed at the NRL, 181 (52.6%) were travel-related. The majority of patients was male (76.2%), with a median age of 31 (8–77). The majority of patients had visited Southeast Asia (64.1%), or Europe (12.2%). Thailand (40.9%) was the most visited country; other 'hot-spots' were Malaysia, Indonesia, Cuba, Costa Rica, and France. Exposure risks were known in half of the cases; 96.7% (n = 88) reported exposure to fresh water. In the AMC, 33 patients were diagnosed with travel-related leptospirosis. Common symptoms at presentation were fever, headache, myalgia and nausea; one patient presented with an orchitis. Severe manifestations were pulmonary haemorrhage (n = 1), meningitis (n = 4), and renal failure (14 patients, 42.4%). No patients needed dialysis, none died.
CONCLUSION Leptospirosis occurrence in returning travelers in the Netherlands continues to increase. In any traveler presenting with unspecified febrile illness, it should be considered. Early treatment can reduce the risk for adverse outcomes.

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The public health and economic implications of infant male circumcision in rural Ghana; a community level population based study

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INTRODUCTION The influence of economic determinants on choice of infant male circumcision provider is not known in areas with high population coverage such as rural Africa.
AIM To determine the key socio-economic factors which influence the choice of infant male circumcision provider in rural Ghana.
METHODS We investigated the effect of family income, distance to health facility, and cost of the circumcision on choice of infant male circumcision provider in rural Ghana. Data from 2847 circumcised infant males aged under 12 weeks and their families were analysed in a population-based cross-sectional study conducted from May to December 2012 in rural Ghana.

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Multivariable logistic regression models were adjusted for income status, distance to health facility, cost of circumcision, religion, maternal education, and maternal age.
RESULTS Infants from the lowest income households (325, 84.0%) were more likely to receive circumcision from an informal provider compared to infants from the highest income households (260, 42.4%) even after adjusting for religious affiliation (adjusted odds ratio [aOR] 4.42, 95% CI 3.12–6.27 $P = <0.001$). There appeared to be a dose response with increasing risk of receiving a circumcision from an informal provider as distance to a health facility increased (aOR 1.25, 95 CI 1.30–1.38 $P = <0.001$). Only 9.0% (34) of families in the lowest socio-economic quintile received free circumcision services compared to 27.9% (171) of the highest income families.
CONCLUSION The Government of Ghana and Non-Government Organisations should consider additional support to poor families so they can access high quality free infant male circumcision in rural Ghana.

8P2

Caring practises of mothers with low birth weight infants in the neonatal period; A retrospective qualitative study in the Hohoe municipality, Ghana

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INTRODUCTION Birth weight is vital in the development of every newborn hence, influences child health and survival. Causes and adverse effects associated with Low Birth Weight (LBW) deliveries are well documented. Yet, newborns weighing less than 2.5 kg at birth are on the ascendancy particularly in resource constraints countries. In Ghana, LBW constitute 11% of all deliveries with the neonatal mortality rate at 28 per 1000 live births (1).
OBJECTIVES This study explored the understanding, knowledge and beliefs of mothers on LBW infants, the type of care given to them in the home environment, how they are perceived in the community and the factors that contributed to their survival.
METHOD A retrospective qualitative study employing the phenomenology design, which describes detailed experiences, was used to collect data from October 2016 to January 2017 in the Hohoe Municipality, Ghana. Using a topic guide, after 20 semi-structured interviews and three focus group discussions involving 18 purposely-selected participants, thematic saturation was reached. The computer-assisted Atlas.ti (version 7.5.16) was used to code and theme the data.
RESULTS LBW babies were described and identified based on size, helplessness and activity levels. Mothers did not perceive LBW babies as vulnerable and required special care compared to their normal weight counterparts. Cause of LBW was linked to poor diet intake, gestational ailments, hereditary, heavy work load and ordained by destiny. Apart from feeding, adult female relations deemed experienced in newborn care were the primary caregivers providing mainly bathing, thermal, cord and circumcision care. Male involvement was minimal due to fear of causing harm to the baby. This led to spousal role neglect and conflict. Societal reactions regarding LBW babies were similar as for normal weight newborns but where the newborn weighed <2 kg, attitudes regarding acceptability and handling differed. Both health promoting and negative deep-rooted cultural beliefs influenced the knowledge, practices and understanding on LBW care.
CONCLUSION No difference exists in the care rendered to LBW and normal weight infants. Cultural elements influenced caring practises. In-depth and culturally-adapted counselling provided before discharge from the health facility, targeted at mothers and their primary caregivers could improve child health.
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8P3

An evaluation of continued cognitive and motor decline in Congolese Konzo children during four-year follow-up

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BACKGROUND Konzo is an irreversible upper-motor neuron disorder affecting children dependent on bitter cassava for food. The progression of the disease is unknown.
METHOD Two years after initial assessment, 76 of 123 DR Congo children with konzo (Mean age 10.5 yrs) were compared to 41 of 87 nonkonzo children from konzo-affected households on the Kaufman Assessment Battery for Children, 2nd edition (KABC-II), and the Bruininks-Oseretsky Test of Motor Proficiency, 2nd edition (BOT-2). At 4-year follow-up, 55 konzo and 33 nonkonzo children were evaluated.
FINDINGS Konzo boys did worse than non-konzo on the KABC-II Mental Processing Index (MPI) at 2- year follow-up ($P = 0.01$), but girls did not. At 4-year follow-up, the difference in MPI between konzo and nonkonzo was attenuated in boys and amplified in girls. Consistent with baseline, both konzo boys and girls were lower on BOT-2 at both follow-up times ($P < 0.01$). Both konzo and non-konzo boys declined on BOT-2 fine Motor proficiency ($P < 0.02$) and KABC-II MPI performance at 2- and 4-year follow-up ($P < 0.01$), but not the girls. For the boys, increases in urinary thiocyanate levels, an indicator of exposure to toxic cassava, was significantly related to decreases in BOT-2 motor proficiency ($P = 0.03$). This was not the case for the girls or for the relationship between thiocyanate and KABC-II MPI cognitive ability performance.
INTERPRETATION Motor and cognitive performance continues to be significantly impaired in konzo male children at follow-up, perhaps from pervasive developmental risk or from neurocognitive impairment from continuing exposure to poorly processed cassava. Funding. NIH grant, R01ES019841 (PI: Tshala-Katumbay)

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Community acquired pneumonia in Cuban children under five, 2009–2015

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INTRODUCTION Community acquired pneumonia (CAP) is the leading cause of morbidity and mortality in children under five years old.
AIM To estimate hospital and population burden of CAP in children <5 y-o hospitalized during 2009–2015, as baseline previous the introduction of Cuban pneumococcal vaccine.
METHODS A descriptive mixed ecological study using data from six hospitals of the Sentinel Network for Surveillance and Vaccines Evaluation of the Cuban Pneumococci project was conducted. The study population included all the hospitalized patients <5 years with diagnosis of Rx-confirmed CAN. The proportions of general hospitalization and for Intensive Care Units to CAP were calculated in under five and 1–4 y-o children by study year and the rate of hospitalization incidence was estimated using the reference population of each participant hospital, with CI-95%. Proportions reported for every indicator in 2009 and 2015 were compared in each age group. The reductions between both age groups were compared using a proportions comparison test.
RESULTS In 2009–2015 period, 9.6% up to the total hospitalizations in children <1 y-o were community acquired bacterial pneumonias; in the 1–4 y-o group it was higher (13.9%); a reduction of 64.5% in the period was verified in <1 y-o ($P < 0.0001$) and 74.1% ($P < 0.0001$) for the 1–4 y-o group. The accumulated incidence rate of CAP hospitalizations in <1 y-o was 4549 x 10^5 inhabitants (IC95%: 4452; 4647); for the 1–4 y-o group it was 1368 x 10^5 (IC95%: 1340;1395).
CONCLUSIONS These first results represent an advanced step intending to demonstrate the need of pneumonias surveillance and their utility to measure the impact of a Cuban anti-pneumococcal vaccine.

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Childhood tuberculosis in a rural hospital in southeast Ethiopia: a seventeen-year retrospective study

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INTRODUCTION Information about childhood tuberculosis (TB) in rural hospitals in low-income countries is limited.
AIM We described the epidemiology and treatment outcome of childhood tuberculosis cases in a rural Ethiopian hospital (Gambo Rural General Hospital) over a 17-year period (1999 to 2016).
METHODS Retrospective analysis of data collection using childhood TB registers (0–13 years old) and treatment cards in a rural Ethiopian hospital. Information was collected on number of cases, type of TB and treatment outcomes using standardized definitions.
RESULTS 1204 patients under 14 years old were registered, 582 (48.3%) of them were under five. Only 9 (0.7%) patients were HIV +, but in many patients [826 (68.6%)] HIV test was not done or was not available.

A total of 74 (6.1%) patients had smear-positive pulmonary TB (PTB), [2 (2.7%) were under five]; 739 (61.4%) had smear-negative PTB [478 (64.7%) under five], and 391 (32.5%) extra-PTB (EPTB) [102 (26.1%) under five]. Smear samples were mainly from spontaneous sputum and scarcely from gastric aspirates. Among the EPTB the most frequent location was the lymph nodes in both groups of age (51.1% of all EPTB)

40.1% of the patient were admitted to the hospital and the rest were managed as outpatients. Under five patients are admitted more often than the older child (58% vs. 42%; $P = 0.01$) The percentage of treatment defaulters was 13.5%. The mortality rate was 4.2% and was the same for under or over five.
CONCLUSION (1) The registration of TB cases can be useful to understand the epidemiology of childhood TB in rural health facilities. (2) Spontaneous sputum smear has a very low diagnostic yield in childhood in low-income countries especially in under five. (3) Under five patients are admitted more often than the rest.

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Severe malaria and risk factors associated to the lethality in children admitted in Jason Sendwe Hospital, Democratic Republic of the Congo

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INTRODUCTION In DRC, Malaria remains a major public health problem where the morbidity and mortality challenges the current malaria control strategies. This study aimed to identify the epidemiology, the clinical features and the risk factors of lethality of severe malaria in pediatrics' population of this hospital.
METHODS This retrospective cross sectional study was conducted in Lubumbashi, in Katanga Province. All the patients aged of 0–5 years old, hospitalized for severe malaria were collected from 1st January 2014 to 31th December 2015.
RESULTS Among 2064 patients hospitalized during the study period, 308 (14, 9%) were reported for severe malaria. Mean age was 31, 55 months, males were more affected 53, 9% (sex-ratio 1, 17). Anemia was the most frequent manifestation (58, 4%), followed by cerebral malaria (35%). The study showed that 27, 6% of children hospitalized for severe malaria had died. Cerebral malaria and malnutrition were significantly associated to the lethality ($P = 0.0002$).
CONCLUSION The present study has shown that severe malaria is a high leading cause of death in young children. Further research and intervention are essential for the disease control.

Abstracts

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Home-based management of presumptive malaria in children under 5 years old in an urban health area, Democratic Republic of the Congo

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INTRODUCTION Malaria remains one of the major causes of morbidity and mortality in tropical and subtropical regions of the World.

This study aimed to explore the knowledge, attitudes and practices of housewives and management of presumptive malaria in young children.

METHODS This study was an observational cross-sectional study conducted from 6th January to 30th March 2013. Free and structured interview was used for data collection.

RESULTS A total of 300 households were surveyed. We found 545 children, of whom 314 (57, 6%) had a presumption of malaria. Among them 31, 2% were treated strictly at home, 50% received treatment before the transfer to the hospital. The positive predictive value of the home malaria presumption was 75%.

CONCLUSION The present study has shown incoherence between the presumptive diagnosis and the confirmed one.

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Prevalence and determinants of under and overnutrition among under five children in Bengo Province, Angola

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INTRODUCTION Children malnutrition is a major public health problem in developing countries. Identifying the risk factors of malnutrition and determining their magnitude is necessary to develop nutritional interventions to confront this problem.

AIM The aim of this study is to assess the determinants associated to under and overnutrition in children under 5 years in Bengo Province, Angola.

METHODS A community-based cross sectional study was used during August to September 2014. A questionnaire adapted from ProPAN 14, willing to collect data on children's general health care, breastfeeding and feeding practices, food ingestion in the previous 24 hours, socioeconomic characteristics and water supply, was applied. Anthropometric measures were collected from all children and mothers to determine their nutritional status Univariate and multivariate analysis were performed to identify factors related to malnutrition.

RESULTS The survey was conducted during 30 days and comprehended 808 children aged 0 to 59 months, from which 50.5% were male Infant wasting, stunting and underweight prevalence were 7.7%, 35.8% and 15.2% respectively. The prevalence of overnutrition was 4.2%, with 3.4% of overweight and 0.8% obese. Risk factors significantly associated to stunting were increased age of children (OR = 4.45, 95%CI 1.98, 9.95), low birth weight (OR = 2.23; 95%CI 1.20, 4.11), insufficient information about child feeding among caregivers (OR = 2.23; 95%CI 1.20, 4.15), and non-exclusive breastfeeding (OR = 1.88; 95%CI 1.30, 2.76). Inadequate dietary diversity was significantly associated to a higher risk of wasting (OR = 2.97; 95%CI 1.21, 7.32). Both stunting and wasting were significantly associated to diarrhea in the previous two weeks (OR = 1.50; 95%CI 1.07, 2.08 and OR = 3.08; 95%CI 1.48, 6.41, respectively) and living in a household with more than two children aged under five (OR = 1.50; 95%CI 1.04, 2.18 and OR = 3.19; 95%CI 1.51, 6.77, respectively).

CONCLUSION Undernutrition is common among children under 5 years in Bengo province. Age, birth weight, child feeding knowledge, type of breastfeeding, dietary diversity, diarrhea morbidity and number of under five children living at household were related to undernutrition. The presented results evidence the need of nutritional interventions in order to control children malnutrition risk factors.

8P9

Prevalence of *Helicobacter pylori* antigens and antibodies in asymptomatic children in Kinshasa, DR Congo

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BACKGROUND Prevalence of *Helicobacter pylori* (*H. pylori*) infection in children is not well known in Kinshasa/DRC. Some congolese studies on this infection focused only on clinical aspects of the disease in adults, probably because of lack of appropriate methods for the diagnosis in children. Nowadays, in DR Congo several and non-invasive diagnostic tools are available and appropriate to diagnose the infection in children.

AIM Assess the prevalence of *H. pylori* infection in Congolese children living in Kinshasa, the capital of DRC.

MATERIAL AND METHODS It is a cross – sectional study which took place from September 2015 to February 2016 in the city of Kinshasa. In the first part of this study, we analyzed 184 serums of children aged from 0 to 10 years old by Elisa Technique. Serum was obtained from INRB (National Public Health Laboratory) serum bank and screened for IgG to *H. pylori*. In the second part, we analyzed by immunochromatography technique on cassette (SD Bio line), 417 samples of saddles collected in Kinshasa households with children aged from 0 to 10 years and screened them to look for *H. pylori* antigens.

RESULTS The overall prevalence of *H. pylori* infection was respectively 59, 8% and 43, 9% for antibodies and faecal antigen. The prevalence rate of the infection was related to age both for antibodies IgG (50%, 51, 2% and 78, 7%) and for faecal antigen (26%, 43, 4% and 50%) in the age groups of under 1 year, 1–5 years and 6–10 years respectively. In a multivariate analysis, the age groups from 1- 5 years and 6–10 years, children living in Tshangu, children whom the person cooking food was a domestic and those having a history of gastric disease had emerged as the main risk factors associated with *H. pylori* infection.

CONCLUSION This study showed that prevalence of *H. pylori* infection is very high on congolese child's in Kinshasa, which gets very early in touch with this germ.

Abstracts

8P10

Etiology of fever in hospitalized children in Gabon: preliminary results

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INTRODUCTION In the tropics, fever is among the most frequent causes of medical attendances to pediatric(1). In many malaria-endemic areas, the number of malaria cases is decreasing and other infectious diagnoses become increasingly important.
AIM Our study was performed in order to identify and characterize the main causes of fever in children hospitalized with fever in Lambaréné (Gabon).
METHODS From August 2015 to March 2016, we prospectively enrolled 600 children, aged 0 to 15 years old, having a temperature ≥ 38°C and requiring hospitalization at the pediatric ward of Albert Schweitzer Hospital (ASH) in Lambaréné. All children received a physical examination and were sampled systematically (nasopharyngeal, Blood, stool and urine). Point-of-care tests and advanced molecular tests were performed in Gabon and Germany respectively.
RESULTS The length of hospital stay varied from 1–26 days [median: 5]. The average age on admission was 45.5 months [0–191 months] and mean body temperature was 39°C [38–41.5°C]. Most children presented with weakness (83.1%). Beside other fever-related symptoms, patients most commonly presented with cough and/or dyspnea (58.3%), vomiting (54.3%) and convulsions (13.3%). Anemia was the most frequent laboratory abnormality. Positive microbiological cultures of urine and blood were found in 2.7% and 9.7%, respectively. Of 158 children (26.3%) had multiple diagnoses. Malaria was microscopically found in 59.3% (356/600). A full analysis of the molecular and serological profile of infections is ongoing and will be presented.
CONCLUSION In Lambaréné, malaria is still the major cause of hospitalization in pediatric children with fever. Overall clinical features of severity and frequency of co-infections were high, contrasting with a low mortality rate.

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8P11

Neonatal hyperbilirubinemia in hospitalized neonates on the Thai-Myanmar border: an audit of neonatal medical records from 2009 to 2014

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INTRODUCTION Hyperbilirubinemia is a common neonatal disorder worldwide, which is benign if prompt management is available. However, there is a higher morbidity and mortality risk in settings with limited access to diagnosis and care. The current audit aims to describe neonatal hyperbilirubinemia (NH) in a resource-constrained setting in order to improve the management and outcome of jaundiced infants.
METHODS Medical records of 2980 neonates hospitalized in one of three SMRU-special care baby units (SCBUs) on the Thai-Myanmar border were retrospectively audited between January 2009 and December 2014.
RESULTS Clinical jaundice was reported in 65% (1946/2980) of records and was confirmed by a serum bilirubin (SBR) measurement within the first 14 days of life in 81% (1580/1946). Compared to neonates hospitalized without jaundice, there was a higher proportion of males, premature births and younger, primiparous Karen mothers. Among them, 87% (1368/1580) had a bilirubin level above the phototherapy threshold[1] (moderate NH) and 13% (212/1580) above the exchange transfusion threshold[1] (severe NH). Neonates with severe NH were more likely to be premature (AOR: 1.5 95%CI 1.1–2.1), born at home (AOR: 2.1 95%CI 1.2–3.6) and to be G6PD-deficient (AOR: 1.8 95%CI 1.3–2.6). They required a longer period of phototherapy than neonates with moderate jaundice. Most of them, 63% (133/212) were severe at start of phototherapy and 37% (79/212) reached the severe threshold 1 to 8 days after the start of phototherapy. In 2012, after the introduction and training on the use of standard guidelines and LED phototherapy, the proportion of severe NH was reduced three-fold (from 37% in 2009 to 13% in 2012) and the mortality dropped from 10% in 2009 to 2% in 2012 and remained low.
CONCLUSION Jaundice is an important cause of neonatal hospitalization on the Thai-Myanmar border. Risk factors for jaundice were not different to previous reports from Asia. Access to SBR, G6PD testing and phototherapy is possible in resource-constrained settings. The use of standardized guidelines and appropriate treatment helped to decrease the severity and mortality of NH. Reasons for higher NH susceptibility amongst those of Karen ethnicity need to be determined.

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8P12

Clinical and neurodevelopmental outcome of newborns with excessively high levels of serum bilirubin in a limited-resource setting: a matched case-control study

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INTRODUCTION Neonatal hyperbilirubinemia (NH) is the most common condition that requires medical attention in newborns. In some infants serum bilirubin (SBR) levels rise excessively and cause acute bilirubin encephalopathy (ABE) leading to death or lifelong neurological impairment.

Abstracts

AIM This study aimed to describe the clinical and neurodevelopmental outcome in infants with NH born in a limited-resource setting along the Thai-Myanmar border, without immediate access to exchange transfusion, but with phototherapy facilities.
METHODS *Cases* were neonates >28 weeks of gestational age hospitalized between 2009 and 2014 who had two consecutive high SBR measurements that would justify exchange transfusion[1], or a rapid rise in SBR with neurological signs. Survivors from this group were matched to *controls* who had moderately raised SBR levels. Neurodevelopmental outcome was evaluated with Griffiths Mental Development Scale (GMDS) once between two and eight years of age.
RESULTS We identified 132 cases of whom 118 (89%) survived the neonatal period. All neonatal deaths occurred in ABE cases. Phototherapy was used for all cases, starting at median 57 hours of life, four received exchange transfusion. There were 2 childhood deaths, 77 cases were lost to follow-up. 39 cases with controls matched on age, sex and prematurity were available for analysis. Three cases (7.7%) showed severe clinical and neurological impairment, with untestable GMDS-scores.

For the remaining 36 pairs, clinical and neurological examination was similar. The proportion of stunting was high for both cases and controls (38% and 24%; $P = 0.294$). The GMDS-scores were below the 10th centile in one third of the children. There was no difference in risk of scoring below the 10th centile between cases and control, once adjusted for stunting (AOR 1.1; CI 0.3–4.3; $P = 0.880$).
CONCLUSION In this setting with constrained exchange transfusion possibilities, 89% of infants with excessively high SBR levels survive the neonatal period. Survivors have an increased risk of neurological impairment. GMDS-scores of non-neurologically impaired survivors are comparable with children who had only moderately raised SBR levels. GMDS-scores were low in this marginalized population where stunting prevalence is high and pre-school activities rarely available.
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8P13
Comparative post-rainy season surveys of malaria-associated morbidity among febrile pediatric patients in Nouakchott, Mauritania

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INTRODUCTION A post-rainy season survey was conducted in October and November 2016 in the Department of Pediatrics of the "Centre Hospitalier Mère et Enfant de Nouakchott" and results were compared to those of October-November 2012.
AIM To update malaria morbidity data in Nouakchott.
METHODS All children under 14 years old with fever or history of fever during 48 hours before consultation were included. For each patient, finger-prick blood samples were collected, and diagnosis was established by microscopy, rapid diagnostic test, and nested PCR.
RESULTS Of 110 and 163 febrile children recruited in 2012 and 2016, blood smear and rapid diagnostic test were positive in 66 (60%) and 18 (11%), respectively, and PCR was positive in 65 (59%) and 16 (9.8%) in 2012 and 2016, respectively. Among positive cases, *Plasmodium vivax* (53.6%, 56/110 in 2012 and 6.1%, 10/163 in 2016) largely predominated over *P. falciparum* (6.3%, 7/110 in 2012 and 4.9%, 8/163 in 2016). Five (71%) and 2 (25%) of 7 and 8 *P. falciparum*-infected malaria patients in 2012 and 2016, respectively, have never travelled outside Nouakchott whereas none of the *P. vivax*-infected patients had a recent travel history.
CONCLUSION This study confirms the establishment of an autochtonous *P. vivax* malaria transmission in Nouakchott and highlights the possible emergence of local transmission of *P. falciparum* malaria in the city, suggesting the need to continue the monitoring of malaria situation and strengthening control measures in the city.

8P14
Associated factors to double burden of malnutrition stunting of child and overweight or obesity of mother in a secondary city of Benin

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INTRODUCTION The double burden of malnutrition stunting of child and overweight / obesity of mother (DBM/ SCOM) is gaining importance due to nutritional transition that is going on in developing countries in general and particularly in Benin.

The aim of this study was to determine the prevalence of the DBM/SCOM phenomenon and to identify its associated factors in Comé city in Benin.
METHOD It was a cross-sectional and analytical study conducted from June 1st to June 29th, 2015, concerning 357 couples composed with mother in reproductive age and her last under-five year old child. The sample built on a two staged random technique. The data were collected by documentary exploitation, observation and investigation by questionnaire on socio-economic and household factors, health care, feeding practices of mother and child and also their anthropometric measurement. Data were treated and analyzed with software STATA version 11 and WHO-Anthro version 3.2.2. The test of Pearson khi square, the Student test and the multiple logistic regression were used.
RESULTS The frequencies of nutritional status of mothers were 70% normal, 19% overweight, 6% obese and 5% energetic deficit. As for the children, they were 54% normal, 32% moderately stunted and 14% severely stunted. It has implied a 11.5% (IC95% = [10.8%; 12.4%]) DBM/ SCOM prevalence. The The double burden of malnutrition stunting of child and overweight / obesity of mother was more prevalent with older children, the lest physical occupation, the older mother, the uneducated mother, the better-off household, the higher size on household, the possession of car and high food consumption score.
CONCLUSION Most identified factors were modifiable; then, the development and implementation of sensitization program will make it possible to prevent the malnutrition in Comé population.

Abstracts

8P15

Does the deployment of HIV diagnostic assistants in Malawi improve early infant HIV diagnosis and enrollment to care?

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TYPE OF STUDY Retrospective cohort study involving a review of existing program records.

RESEARCH TOPIC/BACKGROUND Like most countries in southern Africa, Malawi is at the epicenter of the HIV epidemic. In 2016, an estimated one million people were living with HIV, which included 40,000 children (0–14). [1] Approximately 90% of childhood HIV infection in Sub-Saharan Africa occur due to mother-to-child transmission of HIV. [2] In 2011, Malawi developed and adopted a novel Prevention of Mother to Child Transmission (PMTCT) Option B+ approach that provides lifelong antiretroviral therapy (ART) for all HIV-infected pregnant and breast feeding women irrespective of clinical or immunological status. Along with Option B+, Malawi started implementing a program of HIV early infant diagnosis (EID) using DNA polymerase chain reaction (PCR) at 6 weeks after birth to improve infant HIV detection and subsequent enrolment to care. [3]

Unfortunately, programmatic challenges persist in implementation of EID program in Malawi along critical points in the infant cascade. In 2013, a sizeable portion (13.5%) of infants failed to receive a PCR test and 25% were tested after 2 months of age. Furthermore, no change was observed post Option B+ in the median time to delivery of test results, proportion of infants started on ART or age at ART start. [4] A pooled analysis on the mortality of untreated, African HIV-infected children reports that 52% of children with peri-partum infection and 26% of those with postnatal infection die at 12 months post-acquisition of HIV infection. [5]

Malawi embarked in 2015 on the training and deployment of a dedicated cadre of providers, known as HIV Diagnostic Assistants (HDAs) to address the implementation challenges and scale-up of overall HIV diagnostic services, including EID and linkage to Antiretroviral Treatment (ART). To our knowledge, this is a novel approach designed by Malawi Ministry of Health (MOH) and its effect on early infant diagnosis of HIV-exposed infants and their enrolment to care has not been evaluated.

OBJECTIVE The focus of our proposal is to compare the effect of HDAs deployment on EID outcomes among HIV-exposed infants and their enrolment to care in health facilities of Mangochi district, Malawi, during the period of January 2015 to June 2015 (pre-HDA deployment) and January 2016 to June 2016 (post-HDA deployment). Our hypothesis is that EID and enrolment to care has improved after the deployment of HDAs. At present there is no published report on the use of HIV Diagnostic Assistants (HDAs) in Malawi and their impact on the uptake of early infant HIV diagnosis (EID) and enrolment to care. The proposed research will provide needed data on the care of HIV-exposed infants regarding the timing of recommended HIV testing and subsequent anti-retroviral treatment for those who are eligible. The study will also identify the factors associated with early DNA PCR uptake and enrolment to care and contribute to future guideline and protocol development processes.

METHODOLOGY This is a retrospective cohort study involving a review of existing program records using the HIV-exposed Child (pink) cards as the data source and review of the DNA PCR and ART registers if data is missing in the HIV-exposed child card. OpenEPI software version 3 was used to calculate the sample size. Considering 30% DNA PCR uptake before the deployment of HDAs and 40% uptake after the deployment of HDAs, 95% significance level, 80% power and a design effect of 2, we calculated a sample size of 1500 HIV-exposed infants – 750 in pre-HDA period and 750 in post-HDA period.

The 33 Health facilities in the 5 zones of Mangochi district where HDAs were deployed will be considered for sampling. Efforts will be made to achieve geographical coverage and representativeness of different levels of health system (primary, secondary and tertiary care). All the 4 hospitals in the 3 zones will be included in the study. The remaining sites were stratified by zones and Stata 14 software package was used to randomly select health facilities from the 5 zones: four each from Chilipa, Makanjira, Monkey-bay and Namwera zones and 5 from Mangochi zone, including the district hospital.

Data will be collected from health facilities by trained data collectors using a paper based structured proforma in May 2017. The data will then be double-entered and validated using Epi-Data software (version, EpiData Association, Odense, Denmark).

Association between exposure and outcomes will be assessed using the chi-square test or Fisher exact test for categorical variables and Wilcoxon rank-sum test for continuous variables with levels of significance set at 5%. Relative Risks with 95% confidence intervals will be calculated to measure the strength of association. A multivariable binomial regression analysis will be done to assess the independent effect of HDAs on the outcomes after adjusting for all confounders.

PLANS FOR DISSEMINATION OF FINDINGS The results of the study will be disseminated both nationally and internationally. The results will be submitted to the NHSRC. Findings may be used to improve EID and enrolment to care.

Dissemination will occur through three main mechanisms: 1) a report to the Malawi Ministry of Health; 2) presentations at local and international scientific venues; and 30 related publication of manuscripts in open access journals

8P16

Clinico-epidemiological profile and outcome of snake bites victims: a pilot project to monitor and accelerate the reduction of snake bite mortality - Touboro Health District Cameroon- 2016

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INTRODUCTION In Cameroon, snake bites are a public health problem under–reported with 2% case-fatality rate (CFR). In 2015, an active review found 28 cases in Touboro Health District not reported with 25% CFR. The Ministry of Public Health conducted a pilot for surveillance and management program of snake bites using a strategic tripod: training of health personnel, provision of anti-snake venom (ASV), and strengthening of epidemiological surveillance.

AIM We aimed at describing epidemiology, clinical features, and outcome of snake bitten cases in order to monitor progress.

METHODS We screened inpatient registers from April to November 2016 and snake bite cases were included. Medical records were reviewed to obtain clinical and epidemiological details. We coded Signs and symptoms according to the African Society of Venimology recommendations. A line list was generated and analysis done using epi-info7.
RESULTS A total of 58 cases were reported from 13 health facilities; 37 (64%) of them living in Touboro. Patients were predominantly young males 33 (57%), median age 25 years (range 3–60). Majority of snake bites 38 (65.5%), occurred in daytime during the harvest season (July-September). Median time from bite to admission was <1 hour (0.4–6). Four patients (7%) died. An average of two vials (1000 DL50) of a polyvalent ASV composed of lyophilized fragments of F (ab') 2 immunoglobulins were used per patient to obtain recovery after 4 days hospitalization. Vipers were reported to have caused 51 (88%) of bites. Five patients had neurological syndrome. Hemorrhagic signs led to blood transfusions for 8 (14.5%) patients.
CONCLUSION Snake bite is a neglected tropical disease in Cameroon. Viper's bites affects young persons during harvest season. Snake bites can be managed successfully at secondary care settings with an average of 2 polyvalent ASV. Anti-snake venom should be made available in Northern Cameroon where CFR are high.

8P17

Integrating nutrition into local development plans: a challenge for Burkina Faso

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INTRODUCTION Nutrition is a multifactor phenomenon and multi-sectoral planning an indispensable tool.

The translation of national policies into effective actions, at the decentralized level, is a prerequisite for ensuring nutritional impact.
AIM The objective of the study was to analyze the overall local planning process in Burkina Faso in order to identify factors influencing the process of integrating nutrition into communal development plans, opportunities and challenges.
METHODS The study was carried out in two stages: i) an analytical review of communal development plans in 10 communes in two regions with high prevalence of child malnutrition (Sahel and East) and ii) the semi-structured individual interviews conducted in March 2017 with 39 actors at the central and communal levels involved in the local planning.
RESULTS The degree of integration of nutrition in the local development plans (LDCs) varied from one community to another. Three types emerged: i) a commune with 75 percent nutritional coverage, ii) three with 50 percent coverage and iii) six with 25 percent coverage. All municipalities acknowledged malnutrition as a priority, although 60 percent of them did not plan any action to address the issue. Factors influencing local planning process in a holistic way included sectoral policies, sensitivity of local actors to nutrition, and the presence of nutrition support partners within the community. Specifically, actors unanimously agreed on the main obstacles: - the level of participation and inclusion of the local planning approach was low, - the local actors did not master the planning process and human resources capacity was limited, - the local elected representatives had insufficient knowledge on malnutrition, - the local elected representatives preferred investing in more visible infrastructures.
CONCLUSION Integrating nutrition into LDCs is a major challenge for Burkina Faso. So the upcoming revision of the communal development plan (CDP) remains an opportunity. Strengthening the quality of the local planning process by addressing the identified barriers would significantly improve nutritional planning at the decentralized level.

8P18

Impaired child development in the Amazon region of Peru: describing the current situation and identifying early-life targets for intervention

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INTRODUCTION It has been estimated that 43% of children under-five in developing countries are at risk of not fulfilling their developmental potential. This early childhood period is considered to be the most important development period across the lifespan as early deficiencies can have lifelong effects.
AIM To describe child development at five years of age in a cohort of Peruvian children and identify possible early-life targets for intervention.
METHODS A longitudinal cohort study was conducted in Iquitos, Peru between September 2011 and July 2016. A total of 1,760 children were recruited at one year of age and followed-up to five years of age. Socio-demographic and health information was collected with a questionnaire administered to the child's primary caregiver. Cognitive development was assessed in a random sample of 880 children with the Wechsler Preschool and Primary Scale of Intelligence-III (WPPSI-III).
RESULTS Standardized IQ scores from the WPPSI-III at five years of age were much lower than the reference population (whose scores follow a normal distribution (mean = 100; standard deviation = 15)). The mean (sd) IQ score in our cohort was 77.1 (10.8) with 87.8% of children considered to be below average and 20.6% considered to have extremely low development. In multivariable linear regression analyses, early-life variables that were associated with decreased WPPSI-III scores include: low socio-economic status (β (95% confidence interval (CI)) = −1.54 (−2.24, −0.85)), stunting at one year of age (β (95% CI) = −2.59 (−4.51, −0.68)) and continued breastfeeding at one year of age (β (95% CI) = −3.38 (−5.89, −0.87)). Variables associated with increased WPPSI-III scores include: attending well baby clinics (β (95% CI) = 0.52 (0.30, 0.74)) and higher receptive language scores at one year of age (β (95% CI) = 0.55 (0.02, 1.07)).
CONCLUSION These results provide empirical evidence documenting severe child development impairments in an impoverished region of Peru. It is imperative that evidence-informed interventions be identified, prioritized and targeted to the early childhood period to prevent lifelong disabilities. Interventions targeting nutrition, age-appropriate behavioural stimulation and health care usage during the first year of life may be particularly beneficial.

Abstracts

8P19

Uptake of HIV Testing and Counselling (HTC) among acutely malnourished children in rural and urban Blantyre, Southern Malawi: a retrospective comparative review

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INTRODUCTION Human Immunodeficiency Virus (HIV) is understood to contribute significantly to the increased burden of malnutrition-related morbidity and mortality in sub Saharan Africa. Fittingly, integration of HTC in Community Management of Acute Malnutrition (CMAM) services is envisioned to facilitate prompt identification and referral into care. However, there is limited evidence to establish HTC uptake and location-specific variations that may exist in CMAM programmes.
AIM We aimed at assessing the uptake of HTC in CMAM programmes in Blantyre and compare these findings in rural and urban settings.
METHODOLOGY We conducted a retrospective review of CMAM monthly reports for 2014 and 2015 from 6 urban and 12 rural health facilities. The population comprised acutely malnourished children aged 6 months to 12 years. A pre-tested data abstraction tool was used to extract data on location, new admissions, HTC referral, and HIV sero status. We used descriptive statistics, univariate and bivariate analysis to assess the associations between HTC referral/testing and covariables, expressed as odds ratio with 95% CI.
RESULTS Of the total 4527 children newly admitted/enrolled, 2411 (53.5%) were referred for HTC. HIV test was done in 913 (92%) and 1346 (95%) children at urban and rural health facilities respectively. HIV prevalence was 23.7% and 17.3%, respectively, corresponding with a 49% (95%CI 21–83%) higher level in urban relative to rural Blantyre. Level of HTC referral did not differ between rural and urban facilities (OR = 1.09, 95%CI 0.97–1.23). Rural facilities were 68% more likely to test referred children compared to urban facilities (OR = 1.68, 95%CI 1.21–2.34).
CONCLUSION While HTC referral rates were similar across settings, urban facilities were less likely to test referred children for HIV and had higher HIV prevalence, compared to rural facilities. Interventions to increase CMAM HTC uptake should contextualize location. Future research ought to target factors leading to location-specific variations in HIV testing and prevalence. Use of retrospective secondary data was a limitation in terms of level of analysis since CMAM reporting is grouped and not per child.

8P20

Mental health among private high school students in Hanoi, Vietnam

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INTRODUCTION Mental health problems are common among Vietnam adolescent. However, studies focus on private high school students are limited.
AIM This study aims to examine mental health status and related factors among private high school students in Hanoi, Viet Nam.
METHODS A cross-sectional study was conducted among 342 students in a private school in 2016 using a self- administered structure questionnaire. Strengths and Difficulties Questionnaire (SDQ) was used as mental health screening instrument. This instrument has 25 items and divides into 5 domains: 1) emotional symptoms; 2) conduct problems; 3) hyperactivity, 4) peer relationship problems; and 5) prosocial behaviors. The first four domains are added together to screen mental health problems and a range of total score is 0 – 40. In this study, we used the cut-off point is 15 to assess mental health problem. Statistical analyses were performed using STATA 12.0. Significance level is at $P < 0.05$.
RESULTS The result showed that mean age of participant is 16.79 ± 0.88. 62.2% participant are boys. With the cut-off point of 15, 27% of students were screened with mental health problems; it was not significantly higher in girls (30.2%) than boys (25%). Among 4 domains that were used to assess mental health problems, prevalence of participants with conduct and peer relationship problems are similar (24.7%) and are higher than emotional problem (19.7%), hyperactivity problem (14.3%). 27% students have prosocial behaviors. Bivariable analysis indicated various factors associated with mental health problems among students such as: academic, athletic, social, and personal behaviors. Multinomial logistic regressions showed that studying time and frequency of playing game have significant association with mental health problems ($P < 0.05$).
CONCLUSION The prevalence of students with mental health problems in our study is higher than some previous studies in Vietnam and shows the need of developing and implementing intervention programs at school to improve mental wellbeing of student.

8P21

Malnutrition associated to uncomplicated malaria in sub-saharan African adults: socio-demographic factors, clinical and biological impact

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BACKGROUND In the last decade, nutrition transition that occurred in Africa exposed the populations to a double burden of diseases. Undernutrition and overnutrition associated to malaria infections in adults could worsen the disease morbidity.
AIM We conducted an analysis to investigate the socio-demographic factors of malnutrition in adults and describe clinical and biological impact of underweight and overweight/obesity in adults infected with malaria.
METHODS We carried out a secondary analysis on data from an observational study conducted in four African countries. Only data from adults were considered in this analysis using univariate and logistic multivariate models. Body mass index was used to define nutritional groups according to World Health Organization criteria. Biological data were analysed from a subset of study participants.
RESULTS Data from 1693 adults in the main study and 239 in the nested were considered. Underweight and overweight/obese adults' frequencies were respectively 14.2% and 16.1%. The proportion of underweight was higher in adults under 30 years old (16.8%, ARR: 1.4, $P = 0.04$) and in adults older than 45 years (22.7%, adjusted risk ratio (ARR): 2.0, $P < 0.001$) than those aging 30 to 45 years old. The overweight/obese's one was less in adults under 30 years old (15.6%, ARR: 0.6, $P = 0.007$). More women were both underweight (18.1%, ARR:

1.6, $P = 0.009$) and overweight/obese (22.5%, ARR: 1.6, $P = 0.009$). Diarrhea was reported more often in underweight adults with an adjusted odds ratio (AOR) at 3.3 ($P < 0.001$). Parasite density was comparable to normal weight group after adjusting (AOR: 0.7, $P = 0.50$). Fever was significantly more reported (AOR: 1.9; $P < 0.001$) in overweight/obese adults. Weakness (AOR: 1.2, $P = 0.35$) and cough (AOR: 1.3, $P = 0.20$) were not significantly associated to overweight/obesity after adjusting. Overweight/obese adults had a trend of lower association to anemia (AOR: 0.5, $P = 0.07$).
CONCLUSION Underweight seems to be predominant in younger and older adults while overweight/obesity is predominant in middle and older adults. Women are both the most underweight and the most overweight/obese. Nutrition transition is changing malaria morbidity in African adults.

8P22

Geographical variations in nutritional status of children in India: a fresh evidence based on NFHS 2015-16

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INTRODUCTION Likewise other developing countries, India steps into Sustainable Development Goals (SDG) 2 – which calls to end hunger, achieve food security and improve nutrition –that needs to be addressed for improving health outcomes among people, and especially among children.
AIM Using the most recent data this paper examines level and trends in underweight, stunting and wasting among children under 5 years in India and across states and districts (smallest administrative unit).
METHODS We used two rounds of the National Family Health Survey (Indian format of Demographic and Health Survey) conducted in 2005–06 and 2015–16. We examined prevalence of underweight, stunting and wasting at national, state and district level and analysed trend over past decade. Geospatial analysis is used to understand the geographical clustering of undernutrition after controlling for key background characteristics such as residence, maternal education and household living status.
RESULTS In past one decade, India witnessed decline in childhood undernutrition, still one in three children were underweight, two in five children were stunted and one every five children were wasted in 2015–6. Prevalence of undernutrition varied across the states – around 20% children of Punjab compared to around 50% of children in Bihar and Jharkhand were underweight. Similarly, around 20% children of Tamil Nadu compared to around 50% children of Bihar and Jammu & Kashmir were stunted. We found a significant geographical clustering in childhood undernutrition across north part of the country. This clustering is associated with underdevelopment of the area, agricultural productivity, and environment.
CONCLUSION Despite the ambitious "mid-day meal" program – to reduce undernutrition among school going children – India remains home of huge number of undernourished child. Moreover, there is considerable geographical variation across the states and districts. While the SDG 2 calls for improving nutrition and ending hunger; this study timely provides evidence on extent of undernutrition in the country. Addressing the undernutrition, India needs area specific intervention to improve childhood nutritional status.

8P23

Emergence of dancing and singing in infants and toddlers

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INTRODUCTION Dance and music are present in all human societies but their functions are a mystery of human evolution. Applying the hypothesis that ontogenesis partially recapitulates phylogenesis a way to elucidate their evolutionary functions is to study their emergence in infants and toddlers. At present, knowledge on the development of dance and music during childhood is scarce.
AIM To obtain knowledge on the emergence of dancing and musical capacities in children.
METHODS Parents of 1016 children originating from 76 countries were interviewed regarding the emergence of dancing, talking, walking and singing in their children. Results were compared to those obtained in other 100 children with neurological deficiencies.
RESULTS The individual dance impulse (IDI) was observed constantly (1008/1016 [99.21%]) and emerged on average around the 10th month of life (8–25; 95% CI), IDI emerged most frequently at first (598/937[63.82%]) followed by talking (256/937[27.32%]), walking and singing. IDI was neither influenced by pregnancy and delivery history, nor by musical and dance habits of the parents. Children danced with others around 4 months later and did so more frequently when parents used to dance (498/545 [91.14%]) vs. 281/337 [83.83%]; $p \leq 0.0005$). Later, around the 19th month, children started to sing. Contrary to walking and talking which had been observed in all children, this was not the case for singing in 74/955 (7.75%) children. In comparison to healthy children, children with neurological deficiencies did not display IDI in 15/100 (15.00%) and when they did so, this happened on average 9 months later.
CONCLUSION IDI is an omnipresent behavior of healthy infants independent from the cultural background of their parents. This suggests that the impulse to dance is innate and that dance plays an important role in human evolution. The results of our investigation have implications in anthropology, ethnology, musicology, psychology, evolutionary biology, and philosophy. In medicine, the emergence of ISD may be added to the physiological behaviours that infants and toddlers worldwide display indicating a healthy sensomotoric development.
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Richter J, Ostovar R, "It don t mean a thing if it ain t got that swing" - an alternative concept for understanding the evolution of dance and music in humans: front Hum Neurosci. 2016 Oct 7;10: 485

Abstracts

8P24

Evaluation of RSV and hMPV viruses in respiratory samples of children under 5 years by real-time PCRin Arak, Iran

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ABSTRACT Respiratory viral infections are important cause of morbidity and mortality in pediatrics. Although respiratory syncytial virus (RSV) and human mtapneumovirus (hMPV) are considered as prevalent pathogens in this group, few epidemiological are available about their infection rate in some countries. Accurate and timely diagnosis of these viruses could results in correct patients' management and prevents unnecessary antibiotic therapy.

AIM Therefore, the purpose of current study was to evaluate the frequency of RSV and hMPV viruses, using a duplex Real-time PCR assay, in children who were hospitalized in Aral, Iran.

METHOD A total number of 280 nasopharyngeal aspirate samples from children under 6 years old were collected between Januarys to February 2015. The samples were initially tested for influenza A and B viruses using the standard "WHO information for molecular diagnosis ofinfluenza virus" (update 2014). It was shown that 8 samples were influenza A positive and the negative samples (n = 272) were tested for RSV and hMPV viruses using a validated in-house duplex Real-time PCR assay.

RESULTS Of the 272 influenza negative samples, 46 (17%) were positive for hMPV and 19samples (7%) were RSV positive. No co-infection with hMPV and RSV was observed in this study.

CONCLUSIONS The results of this study showed that the rate of infection with hMPV and RSV is remarkable in pediatrics respiratory disease and that the molecular diagnosis of these pathogens should be considered as routine diagnosis. The result paved the way for a domestic multicenter prevalence study.

8P25

Determinants of stunting and severe stunting among Burundian children aged 6–23 months: evidence from a national cross-sectional household survey, 2014

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INTRODUCTION Burundi is one of the poorest countries and is among the four countries with the highest prevalence of stunting (58%) among children aged less than 5 years. This situation undermines the economic growth of the country as undernutrition is strongly associated with less schooling and reduced economic productivity.

AIM This study aimed to identify predictors of stunting and severe stunting among children aged less than two years in Burundi.

METHODS The sample is made up of 6199 children aged 6 to 23 months with complete anthropometric measurements from the baseline survey of an impact evaluation study of the Performance-Based financing (PBF) scheme applied to nutrition services in Burundi from 2015 to 2017. Binary and multivariable logistic regression analyses were used to examine stunting and severe stunting against a set of child, parental and household variables such as child's age or breastfeeding pattern, mother's age or knowledge of malnutrition, household size or socio-economic status.

RESULTS The prevalence of stunting and severe stunting were 53.1% [95%CI: 51.8–54.3] and 21% [95%CI: 19.9–22.0] respectively. Compared to children from 6–11 months, children of 12–17 months and 18–23 months had a higher risk of stunting (AdjOR: 2.0 and 3.0, both $P < 0.001$). Other predictors for stunting were small babies (AdjOR = 1.5 for medium-size babies at birth and AdjOR = 2.9 for small-size babies at birth; both $P < 0.001$) and male children (AdjOR = 1.58, $P < 0.001$). In addition, mothers' high education level (AdjOR = 0.64, $P = 0.006$), correct mothers' child nutrition status assessment (AdjOR = 0.30, $P < 0.001$), delivering at health facility (AdjOR = 0.72, $P < 0.001$) were found to be protective for stunting. Less or equal to 2 under five children in the household (AdjOR = 0.69, $P = 0.003$ for stunting and AdjOR = 0.66, $P = 0.003$ for severe stunting) and wealth were found to be protective for both stunting and severe stunting. The risks factors for stunting were found to be applicable for severe stunting as well.

ConclusionMother's education level, mother's knowledge about child nutrition status assessment and health facility delivery were predictors of child stunting. Our study confirms that stunting and severe stunting are in Burundi, as elsewhere, a multi-sectorial problem. Some determinants relate to the general development of Burundi: education of girls, poverty, and food security; will be addressed by a large array of actions. Some others relate to the health sector and its performance – we think in particular of the number of children under five in the household (birth spacing), the relationship with the health center and the knowledge of the mother on malnutrition.

8P26

Self-medication in hospitalized children aged less than 15 years in Lomé, Togo

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INTRODUCTION In sub-Saharan Africa, self-medication remains a public health issue. It is responsible for delayed diagnosis and frequent side effects in children. In Togo, data regarding self-medication in children is rare.

AIM Identify the causes and consequences of self-medication in hospitalized children aged less than 15 years.

METHODS We conducted a descriptive study from June 18 to July 18, 2016 in two teaching hospitals in Lomé. Parents (or accompanying persons) of hospitalized children were interviewed, within the study period, using a questionnaire on self-medication and its determinants, which was validated on a sample of ten patients. Data was entered and analyzed using SPSS Statistics.

RESULTS We included 204 parents or accompanying persons. Self-medication prevalence was 85% (n = 175). One drug out of

two was an over-the-counter medication. Fever, headaches and abdominal pain were the main symptoms responsible for self-medication. Pain killers and antipyretics were used in 92% of cases. An anti-microbial (antibacterials, antimalarials, and other antiparasitics) was auto-administered in approximately half the cases. Traditional and vegetable drugs represented the other half. Self-medication was more frequent in large families. Among self-medication consequences, an anemia requiring a transfusion was reported in 39% of hospitalized children. Poverty, absence of health insurance and low education level were significantly associated with self-medication. Age of parents and geographic access to drugs were not associated with self-medication.
CONCLUSION Self-medication is common in Togolese children. Health coverage, health education, literacy, and fighting counterfeiting and illicit drug selling are needed to reduce this practice.

8P27

Gastro-intestinal parasitic infection amongst primary school children in Ogiobo and Eresoyen primary schools in Benin City, Edo state, Nigeria

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INTRODUCTION Intestinal parasitic infections have a wide global distribution and are estimated to affect about 3.5 billion people, most of whom are children residing in developing countries. This epidemiological study was carried out between January and March, 2013.
AIM To determine the prevalence of intestinal parasitic infection between primary school children in the urban area of Oluku and rural areas of Ugbogiobo in Edo State. Identify the socio-demographic, gender, environmental and other predictors of intestinal parasitic infections risk in the children. To also create a better understanding of the disease, epidemiology and its eventual control. To determine the positive correlation between the presence of sanitary facilities in the school and the prevalence of gastro-intestinal parasites in the children.
METHODS A total of 222 faecal samples were collected from these subjects and examined using the direct smear method for the presence of these parasites.
RESULTS Of the 222 stool samples examined, only 46 were infected, giving an overall prevalence of 20.72%; 40 (18.02%) for Ogiobo and 6 (2.70%) for Eresoyen primary schools respectively. Four parasites were encountered during the study, all of which are helminths, they include; *Ascaris lumbricoides* (13.06%), Hookworm (4.95%), *Trichuris trichiura* (0.45%) and *Taenia* spp. (0.45%). *Taenia spp* occurred only in a multiple infection with *A. lumbricoides*. The highest prevalence of infection occurred in children between the age group 11–13 and lowest prevalence occurred in children between the age groups 5–7 and 14–16 respectively. By sex, the male children had the highest prevalence of infection (65.21%) for the two schools than the female children with a prevalence of 34.78%.
CONCLUSION Gastro-intestinal parasitic infection is higher amongst primary school children in Ugbogiobo (rural area) than in Oluku (peri-urban) due to their poor personal hygiene and environmental sanitation. The best solution to this public health menace is to maintain proper environmental sanitation and a good personal hygiene. The provision of adequate sanitary facilities, portable drinking water and proper enlightenment would also go a long way in controlling these parasitic infections.

8P28

Prevalence and associated risk factors of intestinal parasites among children in a referral hospital in Northern Tanzania

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INTRODUCTION Intestinal parasites are common among children in low income countries. Living conditions especially lack of sanitation and access to clean water are key determinants of the high prevalence of parasitic infections in children.
AIM Showing the prevalence of intestinal parasites and their association with socio-demographic factors in children in Northern Tanzania.
METHODS The study included 153 patients admitted to the paediatric wards of Bugando Medical Centre, Mwanza, Tanzania for a variety of diagnoses (Acute GI-symptoms 9.2%, other internal diagnoses 45.8%, surgical diagnoses 23.7%, neurological diagnoses 6.5%). A single formalin preserved faecal sample was analysed using SAF concentration method for microscopy. A questionnaire about living conditions was completed by the parents. Association was calculated by Odds Ratio.
RESULTS The age of the patients was 1–14 years (median 4, mean 4.9 years), 55.3% were male. In 60 of 153 patients (39.2%) at least one intestinal parasite was detected, including Blastocystis (N = 18; 11.8%, Chilomastix (N = 4; 2.6%), Entamoeba coli (N = 16; 10.5%), Entamoeba histolytica/dispar (N = 6.3;9%), Enterobius (N = 1; 0.7%), Trichuris (N = 2; 1.3%), Ascaris (N = 2; 3.9%), Endolimax nana (N = 9; 5.9%), Schistosoma mansoni (N = 6; 3.9%), Hookworm (N = 6.3; 9%), Giardia (N = 14; 9.2%), Strongyloides (N = 2; 1.2%). For the prevalence of any parasite a significant association was found only between the toilet facilities (no flush vs. flush; OR: 2.42; CI: 1.166–5.012; P-value: 0.016), water access (no tab vs. tab; OR: 2.03; CI: 1.023–4.028; P-value: 0.041), and living area (rural vs. urban; OR: 2.12; CI: 1.095–4.107; P-value: 0.025). Carriage of intestinal protozoa was significantly more common in children without proper sanitation (no flush vs. flush toilet; OR: 2.34; CI: 1.075–5.119; P-value: 0.03) and living in a rural setting (rural vs. urban; OR: 2.22; CI: 1.113–4.436; P-value: 0.02).
CONCLUSION Sociodemographic risk factors to harbour intestinal parasites in children in Northern Tanzania are rural living, type of toilets and water access. These results demonstrate that the living conditions are the key determinant for parasite carriage. Intestinal protozoa may serve as bioindicators for the standard of hygiene.

Abstracts

8P29

Stunting in extreme nutritional vulnerability: Eastern of Democratic Republic of Congo crisis case

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INTRODUCTION Malnutrition is a public health problem in developing countries. Over 45% of child mortality associated with malnutrition. The Eastern of Democratic Republic of Congo crisis start twenty years ago. The prevalence of wasting and stunting in DRC are respectively 7% and 43%. So in South Kivu Province, wasting and stunting are respectively 7.8% and 53%.
AIM To assess nutritional status of children with strong nutritional vulnerability.
METHODOLOGY This cohort study was conducted in Miti Murhesa Heath district (South Kivu Province) from 2007 to 2015. From July 2007 to August 2009, we recruited 214 pregnant women with at least one severely malnourished child during the ongoing pregnancy. Their newborns (216) were followed from birth to 5 years old. During their first years, anthropometric parameters were measured monthly. A survey was conducted in 2015 to assess the nutritional status of these children after reaching the age of five and their schooling level.
RESULTS 70% of mothers didn't attend school and only 3.7% reached high school level. The number of children per household is 5 (1–7) of median (min-max). The average expenditure per family the previous market day is $1.2 USD.

In total 216 of which 56.2% of the children were girls registered with anthropometric parameters at birth similar to those in the general population: Weight in kg Mean (SD) = 3.05 (0.4) and size cm (SD) = 49.9 (1.8) at birth stunting at 6 months and 12 months was respectively 17.5% and 53.9%. So stunting reaching the threshold of 85.6% at 6–8 years. Furthermore, wasting at 6 months and 12 months was respectively 8.7% and 13.2% before returning to 11.6% at age 6–8 years.
CONCLUSION Households with malnutrition history live in a precarious situation that exposes them to nutritional vulnerability in the short and long terms.

8P30

Pediatric tuberculosis in a hospital in Lima Peru, 2005–2015

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INTRODUCTION Children are estimated to contribute up to 25% of tuberculosis (TB) cases and they are at increased risk of severe forms such as TB meningitis. Diagnosis is challenging and clinicians rely on prediction scores. Children with TB have usually been exposed to an adult with TB in the household; isoniazid preventive therapy (IPT) can prevent TB among them.
AIM To describe characteristics of pediatric TB in a referral hospital in north Lima, Peru and explore potential for prevention.
METHODS We conducted a retrospective study reviewing clinical files of children (<14 years old) diagnosed with pediatric TB (defined as any child in whom TB treatment was prescribed) from 2005–2015 in Hospital Cayetano Heredia. Children characteristics were recorded including microbiological confirmation, TB contact, use of IPT and the Stegen-Jones-Kaplan score (pediatric TB prediction score used in Latin America which involves microbiological or histopathological confirmation, tuberculin test, X-ray, TB contact, physical examination, age and BCG vaccination; probability of TB is indicated as low: 0–2 score, medium: 3–4 score, high: 5–6 score, very high: ≥7 score) (1). The denominators reported for each proportion represent those for whom the variable was known.
RESULTS Seventy children with TB were included, 53% (37) were male, 89% (62) were born in Lima, 7% (5) were <1 year old, 32% (22) were 1 to <5 years old and 61%(43) were ≥5 years old. Pulmonary TB was diagnosed in 30% (29/75) patients, TB meningitis was diagnosed in 12% (9/75); 39% (27/70) were admitted to the hospital. The Stegen-Jones-Kaplan score was 0–2 in 20% (14/70) patients, 3–4 in 11% (8/70), 5–6 in 11% (8/70) and ≥7 in 57% (40/70). TB was confirmed microbiologically in 31% (22/70) of patients. A TB contact was reported in 69% (48/70) of which 80% (32/40) reported a household contact and 46% (22/48) reported one of the parents as contacts, 35% (17/48) children reported two contacts. IPT was initiated in 25% (8/32) children.
CONCLUSION Better tools to improve pediatric TB confirmation are urgently needed. Most pediatric TB cases report a known contact and the low use of IPT, suggesting missed opportunities to prevent TB among children.
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8P31

Malnutrition is dominant in boys less than two-years-old in rural Cambodia

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INTRODUCTION Child mortality in the world has been decreasing consistently. However, around 5.9 million children died in 2015 and 45% of them were with malnutrition. Malnutrition during 'the first 1000 days' (from pregnancy period to two-years old of the child) crucially affects physical and mental development, performance at school and work in the long perspective. It is reported in Cambodian Demographic and Health Survey in 2014 that 24% and 32% of children less than five-years-old were underweight ant stunted, respectively.
AIM We have launched a prospective cohort study in rural Cambodia from 2016, which aims to detect contributing factors to malnutrition among children less than two-years-old. This report demonstrates our baseline survey results in March 2016.
METHODS The research sites are seven villages in Khpop Ta Ngoun commune, Steung Trang district, Kampong Cham province. All the villages are bordered by the Mekong river in the south and by hill in the north. We tried to capture all the

children less than two-years-old and measured their weight and height. Three anthropometric indices (Z-scores for weight-for-height: WHZ, weight-for-age: WAZ, and height-for-age: HAZ) were calculated by using the WHO Child Growth Standard.
RESULTS 252 children were measured. This analysis carried out for 247 (138 boys and 109 girls) since five outliers were excluded. Proportions of malnutrition (Z-score < −2) were two times higher in boys than in girls (WHZ: 16% vs 8%, WAZ: 17% vs 8%, HAZ: 12% vs 6%). Two-way ANOVA test reveled that both age and sex were related to all the three indicators. The average WHZ was −0.32 (0–5 months), −0.78 (6–11 months), −1.46 (12–17 months) and −1.00 (18–23 months) in boys and −0.46, −0.34, −0.76, −0.86 in girls. All averages of WHZ, WAZ, and HAZ were significantly decreased from 6–11 months to 12–17 months in boys.
CONCLUSION In rural Cambodia, we found the higher prevalence of malnutrition among boys than girls as they grew up. Moreover, the significance of malnutrition increased around one year old in boys. It is speculated that these are caused by sexual differences in behaviour, physical activities, feeding and hygiene practices.

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Parental knowledges, attitudes and practices regarding childhood fever in the health District of N'sele in Kinshasa, Democratic Republic of the Congo

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BACKGROUND In the Democratic Republic of the Congo (DRC), the utilization of public health services is very low. Therapeutic circuit is oriented either towards self-medication or to private structures where standards guidelines of Ministry of health are not sufficiently respected. Fever is a main symptom by which malaria is suspected in malaria-endemic areas. Since 2015, National Control Program of Malaria (NCP) is encouraging recourse to public healthcare settings, including few number of private pharmacies for accurate management of fever. Diagnosis of malaria is required before any treatment. In the health centers, Rapid Diagnosis Tests (RDTs) are available and free of charge in DRC. Therefore it is necessary to assess the level of Knowledges Attitudes and practices (KAP) of the parents or head of household concerning children who have fever.
AIM To assess the level of KAP of parents or head of household regarding childhood acute fever.
METHODS This was a household-based cross-sectional survey, using structured questionnaire that was developed and distributed among households selected randomly from 15 Health Areas (clusters) of N'sele Health Zone located in the Eastern of Kinshasa in DRC. Parents with at least one child aged of 0 to 14 years with at least one episode of fever in the past, were interviewed. The data collected were analyzed using SPSS version 20.
RESULTS A total of 398 parents participated in this study. Eighty four percent of parents were unaware of information concerning management of fever in children. Most of them (87.5%) did not have a thermometer to measure children temperature. Forty one percent were not aware of the normal axillar temperature and only 14% reported that they attend a health facility upon fever onset. Fifty six percent of parents used primarily self-medication with antimalarial. Eighty one percent of parents did not know how to behave in case of fever in children.
CONCLUSION This KAP study shows a gap of parents related childhood acute fever. Most of parents were unaware about management of fever in endemic malaria area. The obvious gap between the knowledge, attitude and practice requires innovative strategies to improve and promote correct measures behavior among parents.

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Reaching the underserved: taking stock of child health days' with a mixed methods impact evaluation

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INTRODUCTION Child Health Days (CHDs) are nation-wide campaigns focusing on integrated nutrition and immunization and complement the delivery of primary health care services when access to these services is impaired by local conditions. The "Scaling up Nutrition and Immunization" project, implemented between 2013 and 2016, provided support to 13 countries in sub-Saharan Africa to implement CHDs.
AIM We conducted an external evaluation of the project to assess changes in Vitamin A supplementation (VAS) and immunization coverage and to identify successful strategies with a focus on equitable coverage.
METHODS We first reconstructed the programme's Theory of Change (TOC) to understand the desired pathways of change. Further data acquisition included: 1) compilation of a database to assess and map the coverage of 3 tracer services in all 13 countries at subnational level (DTP3, MCV1 and VAS coverage) between 2010 and 2015; 2) case studies with observations, focus group discussions and semi-structured interviews; 3) re-analysis of individual level data from Demographic and Health Surveys conducted in 2015 to identify the profile of non-vaccinated and non-supplemented children based on a children's vulnerability framework. Qualitative and quantitative results were triangulated.
RESULTS Analysis is still ongoing. Preliminary analysis suggests that through the 'reach every community' approach with a specific focus on low performing districts, better geographical coverage can be achieved, and in some cases also better socio-economic equity.
CONCLUSIONS At this cross-road between integration of CHD within the regular services versus institutionalizing the campaign (or a combination thereof) it is important that countries consider strategies that best target the most vulnerable children across all communities to ensure that no children are being left behind.

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Causes of severe febrile illnesses in hospitalized children, nouna Burkina Faso

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INTRODUCTION Infectious diseases remain a public health problem in developing countries contributing substantially to the

nearly 10 million child deaths per year worldwide. Most of these could be prevented by simple interventions and access to treatment. There is increasing awareness in Africa that most acute febrile episodes are due to causes other than malaria. However, the diagnosis of non-malaria based fever requires more complex laboratory facilities often unavailable in health facilities in Africa. A better understanding of the epidemiology of acute fever causes at the local level is needed in order to improve patient management.
AIM To identify causes of severe febrile episodes in hospitalized children in North-Western Burkina Faso in order to develop an algorithm of diagnostic and therapy of fever.
METHODS All children up to 15 years of age admitted with fever (≥38°C) to the the pediatric ward of the District Hospital in Nouna, between October 2015 and March 2017, were eligible for this observational study. Medical history including vaccination status was recorded and a clinical examination performed. Venous blood samples were collected for thick film, blood culture and hematology. Serum was analyzed for liver enzymes and specific antibodies. Urine and stool samples, nasal and pharyngeal swabs and cerebrospinal fluids were collected as appropriate according to the clinical picture. Full blood and serum aliquots were stored for further analyses including PCR. Laboratory tests are being performed on site and at the Heidelberg University Hospital, in Germany.
RESULTS Currently, 566 participants have been included. Data collection and sample analyses are still underway. Results are expected to be presentable by October 2017.

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Impeding factors regarding appropriate feeding of infants and young children in Burkina Faso: infant colic is a forgotten problem to manage

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INTRODUCTION Inadequate infant and young child feeding practices are still common in low income countries. Its determinants are important to be known before implementing nutrition education program.

We aimed at identifying the key determinants of inadequate child feeding practices in a rural community of Burkina Faso.
METHODS Focus groups with mothers of infant and young children and individual interviews with key informants were carried out in 4 villages, to explore the impeding factors with regard to infant and child feeding practices.
RESULTS Recommended feeding practices were well-known but not applied extensively. Indeed, early introduction of non-milk foods before the age of 6 months was common. Complementary foods were undiversified, consisting mainly in thin porridge of cereals. Hygiene practices were inadequate. Indeed, unclean water was commonly used. Handwashing was not done at critical moments and realized without soap. Several impeding factors were highlighted: (1) the low quality of the education program about infant and child feeding practices which improves knowledge but not behavior; (2) low recognition and mismanagement of infant colic; (3) Sociocultural practices like giving water to a newborn baby, taboos causing no consumption of foods like eggs, and grandmothers' influences on infant and child feeding practices; (4) Heavy workload of mothers, leading to little time available to care for the children; (5) Undiversified agricultural production and lack of resources and (6) low access to drinkable water and soap for handwashing.
DISCUSSION To overcome the identified barriers, we proposed a strategy called "DEEP approach" with four actions through a nutrition education centered on family needs: targeting fathers and grandmothers, enabling mother's autonomy, enhancing hygiene and sanitation and providing adequate support to families. Recognition and management of infant colic has been identified as critical intervention to improve exclusive breastfeeding.

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OpenHDS: evidence for improved quality/timeliness and cost in demographic surveillance systems

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Health and Demographic surveillance systems (HDSS) can be the unique source of information in geographic zones where vital registration systems are not present, and play an essential role supporting health intervention studies in such areas. Setting up and running an HDSS is operationally challenging, and requires a reliable and efficient platform for data collection and management. Recent technological advances, specifically mobile devices used for electronic data collection (EDC), and adoption of data management best practices using OpenHDS software have the potential to resolve many of the major shortcomings of running a paper data collection (PDC) HDSS.
AIM Evaluate whether using OpenHDS improves the quality, timeliness of availability of data, and reduces costs.
METHODS In the Nanoro HDSS site (Burkina Faso) that migrated to OpenHDS from a paper system in June 2015, for one HDSS update round in 4 villages the data was collected at the same time with OpenHDS and with the traditional paper method. After data collection, we assessed the time required for data collection and the completeness and accuracy of the data, as well as the types of errors found with the two methods. We also did a cost comparison between PDC and EDC reviewing historical program data.
RESULTS Time to availability of a record is on average reduced by a factor seven with OpenHDS (compared to 4 data clerks working full time for data entry). Fieldworkers take on average 20 minutes less for a visit than with paper forms. Financial and Economic costs with OpenHDS are respectively 13 and 9.5% lower. Demographic rates show lower error rate 0.55% vs. 0.75% with the OpenHDS ($P < 0.001$).
CONCLUSION EDC addresses some problems posed by PDC through validation at data collection time, near real time data to the central database, mostly automated review protocols, reports of data issues emailed to managers allowing near real time review and amended data collection instruments and processes. While there was anecdotal evidence that electronic data capture can improve quality, timeliness, and costs, this is the first study that provides evidence for such benefits resulting from the introduction of EDC.

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Estimating the risk of non-communicable diseases: a case study of Canada

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INTRODUCTION NCDs are considered to be the dominant global public health challenge of the 21st century by the World Health Organization. Thirty percent of deaths in Canada are from cancer, 27% from cardiovascular diseases, 7% from chronic respiratory diseases, and 3% from diabetes approximately. In 2015, the United Nations and the WHO had a goal of reducing the mortality from NCDs by 25% for persons between the ages of 30 and 70. Preventing early death is a major goal of public health policy in order to reduce the social and private cost of health care. All countries can benefit from sharing their experiences and collective expertise on the prevention and the control of these NCDs.
AIM This study investigates the risk factors of non-communicable diseases in Canada. Several risk factors are known to impact the prevalence of NCDs, including lifestyle, habits, social and socioeconomic factors. It estimates the impact of behavioral risk factors and social determinants of health on the likelihood of having a NCD on the Canadian population. The Canadian Community Health Survey 2012 was used to evaluate the study.
METHODS The Probit models were developed to estimate the impact of each risk factor on the probability of having a NCD for female and male Canadians.
RESULTS The results for the BRFs for the Canadian population indicated that: alcohol consumption, tobacco use, physical activity, choosing food with low fat, fiber content and avoiding food high in salt, cholesterol and calorie content and body mass index, such as underweight, overweight and obese were statistically significant. The statistically significant SDOH for Canadians were: age, food security, employment, education, access to healthcare services and health care utilization.
CONCLUSION These results support the fact that the socio-economic situation of an individual can significantly influence the development of a NCD. This situation occurs because developed countries can provide opportunity and access to higher education, in addition to higher quality health care services and health insurance.

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Implementation of mobile medical E-Learning for higher medical education in Zambia – a Zambian-German-Swiss cooperation

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INTRODUCTION Zambia aims to alleviate its severe shortage of qualified medical personnel, particularly in rural areas, by upgrading the cadre of clinical officers to medical licentiate practitioners (MLPs). The MLPs are placed primarily in rural Zambia to provide key clinical responsibilities. The 3-year in-service training implemented by the Chainama College of Health Sciences (CCHS) largely takes place as on the job training in decentralized teaching hospitals. The training is challenged by staff shortages and high workload of medical consultants at practicum sites. Addressing this challenge, a self-directed e-learning platform was introduced to supplement teaching and learning.
AIM The Zambian-German-Swiss cooperation aims to strengthen the MLP training with self-directed e-learning featuring:
-high quality, relevant, updated medical content
-low threshold, ubiquitous and timely unrestricted access
-low cost, robust technology
METHODS A needs assessment was conducted addressing needs and expectations of MLP students and lecturers, as well as existing hardware and technical prerequisites. A mixed-method evaluation guides the e-learning implementation process, looking at feasibility, user-friendliness, usage, knowledge acquisition and efficiency.
RESULTS During the pilot phase, the hard- and software was selected focusing on low-cost and high-quality. For the subsequent study year, hardware choices were altered according to user feedback, i.e. tablets with a mobile data provision were introduced as students stated this as critical. The open-source Moodle Mobile app proved feasible for content offline usage. The need for trained, local IT support was recognised including ongoing user support and - due to the heterogeneity of age and prior IT exposure of students and lecturers - for a mandatory introduction and further training for unexposed users in using technology-enhanced learning. Accessing the e-learning platform through mobile devices proved practical and was received by participants as useful and user-friendly.
CONCLUSION The joint approach aims to strengthen medical education in Zambia with a comprehensive evaluation as basis to customize the e-learning implementation to the given setting and ensure its sustainability. A first evaluation showed the introduced system as feasible, but still identified need for improvement especially with regards to specialized medical e-learning contents, training of IT staff, technological adequacy and automatization of processes.

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Trends in HIV infection in sentinel sites from 2007 to 2016 in Burkina Faso

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INTRODUCTION Surveillance of HIV infection in sentinel sites in Burkina Faso is a source of strategic information for decision makers.
AIM It aims to provide an annual trend of HIV prevalence among pregnant women and to organize an appropriate response.
METHODS An annual cross-sectional study was carried out regularly from 2007 to 2016 in 15 sentinel sites covering 13 regions, including 9 urban and 6 rural. Pregnant women between the ages of 15 and 49 who have not yet been screened for syphilis for pregnancy have been enrolled. 800 samples (for two large regions) and 400 for the other compounds of 5 to 10 ml of venous blood (syphilis) and 2 ml (HIV) were collected. The data were entered and analyzed using EPI INFO and Excel software.

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RESULTS HIV prevalence increased from 2.3% [2.0–2.7] in 2007 to 1.2% [1–1.5] in 2016 among pregnant women aged 15–49 years. Among those aged 15 to 24 years, it increased from 2% [1.6–2.5] to 0.6% [0.4–1]. It has always been higher in urban than in rural areas, respectively, by 3% [2.5–3.5] in 2007 and 1.8% [1.5–2.3] in 2016 and 1.3% [0.9–1.8] to 0.2% [0.1–0.5]. The prevalence has stabilized at 1.3% in the last three years in the 15 to 45 years and 0.6% in the adolescents and young people of 15 to 24 years. In the three largest cities of the country (Ouagadougou, Bobo Dioulasso and Koudougou), HIV prevalence has always been above 2%. HIV 1 has always been predominant above 90%.
CONCLUSION The decline in HIV prevalence among pregnant women in Burkina Faso was observed from 2007 to 2016. However, it remained high in the three largest cities. Further studies in these localities will help to identify the determinants of high HIV prevalence for more effective control.

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HIV serostatus and posttraumatic stress disorder (PTSD) in the armed forces of the democratic Republic of Congo (FARDC)

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INTRODUCTION Posttraumatic Stress Disorder (PTSD) is thought to be associated with poor physical and health outcomes. Determining its prevalence and determinants among military personnel is crucial for an efficient military health program. Here we present results from a PTSD assessment conducted as part of the HIV Seroprevalence and Behavioural Epidemiology Risk Survey (SABERS) among military personnel in the DRC army.
AIM To determine the prevalence of HIV and Syphilis and their risk factors in the FARDC for a better prevention and care program.
METHODS This was a cross-sectional study conducted by trained military investigators. After consenting and enrolling participants, blood was collected from fingerpicks for HIV and Syphilis rapid tests following the national algorithm. A behavioural questionnaire was administered using electronic tablet, which included the 4-item Primary Care PTSD screen. A positive evaluation was considered for 3 affirmative responses. Data analysis were included univariate and multivariate logistic regression using Stata/SE version 13.0 (StataCorp, 4905 Lakeway Dr, College Station, TX 77845).
RESULTS Data on PTSD was collected from 2769 participants. Of them, 283 (10.22%) presented a positive PTSD evaluation; these included 18.38% of the 136 women and 9.80% of the 2633 men participants. Among the 95 (3.42%) HIV seropositive participants, 16 (16.84%) presented PTSD. No women seropositive participants were evaluated positive for PTSD. On multivariate analysis, factors statistically associated with the PTSD were: history of gender-based violence: yes or no (OR = 1.97, 95% CI: 1.26–3.08) and depression, used as a continuous variable (OR = 1.29, 95% CI: 1.25–1.33). HIV status, enrolment sites and military rank were not found to be associated with PTSD.
CONCLUSION PTSD is a real problem among in the DRC army and should be addressed by the army health Corps. Further studies on this matter are needed to better understand its effect on health outcomes.

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Knowledge and awareness of and perception towards cardiovascular disease risk in sub-saharan Africa: a systematic review

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INTRODUCTION Cardiovascular diseases (CVDs) are the most common cause of non-communicable disease mortality in sub-Saharan African (SSA) countries. Evidence on the awareness and knowledge level of cardiovascular diseases (and associated risk factors among populations of sub Saharan Africa is scarce.
AIM This review aimed to synthesize available evidence of the level of knowledge of CVDs in SSA.
METHODS Five databases were searched for publications up to December 2016. The quality of the quantitative and quantitative studies was assessed based on National Institute of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies and the Critical Appraisal Skill Programme (CASP) tool, respectively. Narrative synthesis was conducted for knowledge level of CVDs, knowledge of risk factors and clinical signs, factors influencing knowledge of CVDs and source of health information on CVDs. The review was registered with Prospero (CRD42016049165).
RESULTS Twenty studies were included in this review: eighteen quantitative and two qualitative. This review identified low knowledge level, poor perception of CVDs, and knowledge gaps for risk factors and clinical symptoms of CVDs. In most studies, less than half of the subjects had good knowledge of CVDs. The percentage of participants unable to identify a single risk factor and symptom of CVDs ranged from 1.8% to 56%, and 9% to 77.3%, respectively. Educational level and type of residence influenced knowledge level of CVDs among SSA populations.
CONCLUSION Knowledge level of CVDs, risk factors and warning signs for CVD are low among sub Saharan African populations, and this is linked to low educational attainment and rural residency. The findings of this study prompt educational campaigns to enhance knowledge of CVDs in both rural and urban communities.

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Evaluation of the mental health and qol for elderly Japanese long-stayers in Chiang Mai, Thailand

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INTRODUCTION Some of the Japanese elderly prefer to stay in south-east Asian countries after their retirement because of the low cost of living and warm temperature. Especially Chiang Mai is one of the most popular area to stay for Japanese elderly people. However sometimes they feel uncomfortable because of the differences of food, language, culture, and so on.
AIM We investigate elderly Japanese long-stayers' mental health condition and QOL using self-reporting questionnaires.
METHODS Surveys were conducted for 108 elderly Japanese in two major long-stayers clubs in Chiang Mai, Thailand during February 2016. Measurement contents were socio-demographic variables and General Health Questionnaire-28 items version (GHQ-28) for their mental health evaluation and EQ-5D-3L Japanese version for evaluation of their QOL. One-way ANOVA methods were used to evaluate the seriousness of mental illness. For evaluation of QOL, we used value sets for Japanese version (Tsuchiya et al.), then calculated mean and SD for groups by the results of socio-demographic variables. The level of significance was set to be less than 0.05.
RESULTS Ninety-eight (90.7%) responded completely. Mean age was 69.5 years old. Mostly (88%) went back to Japan at least one time/year (mean = 2.1 times/year). 67 people had one or more chronic diseases such as Hypertension, Diabetes, Hyperlipidaemia. We settled the cut off point for GHQ-28 as 5/6, 21 (23.8%) were included for mental illness. The elderly having chronic diseases were significantly higher than those who don't have any diseases. (Fischer's exact test; $P < 0.05$). Similar results were found in the QOL score, the elderly having chronic diseases were significantly lower score than those who don't have any diseases (mean QOL scores; 0.890 vs. 0.980, $P < 0.05$).
CONCLUSION Chronic diseases may affect both psychological distress and lower QOL for Japanese elderly long-stayers. Many of them had distress about communication with Thai people while they visited a hospital. There is difficult to explain their conditions without Japanese. Hospital interpretation system will be able to help Japanese elderly.
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Epidemiological, clinical and biological features of onychomycosis in Tunis area, Tunisia

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INTRODUCTION Onychomycosis is a cosmopolitan fungal infection of the nail mainly caused by dermatophytes and yeasts of *Candida* genus. It represents over 50% of nail diseases. The prevalence of onychomycosis has increased in the last decade. Even if benign, this infection has negative impacts regarding functional and esthetic aspects.
AIM The aim of this study was to describe epidemiological, clinical and biological characteristics of onychomycosis in Tunis area.
METHODS A retrospective study included 1460 patients with suspected onychomycosis who referred to the Laboratory of Parasitology Mycology of Pasteur Institute of Tunis, during the period 2009–2014. Nail materiel was collected and examined with the optical microscopy, then inoculated on Sabouraud culture medium. Identification of isolated dermatophyte species was based on microscopic and macroscopic criteria and of yeasts by germination tube test and assimilation of sugar test (Auxacolor®).
RESULTS Onychomycosis diagnosis was confirmed in 911 patients (62.4%). The prevalence of onychomycosis was higher in patients aged between 31 and 60 years. Almost 70% of patients with onychomycosis were female. Statistic analysis showed no significant difference for the gender according the location of onychomycosis. Fungal nail infection was significantly more common in patients with diabetes, in whom, the prevalence of the disease was 70.1% ($P = 0.02$).

Mycological tests were contributive in 967 samples of nails (61.1%): toenails were the most frequently affected ($n = 782$ samples; 80.9%). Simultaneous onychomycosis of fingernails and toenails was diagnosed in 56 patients. The most common clinical presentation was distal subungual onychomycosis. Direct examination was positive in 904 out of 967 cases and culture in 503 out of 967 cases. Direct examination was significantly more positive in toenails samples than in fingernails samples ($P < 0.001$). *Trichophyton (T.) rubrum* was the most frequently isolated agent ($n = 405$) followed by *C. albicans* ($n = 81$). *T. mentagrophytes var interdigitale* was isolated in only 7 cases of toenails infections.
CONCLUSION While identifying risk factors contribute to an efficacious management of the disease and the recurrence eviction, mycological examination of nails represent an important step to confirm the diagnosis and to adapt the appropriate treatment.

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Predicative criteria of onychomycosis causative agents' dermatophytes and *Candida*

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INTRODUCTION Dermatophytes and *Candida* are recognized as causative agents of onychomycosis. It's important for both

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biologists and physicians to define the causative agent in order to establish the correct diagnosis and to adapt therapeutic approach.
AIM This study aims to identify epidemiological, clinical and biological criteria that are predictive of the fungal agents responsible of onychomycosis.
METHODS A retrospective study was carried out in the laboratory of Parasitology and Mycology of Pasteur Institute over 6 years period. A total of 936 confirmed onychomycosis cases due to either dermatophytes or *Candida* species were enrolled. Epidemiological and clinical data were recorded for each case. Nails' samples were subject to mycological examination including: direct microscopy examination and culture. Data were analyzed using the Pearson's chi-squared test.
RESULTS Most of onychomycosis cases were dues to dermatophytes (n = 846; 90.3%) whereas *Candida* species were involved in only 90 cases (9.7%). Statistic analysis showed no significant difference in mean age between patients with onychomycosis caused by these two agents. The dermatophytic origin affected rather men while the candidosic one rather women (P = 0.002). Maceration and infectious contact were frequently associated to dermatophytes (P = 0.007 and P < 0.001, respectively).Toe nails were more often infected by dermatophytes and finger nails by *Candida* species (P < 0.001). Distal lateral subungual onychomycosis (DSLO) was the most common clinical pattern in onychomycosis caused by both dermatophytes and *Candida* species. Paronychia was significantly associated to *Candida* (P < 0.001). The mean duration of onyxis was 51 and 32.2 months in Dermatophytic and Candida onychomyosis, respectively (P < 0.001). Direct examination was more sensitive in dermatophytic onychomycosis (P < 0.001) while fungal culture was more contributive in candidosic one (P < 0.001). *Trichophyton rubrum* and *Candida albicans* were the most identified species in toes nails ad finger nails respectively.
CONCLUSION This study emphasizes that clinico-epidemiological features and laboratory findings differ according to the aetiology of onychomycosis which could help both clinicians and biologists to the management of patients.

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Seroprevalence of Hepatitis C Virus infection among general population in Central-Ouest Tunisia

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INTRODUCTION Although constituting a public health problem, the prevalence of hepatitis C virus infection (HCV) is not well known in Tunisia. The present work, conducted at the initiative of the Ministry of Health, is part of the implementation of the national program forhepatitis C elimination in Tunisia.
AIM The aim of this study was to estimate the seroprevalence of HCV infection in the general population from the central-ouest of the country where a relatively high frequence of the disease was suspected.
METHODS A door-to-door cross-sectional study was conducted in the region of Thala (governorate of Kasserine) on a randomly selected sample of 3235 individuals aged 5 to 75 years. The seroprevalence of HCV infection was determined using third generation ELISA tests.
RESULTS A total of3198 individuals were tested. The median age of participants was 27 years with a sex ratio F/M 1.5. The global prevalence of HCV antibodies was 3.16% (95% Confidence Interval (CI) [2.58 to 3.84]). The prevalence of infection was significantly higher among women (4.33%, 95% CI: [3.36 to 5.41]) compared to men (1.96%, 95% CI: [1.36 to 2.81]) (P = 0.001). The age group 50–59 years had the highest prevalence of HCV infection (12.67%, 95% CI: [9.22 to 16.58]).
CONCLUSION The seroprevalence of hepatitis C in the general population of Thala was estimated at 3.16% which is 4 to 9 times the prevalences reported nationwide. This confirms the endemic pattern of the infection in the region and makes its population a priority target for elimination strategies at national scale.

8P46

Steeply increasing HIV prevalence among young men in Zambia past 12 years - data from demographic and health surveys

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INTRODUCTION The HIV epidemic remains a major concern on the global health agenda, despite the progress made in reducing incidence. The momentum to reduce new HIV infections must be maintained, however, and careful investigation of trend data is important for efficient planning, resource allocation and informing programmes. Trends in HIV prevalence among young people are seen as a good proxy measure of incidence, and in this study we examined geographical and sub-population differences in HIV prevalence trends among young men and women aged 15–24 years in Zambia.
AIM To examine the trends and sub-national differentials in HIV prevalence from 2001 to 2014 among young men and women aged 15–24 years.
METHODS The study investigated changes on HIV prevalence among young men and women aged 15–24 years based on data from Zambia Demographic and Health Survey conducted in 2001–2, 2007 and 2013–14.
RESULTS There has been a steady increase in HIV prevalence among young men over the years. The proportion of young men infected with HIV increased significantly in urban Zambia from 3.7 in 2001–2 to 7.3 in 2013–14 (aRR 2.06 CI 1.03 – 4.12). In rural areas, a non-significant increase in young men was observed from 2.6 in 2001–2 to 3.6 in 2013–14. In contrast, the HIV prevalence among women tended to decline in both urban and rural areas over the same period. However, this drop in prevalence was most substantial between 2001–2 and 2007. Among 15–19 years old urban young women the prevalence tended to increase between the two most recent surveys.
CONCLUSION The repeated national surveys suggested HIV prevalence has increased during the past 12 years among young men in Zambia. Among young women the prevalence dropped during the first period but later tended to stabilise. This has important implications for preventive efforts. The differences in the magnitude and direction of HIV trends among young women and men may reflect differences in intensity and focus of previous prevention programmes.

Abstracts

8P47

Implementation of sexuality education policies in Uganda; obstacles and challenges

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INTRODUCTION Uganda has witnessed risky sexual behaviors among adolescents. Yet, adolescents are identified as torch bearers for the success of sustainable development goals. Investing in the health of adolescents generates a 'triple dividend'. Some scholars argue that formulating and implementing policies can influence sexual and reproductive health (SRH) outcomes.
AIM This paper interrogates the obstacles to implementation of sexuality education as stipulated in the Adolescent Sexual and Reproductive Health Policy in Uganda.
METHODS Document analysis was done of the Adolescent Health Policy, plans and strategies on ASRH. Interviews were done with policy makers and key stakeholders from Kampala district. More interviews and focus group discussions were done with adolescents, parents, teachers and health workers in Mbarara district. The total sample size was 75 in-depth interviews and 13 FGDs. Content analyses were done thematically and manually, using open and axial coding. Categories were formed, read and re-read to ascertain accuracy and make sense of the data, picking out the most important information answering the research question.
RESULTS The Adolescent Health Policy outlines a holistic approach and stresses the need for youth friendly services, training of teachers and health workers to teach sexuality education. However, there was no evidence of policy implementation in Mbarara district. Non-implementation appears to arise primarily, but by no means exclusively, from the socially-embedded cultural-religious norms that are hostile to "comprehensive" sexuality education, which is widely deemed to be socially alien, culturally unacceptable; or even injurious to the African value systems. Indeed, public discussion of sexuality is still considered "taboo". While field research suggests that the inadequacy of finances; the poor coordination between the relevant ministries; the weak monitoring and regulatory frameworks, and the short-term oriented donor support, are important, they seem to be secondary explanations -. The primary explanation we contend lies in the deeply embedded social norms and values.

8P48

Maternal and child health among the Okinawan Diaspora in Hawaii in the early 20th century

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INTRODUCTION Japanese began emigrating to Hawaii in 1885 primarily as labourers on sugarcane plantations, and Okinawans soon followed beginning in 1900. When those young men settled down in "the new world," the women were invited to Hawaii as "picture brides." Those first settlers had insufficient speaking skills in the local language and difficulties in adapting themselves to different customs and cultures from their own.
AIM To describe both the difficulties and adaptations for delivering and raising babies by women in different countries nearly one century ago.
METHODS Meta-analysis of literature and interviews with the decedent families.
RESULT Women were not only housewives, but also active members of the labour force on the sugarcane plantations, working throughout their pregnancies up to their due dates. Although home deliveries were mainly conducted by Japanese/Okinawan TBAs up to the 1940's, by the second generation births were generally overseen by professionals at hospitals. This transition of delivery started nearly 20 years earlier than in Japan and 30 years earlier than in Okinawa. These members of the diaspora were generally well adapted to Hawaii possibly because a few Japanese/Okinawan health professionals also migrated and integrated traditional practices with modern healthcare for the immigrants.

With limited financial resources, the mothers depended on the support and protection of their communities to get through the perinatal period and to raise their babies.
CONCLUSION One of the elements that contributes to the first generation of a diaspora successfully settling in the newly habituated community might be the presence of health professionals from their home-country, with whom they can use their mother tongue when asking about health problems and who can harmonize the health-related habits of the immigrants, i.e., Japanese and Okinawan immigrants in Hawaii. In such circumstances, mothers could more easily survive the life-threatening maternal life stage even in non-habituated settings.

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Systematic review and meta-analysis of risk factors for epilepsy and nodding syndrome in Sub-Saharan Africa

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INTRODUCTION Epilepsy is more frequent in Sub-Saharan Africa (SSA) than in other parts of the world. Studies have attempted to identify risk factors that explain this high frequency, providing conflicting results. Several studies have evaluated possible risk factors for nodding syndrome (NS), a form of epilepsy occurring in Central and Eastern Africa, the cause of which is still unknown.
AIM Summarize published epidemiological studies evaluating strength of association between potential risk factors for epilepsy or NS in SSA.
METHODS A systematic review is on-going. The protocol was registered at PROSPERO (nr 42016042538). MEDLINE was searched in June 2016 without restrictions in time or language. Search terms were: (((nodding) OR epilepsy [MeSH Terms]) AND (sub Saharan Africa [MeSH Terms])). Records were eligible if they described individual-level associations between potential risk factors and epilepsy or NS. We excluded studies about seizures in special situations (i.e. age <5, pregnancy, HIV, recent trauma).
RESULTS The search retrieved 899 records. 126 full-text records were assessed for eligibility. 43 studies (24 case-control, 8 cross-sectional, 2 cohort and 9 cross-sectional with nested case-control) from 19 different countries met eligibility criteria. These studies, carried out between 1981 and 2011, described at least 624,007 subjects (6057 with and 617,950 without epilepsy)

and assessed a variety of risk factors, including family history, hygiene and sanitation, diet, animal contact, and parasitic, bacterial and viral infections. Preliminary analysis suggests that studies tend to focus on rural areas with high prevalence of epilepsy, using different designs and definitions of exposure and outcome. Several studies presented a high risk of selection bias (e.g. related to choice of cases/controls), information bias (e.g. differential recall, inaccurate or differential diagnostic testing) and do not correct for confounding. Case definitions as well as the quality of reporting varied. Few studies examined a wide range of potential risk factors, with recent studies focusing more on the possible role of *Onchocerca volvulus* infection.
CONCLUSION True heterogeneity (different causes of epilepsy in different populations) as well as study design (with varying risk of bias) explain conflicting results in the literature about risk factors of epilepsy and NS in SSA.

8P50

Trends in socioeconomic inequalities in obesity and overweight among women in Cameroon, 2004 – 2011

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INTRODUCTION Non-communicable diseases (NCDs) now represent a large burden in terms mortality and morbidity in developing countries. Obesity is a major risk factor for many NCDs such as diabetes, hypertension and coronary heart disease. However, little is known about its magnitude and distribution in Cameroon.
AIM In this work, we study the evolution of socioeconomic inequalities in obesity and overweight among Cameroonian women between 2004 and 2011, and identify the factors associated with the observed trends.
METHODS We used data from Cameroon Demographic and Health Surveys on (not pregnant) women aged 15 to 49. Obesity is defined as a body mass index (BMI) ≥ 30, and overweight as a BMI between 25 and 29.9. We used the normalized concentration index to measure the level of inequality in the two variables of interest -with the household wealth index as indicator of socioeconomic status-, and a decomposition technique to quantify the contributions of different factors.
RESULTS The prevalence of women obesity in Cameroon has increased from 7.8% in 2004 to 10.3% in 2011 (12.4% to 15.4% in urban areas) and remains mainly concentrated on the 'richer' (concentration index: 0.41 and 0.39 respectively). Living in urban areas, belonging to wealthier households, having a high education level, and being a household head are factors associated with a higher risk of obesity, and their distributions have not changed over time, which explains the stagnation of the level of inequalities. Overweight remained constant (from 21.6% to 22.1%), and results on inequalities and contributions of different factors are similar to obesity.
CONCLUSION Obesity has significantly increased among women over the period 2004 – 2011 in Cameroon, while overweight remained constant. These two health issues are mainly concentrated among the better-off and their distribution along the socioeconomic gradient has not changed. These findings are certainly related to the lifestyle of wealthier and urbanized women in Cameroon, particularly as regards physical activity and eating habits. More effective prevention policies – targeting the most at risk – are needed to reduce the magnitude and progression of obesity and overweight among women in Cameroon.

8P51

Epidemiological, clinical characteristics and outcome of scorpion envenomation in Abdanan County, Western Iran: an Analysis of 780 cases

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INTRODUCTION So far, 63 species of Scorpion has been reported in Iran. About 85.5 percent of identified species belonging to Buthidae family, 9.5 percent to Hemiscorpiidae and 5 percent belongs to the family Scorpionidae. Scorpion stings are primarily due to accidental contact with a scorpion. They use their stings only when roughly handled or trodden on. Scorpionism is a major health problem in southern half of Iran (Khuzestan, Sistan-and-Baluchestan, Hormozgan and Kerman) with 75% annual mortalities of scorpion sting in Iran.
AIM The aim of this retrospective descriptive study was to describe the epidemiological characteristics and outcomes among humans in Abdanan County, western Iran during 2009–2013.
METHODS In this study, all patients with scorpion sting reviewed and our needed data recorded. A questionnaire including demographic, epidemiologic and clinical data was completed for the patients. The frequencies of entomo-epidemiological and medical parameters were converted to the percentage rank.
RESULTS There were 780 scorpion victims. Scorpion stings were more prevalent in July (19.4%). The most relative frequency of scorpion stings were in rural areas (58.1%). The most stung organs were hands, with 50%. Most of the cases were males (55%) in the 21–30 age groups (25.2%). About 73.7% of the sufferers slept indoors and on the ground. Nearly 74.1% of envenomed cases were due to yellow scorpions. Clinical signs and symptoms were both local and systemic. The majority of cases (43%) were housewives. The stings mainly occurred at night between 12–18 (28%) when the victims were asleep.
CONCLUSION Due to dangerous complication of scorpion sting, it is suggested that members of families especially these families residing in villages and around of cities be in instructed about taking care people, observing immunity measures and using suitable clothes and shoes at night.

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Epidemiological pattern of pediculosis capitis in the Eastern Area of Ahvaz, Southwestern Iran

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INTRODUCTION Pediculosis (louse infestation), a parasitic disease, used as an important factor to determine health status of a community. It mainly affects schoolchildren aged between 3 and 12 years. Head lice infestation prevalence rates of 5.8% to 35% have been reported from different regions in different institutions. In Iran, its prevalence was reported between 1.6% and 13.4% from some cities with various sociodemographic backgrounds.
AIM This descriptive cross-sectional study was conducted on the patients with head lice infestation who referred to the health

care centers in the area eastern of Ahvaz, southwestern Iran, during 2008 to 2013.
METHODS Data was collected by trained individuals using a questionnaire that included the information on the diagnostic result of head lice. The screening method was by inspection. The collected information was evaluated using SPSS software, version 11.5.
RESULTS The infestation of head lice was 5446 cases. The prevalence of pediculosis was greater in the urban (72.1%) than in the villages (27.9%) areas. About 9.5% of patients had infestation background to head lice (*Pediculus capitis*). Pediculosis capitis infestations were highest (41.2%) in subjects aged 6–10. Most of the cases were found in the winter (49.7%). The patients with head lice could be found in all months. Approximately, 18.5% of the cases with head lice were detected in January.
CONCLUSION A health behavior and knowledge promotion is recommended among the children, especially, of 6–10 age groups.

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Identifying unusual malaria events in the absence of historical data. Speculations from malaria-free Norway to endemic south Sudan

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INTRODUCTION Detecting an unusual malaria event is challenging, especially in high-endemic contexts where transmission is continuous. Médecins Sans Frontières (MSF) uses quanti-qualitative information to identify unusual malaria events that may require an operational response. To this end, the classic average plus standard deviation method (AV+SD) is commonly utilized. However, this approach relies on extensive antecedent data, which is often missing due to fragmented surveillance and fragile operational contexts, such as in malaria endemic South Sudan. A method using a linear regression (LR) was proposed that only relied on 8 weeks of retrospective data and used the upper prediction interval as a cut-off. In the absence of a complete series of retrospective malaria data from South Sudan, weekly influenza data from Norway was the testbed for this analysis.
AIM To compare the performance of the LR and AV+SD methods on a complete series of weekly influenza cases (2006–2015) from 19 Norwegian counties. To apply the LR method in a case study on malaria occurrence (2010–2016, fragmented data) from MSF facilities in South Sudan.
METHODS With Norwegian data, a gold standard was set by running the Moving Epidemic Method. Then, the LR and AV+SD methods were run with two-sided alphas of 0.1, 0.05, 0.01. A method that randomly assumed extreme observations was also applied. For each site, method and year, the number of weeks reporting cases above the cut-off was counted and a Spearman's correlation coefficient calculated against the gold standard. Unpaired t-tests compared the mean correlation coefficients of methods. For the South-Sudanese data, we assessed the capacity of the LR method to identify malaria events in which an MSF operational response was mounted.
RESULTS For the Norwegian influenza data, LR and AV+SD methods performed significantly better than the random assignment (P-value <0.01), but they did not significantly differ from each other (P-value > 0.05). For the South-Sudanese malaria data, the LR method accurately identified period were an operational response was mounted.
CONCLUSION The LR method seems to be a plausible alternative to the AV+SD method, in settings where antecedent data is incomplete or missing.

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The ecofaunistics of scorpions in Zarrin-dasht County, Iran

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INTRODUCTION About 2 000 species of scorpions are reported in the world. Of these species, only 30 species have medical importance. Annually, 40 000–50 000 people are stung by different species of scorpions in Iran. In Iran, the main significance of the scorpion stings are associated with three species of scorpions including *Mesobuthus eupeus*, *Androctonus crassicauda* and *Hemiscorpius lepturus*. While, *Hottentota* (*Buthotus*) *saulcyi*, *Odontobuthus doriae*, *Olivierus* (*Mesobuthus*) *caucasicaus* and *Apistobuthus pterygosercus* have secondary importance in scorpion envenomation. Furthermore, there are two species of scorpions whose stings frequently result in dying (*H. lepturus* and *A. crassicauda*). H. lepturus, mainly in Khuzestan Province is the most perilous scorpion. This species is found in abundance in South West and South Areas of Iran.
AIM Regarding wide distribution of scorpions and the increasing incidence of scorpionism in various regions of Iran, the current work was designed to determine the ecofaunistics of scorpions in Zarrin-dasht County, South of Iran.
METHODS The kind of research was descriptive-cross sectional and the manner of sampling was cluster random sampling. This descriptive-practical research was done in Zarrin-dasht County for bio ecology of scorpions. The specimens of scorpions were captured by rock-rolling, black light and also burrow excavation methods.
RESULTS Totally 252 alive scorpions were collected from selected sites. Twelve species and subspecies from Buthidae, Hemiscorpiidae (Liochelidae) and Scorpionidae families, were identified in this county. The found species and subspecies were as follows: *Odontobuthus odonturus* (42.1%), *Scorpio maurus townsendi* (40.1%), *Olivierus* (*Mesobuthus*) *caucasicus* (8.3%), *Mesobuthus eupeus kirmanensis* (4.4%), *Compsobutus matthiesseni* (1.6%), *Compsobuthus rugosulus* (1.2%), *Androctonus crassicauda* (0.4%), *Hemiscorpius lepturus* (0.4%), *Sassanidotus zarudnyi* (0.4%), *Mesobuthus eupeus afghanus* (0.4%), *Mesobuthus eupeus philippovitschi* (0.4%) and *Mesobuthus eupeus Phillipsi* (0.4%). *O.odonturus* and *S.maurus townsendi* with 82.2% (207 Specimens) were the dominant species. About 77% of all specimens were female and 23% were male. Nearly, 89.3% and 10.7% of scorpions were collected from plain and mountainous areas, respectively. Also, the majority of specimens were caught in the summer season (43.3%).
CONCLUSION Planning prevention, control and treatment programs based on the identified species is suggested.

Abstracts

8P55
Distribution of hepatitis C virus genotypes in central-ouest of Tunisia

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INTRODUCTION Hepatitis C Virus (HCV) strains are currently classified into seven genotypes (1 to 7) and several subtypes. Previous studies conducted in Tunisia showed that genotype 1 counts for more than 80% of circulating HCV genotypes and most of isolates belong to subtype 1b.
AIM The aim of this work was to study the genetic characteristics of HCV strains detected in the central-Ouest of Tunisia in 2013, and to compare them with those previously published in GenBank.
METHODS The genotyping of HCV strains was conducted by amplification of a partial NS5b and/or the Core/E1 Junction gene by nested RT-PCR, followed by nucleotide sequencing and phylogenetic study. We also compared our strains by blast with other Tunisian strains previously published in GenBank.
RESULTS Genotyping showed a predominance of subtype 1b, accounting for (84.3% (n = 43)) of all strains investigated with a co-circulation of four others (1d; 1.96% (n = 1)), (2c; 9.80% (n = 5)) and (2k; 1.96% (n = 1)). Phylogenetic study comparing 1b and 2c strains from the central-west of Tunisia with other Tunisian strains did not show a particularity in this region. Regarding the subtype 1a, it was first introduced in the Tunisian in hemophiliac population; the 1a strain detected in this study did not belong to this group. Regarding sub-type 2k, we have sequenced in addition of the partial NS5b gene the Core/E1 junction since the first region was non conclusive. Finally, the rare genotype 1d was detected in one strain and was phylogenetically close to a strain detected in a woman of Moroccan origin.
CONCLUSION Our study showed that in this hyperendemic region, the same HCV subtypes circulate as in other parts of the country with the predominance of subtype 1b followed by subtype 2c.

8P56
Clinical laboratory and epidemiological research on cutaneous Leishmaniasis in the South-west of Iran

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INTRODUCTION Cutaneous Leishmaniasis (CL) is a zoonotic parasitological disease. This disease cause always important health challenges for the human communities. The CL is endemic in 88 countries in the different regions of the world. Annually approximately two million new cases of disease are occurring around the world that over 90% of those are seen in the countries of Afghanistan, Pakistan, Iran, Iraq, Syria, Jordan, Algeria, Tunisia, Morocco and Saudi Arabia. The CL is seen in the two types of dry and wet in different parts of Iran. In the wet form of the CL, different species of rodents especially rats (gerbil) and in the dry form, infected humans and dogs act as a reservoir hosts. Different species of sand flies are vectors for transmitting pathogenic organisms to the man.
AIM This research was designed to determine the epidemiology of CL in the Eastern Area of Ahvaz, Iran during 2009- 2013.
METHODS This was a descriptive cross-sectional study. The disease was diagnosed based on clinical examination and microscopic observation of the parasite in the ulcer site. The patient's information were recorded. After extracting information, the results were analyzed by using the statistic package for social science version 17.
RESULTS The results of the study showed that a total of 568 cases with the CL have been identified during the five years. About 55.3% patients were male and 44.7% female. Of the total number, 86.4% and

13.6% patients were living in cities and villages, respectively. In the survey about the ulcer site on the body, the maximum number of lesions was found to be on the hand (40.1%). The results related to the number of patients' lesions showed that most cases (48.8%) had one lesion. The highest frequency infected age groups were observed in 20–29 years old (25.5%). The results showed that most cases have been reported in in February (22.8%).
CONCLUSION Such a high prevalence and incident rate is alarming and require control and prevention measures. Along with the training, controlling the reservoir hosts and vectors and the use of the insecticide – impregnated bed net can play an important role in reducing the problem.

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Good epidemiological practice: from guidelines to practical implications

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INTRODUCTION Good Clinical Practice (GCP) guidelines are often used in epidemiological research, but researchers usually face a number of challenges adhering to them outside the scope of clinical trials - they were developed, specifically and prescriptively, for clinical trials and do not offer the flexibility needed to apply them in epidemiological studies. Conversely, from the late nineties onwards a number of documents specifically aimed at improving epidemiological practice have been published by national epidemiological associations, international organisations and academia. However, there is currently no international consensus or comprehensive approach to guide researchers in the implementation of an epidemiological study.
AIM The aim of this study is to develop a Good Epidemiological Practice (GEP) framework to provide practical guidance for researchers embarking on an epidemiological study.
METHODS We conducted a literature review to identify 1) Ethical guidelines of research provided by international organisations; 2) Guidelines for Good Epidemiological Practice (GEP), laid out by national and international epidemiological associations; 3) Guidelines for reporting epidemiological studies, mainly academic in nature and scope and; 4) approaches to quality assurance applied in health sciences .
RESULTS We identified mandatory requirements, practical implications, and suggested best practices covering the stages of implementation of an epidemiological study: Protocol writing, statistical analysis plan, data management plan, data collection, data management, data analysis, study reporting and data protection. These elements were put together in a comprehensive approach to

quality assurance based on standards and criteria - covering all stages of study implementation - for researchers to adapt based on their chosen data quality framework and study scope.
CONCLUSION While regulations, guidelines and standards can result inflexible limiting rules and potentially threaten the freedom of scientific research, a GEP framework can support researchers to conduct ethical, efficient and auditable research.

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Beliefs about mental problems and treatment seeking in rural communities in Cambodia

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INTRODUCTION With the lowest health services utilization in the region, only a small fraction of Cambodians has access to mental health care[3]. Mental health in Cambodia goes largely undocumented and only 0.02% of the total national health budget goes to mental health services[1]. Cambodian's health seeking behaviour is based primarily on self-medication and both private and traditional sectors rather than on government health services. Supernatural beliefs are also known to profoundly influence the attitudes of people especially with regards to seeking treatment of mental health problems[2].
AIM This study aims to evaluate Cambodians beliefs surrounding mental health problems and the main factors that influence their choices of treatment. We also aim to determine relative cultural appropriateness and effectiveness of traditional and modern treatments for mental health problems.
METHODOLOGY Qualitative methods of research were used. Three detailed cases were selected for this study and in-depth interviews were conducted with 19 respondents including all persons involved with these cases: consumer, traditional and medical providers. The in-depth interviews lasted around 2 hours long with revisits.
RESULTS Results revealed Khmer nosology and supernatural etiology were widely used to explain mental problems. Traditional providers validated consumer's supernatural belief about the conditions, and culturally adapted the terminology of mental problems. Modern providers were contacted mostly when conditions were believed to be caused by physical factors. Even though supernatural beliefs place great importance in accessible and popular traditional treatments that bring temporary relief, consumers often combined both treatments for mental problems. Barriers to further develop comprehensive modern treatments in rural communities largely reflect the lack of knowledge and training on mental health, heavy workload of providers, the dependency on biomedical approach and the poor accessibility of these services.
CONCLUSION Strong beliefs about mental health problems are commonly present in rural communities with direct influence on consumer's behaviours. Traditional treatments are by far the most favoured therapy. Despite the coexistence of both treatments, structural barriers hinder further development of comprehensive modern treatments. Further research should explore new ways of building bridge between both approaches to find practical and accessible solutions to improve the support to rural communities.
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8P59

Snakebite in the district of Akonolinga, Cameroon: a cross-sectional survey on incidence, complications and use of traditional medicine

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INTRODUCTION Snakebite globally affects more than a million, and kills at least 94'000 victims yearly. Epidemiological statistics are often based on hospital rather than community data, therefore underestimating true incidence.
AIM We analysed community snakebite incidence, complications, and health-seeking behaviours, in the rural district of Akonolinga, Cameroon.
METHODS A cross-sectional, exhaustive, door-to-door survey was conducted in 20 villages, randomly selected out of 330, covering a population of 10'000 (out of 105'000), using proportionate sampling. All inhabitants bitten in the past 12 months were included. Data on bite circumstances, health-seeking behaviour, symptoms, short- and long-term complications, were collected with e-questionnaires. Proportion of - and risk factors for - events were analysed.
RESULTS Among 9'924 surveyed inhabitants, 66 snakebite victims, including 2 deaths (3%), were identified, resulting in incidence and mortality rates of respectively 665 and 20 per 100'000 inhabitants per year. Victims' median age was 34 years (range 5–70), 53% were male and 57% fieldworkers. 10.6% (n = 7) of victims described no envenoming, 30.3% (n = 20) mild local envenoming, and 59.1% (n = 39) severe envenoming, including 25.8% (n = 17) progressive cytotoxic, 30.3% (n = 20, 1 death) digestive, and 3% (n = 2, 1 death) neurotoxic. Traditional treatment was used by 89% of victims directly in their family, 38% by traditional healers and 47% in health facilities, with median delays of 5, 45 and 60 minutes, respectively. These included incisions (86%), tourniquets (77%), black-stones (67%), ingestion or local application of plants (62%) or urine (23%). Health professionals used anti-venoms (3%) and black-stones (17%). After all types of treatments, 32 patients (48%) developed further swelling (56%), or persistent vomiting (44%), which was associated with consulting traditional practitioners (P = 0.011, OR: 3.42, 95%CI 1.24–9.41) and with systemic envenomation (P < 0.01, OR: 16.68, 4.63–60.11). Victims treated by family members suffered less

complications ($P = 0.03$, OR 0.18, 0.04–0.70). Overall, 76% ($n = 49$) presented chronic complications, including amputation ($n = 1$), ankylosis ($n = 1$), and psychological trauma ($n = 47$).
CONCLUSION Snakebite incidence and mortality are very high in rural Akonolinga, Cameroon. Traditional healers and medical practitioners should be trained regarding snakebite prevention and care, with an emphasis on chronic complications. Similar surveys should be performed across the country and the region.

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Knowledge, attitude and practices: assessing maternal and child health care handbook intervention in Vietnam

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INTRODUCTION Maternal and Child Health (MCH) Handbook, a home-based record for maternal and child health, was piloted in four provinces of Vietnam (Dien Bien, Hoa Binh, Thanh Hoa and An Giang) from 2011 to 2014.
AIM To assess the changes in pregnant women's knowledge, attitude and practices towards antenatal care service utilizations and breastfeeding practices, through the MCH Handbook intervention.
METHODS To compare pre-intervention baseline in 2011, post-intervention data were collected in 2013. Structured interviews were conducted with randomly selected 810 mothers of children 6–18 months of age in the four provinces. Focus group discussions among mothers was conducted in the four provinces.
RESULTS There was no significant difference in pregnant women's knowledge about a need for ≥3 antenatal care visits between pre- and post-interventions. Yet, the proportion of pregnant women who made ≥3 antenatal care visits in post-intervention was significantly higher than in pre-intervention. Thus, MCH Handbook is likely to have contributed to practicing ≥3 antenatal care visits, by changing their attitude. The proportion of mothers who know the need for exclusive breastfeeding during the initial six months significantly increased between pre- and post-interventions. The proportion of those practicing exclusive breastfeeding significantly increased between pre- and post-interventions, too. Thus, MCH Handbook is likely to have contributed to the increase in both knowledge about and practices of exclusive breastfeeding.
CONCLUSION The results imply that MCH Handbook contributed to the increase in pregnant women's practices of ≥3 antenatal care visits and in both knowledge about and practice of exclusive breastfeeding. While there is room for improvement in the level of data recording, MCH Handbook plays a catalytic role in ensuring a continuum of maternal, newborn and child care. This study is the first attempt to estimate pregnant women's behavioural changes through MCH Handbook intervention in Vietnam.
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Determinants of intermittent preventive treatment use among pregnant women attending antenatal care at three levels of care in Oyo state: a comparative cross sectional study

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INTRODUCTION The World Health Organization recommends use of intermittent preventive treatment using Sulphadoxine-pyrimethamine (IPTp-SP) as the important preventive measures against malaria in pregnancy for use in highly endemic regions. Despite the effectiveness, safety and the adoption of a national IPTp policy the uptake of IPTp-SP has been consistently low in Nigeria.
AIM This study therefore aims at identifying and comparing the determinants of preventive use of SP among pregnant women attending Antenatal Clinics (ANC) at the three levels of health care facilities in Oyo State, Nigeria.
METHODS This study is a cross sectional comparative survey among pregnant women attending antenatal care in tertiary, secondary and Primary Health Care (PHC) facilities in Oyo State. At each of the three different facilities surveyed, 158 respondents were interviewed. Data was collected using interviewer-administered questionnaire. Descriptive statistics, Chi-square, Logistic regression were used to analyse quantitative data at 5% level of significance.
RESULTS About 82.5% of respondents used IPTp. Reasons given for non- use include, the drug not being offered or prescribed 34.9%, late/poor attendance to ANC 15.7%, "just don't want to use"18.1%, being afraid of complications 9.6%, non- availability of the drug at the ANC 9.6%, forgetfulness 9.6% and the drug could cause weakness 2.4%. Non-use of IPTp was highest among the THC attendees (21.5%) followed by the PHC attendees (18.%). About 50.8% had a poor perception on IPTp-SP and 42.6% had good knowledge on malaria and IPTp-SP. Good knowledge about IPTp-SP (OR = 6.0, 95% CI = 2.52–14.27) and irregular keeping of ANC appointment (OR = 0.36, 95% CI = 0.17–0.76) were found to be statistically significantly associated with IPTp-SP use.
CONCLUSIONS The use of IPTp-SP among many pregnant women in this study is encouraging. However, for Oyo state to achieve the Roll Back Malaria target of 0% non-use, the providers' practices must change positively and access as well as acceptability should be improved.

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Policymaker, health provider and community perspectives on male involvement in maternal health in Mozambique: A qualitative study

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INTRODUCTION Increasing male involvement is considered an important, but underused intervention for improving maternal health in Southern Mozambique. Most intervention studies to improve maternal health target mothers while their partners play a crucial role in the women's ability to seek and obtain better

antenatal care and to prevent and treat infectious diseases like HIV and malaria. Different strategies have been represented in the literature to stimulate male involvement in resource limited settings including advising women to invite their partner, peer counselling strategies and invitation cards by providers. Unfortunately none of these strategies have been investigated in Southern Mozambique and research is very limited.
AIM This study explores the attitudes and beliefs of health policymakers, health care providers and local communities regarding the benefits, challenges, risks and approaches to increase men's involvement in maternal health in Mozambique.
METHODS/DESIGN This situation analysis will be the key foundation for designing and implementing context-specific, appropriate interventions to increase male involvement in maternal health in Mozambique. Individual interviews with community leaders, health officers and other stakeholders including the Ministry of Health, non-governmental organisations and academic institutions will be carried out to assess their attitudes and perspectives regarding male involvement. Subsequently focus group discussions will be conducted to explore barriers and facilitators for male involvement in the community and at health provider level. Participants will include pregnant women or women with infants <2 year, male partners, traditional birth attendants, male and female community leaders and health providers. Analysis will be done by applying a socio-ecological systems theory in thematic analysis, in order to differentiate between factors that contribute to male involvement at micro and macro level.
ETHICS AND DISCUSSION Data collection will take place in May and June 2017. The presentation/poster session will include the preliminary findings of the study.

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Socio-cultural aspects of vaginal practices: a systematic and cross-cultural review of qualitative research

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INTRODUCTION The World Health Organization defined vaginal practices as 'a variety of behaviours that involve some modification to the labia, clitoris, or the vagina'. These practices could affect immune defences by changing vaginal flora and/or obfuscating symptoms of infections, and lead to untreated STIs and reproductive tract infections. Moreover, they may affect the acceptability of condom use and microbicides, key elements of HIV prevention efforts.
AIM This systematic review aims to give a comprehensive overview of qualitative research on vaginal practices across different regions.
METHODS The databases of BioMedCentral, Jstor, PubMed, Science Direct, Web of Science, Wiley Online Library, Phil Papers and SID were used to find qualitative research on vaginal practices. Studies were selected according to inclusion and exclusion criteria, subsequently the quality of the studies was assessed and data extracted.
RESULTS In total, 30 articles were reviewed and the following themes were identified: (i) different types of vaginal practices, (ii) meanings and motivations, (iii) gender equality and agency, (iv) notions of harm and (v) the historical background. In addition to a range of vaginal practices in the Global South, the review indicated the existence of vaginal practices associated with high-income countries that might imply harm. Furthermore, the review has highlighted a range of topics that require further research, such as vaginal practices among migrants. It pointed out that more qualitative research should be undertaken to understand which factors influence vaginal practices, and how recommended policies for prevention and care are implemented and received locally.
CONCLUSION The review demonstrated the need to understand vaginal practices as embodied, as such they are reflection of culture and society but also tools women use to navigate in their specific context.

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Descriptive epidemiology of prevalence and factors associated with anemia among pregnant women initiating antenatal care in rural northern Ghana

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INTRODUCTION Anemia in pregnancy results in adverse maternal and child health outcomes. Prevalence varies across rural-urban dwellings with a tilt towards rural. There is paucity of data on the prevalence of anemia in most rural settings of northern Ghana.
AIM We set out to determine the prevalence and factors associated with anemia among pregnant women at first antenatal care visits to the Navrongo War Memorial Hospital in 2014.
METHODS Records of pregnant women initiating antenatal clinic were systematically extracted analyzed and described. Maternal hemoglobin levels of pregnant women are measured to the nearest 0.1 g/dl using the SYSMEX KX-21N, Germany hematology analyzer at the hospital laboratory. Logistic regression analysis was used to determine factors associated with anemia while adjusting for confounding effect of socio-demographic, anthropometric and relevant maternal obstetric characteristics.

The study protocol was approved by the department of Community Health and Family Medicine, School of Medicine and Health Sciences (SMHS) of the University for Development Studies, Tamale.
RESULTS More than half (80%) of the 506 pregnant women were within the age groups 20–34 years, 13% were within the 35 + years and 7% were teenage pregnancies. Most of the pregnant women had their first antenatal clinic visit in the second trimester (49%) while 4% had their first visit in the third trimester. The prevalence of anemia among 506 pregnant women was 43% (95%CI 38.4–47.1) The median hemoglobin level was 11.1 g/dl (IQR 7.3–13.8). Prevalence of anemia was highest among mothers who booked at third trimester (55%, 95%CI 33.6–74.7), teenage pregnancies (52% 95%CI 34.9–67.8) and among grand multiparous women (58% 95%CI 30.7–81.6). Factors associated with anemia from logistic regression analysis included higher parity (OR = 0.7, 95%CI 0.44–1.03), higher gestational age (OR = 2.3, 95%CI 0.87–5.89) and higher BMI (OR = 3.2, 95%CI 1.19–8.32) at time of booking.

Abstracts

CONCLUSION Burden of anemia in pregnancy is still high in rural Ghana and contributes to adverse maternal and child health outcomes. Late initiation of antenatal care is a major contributor. Early initiation of antenatal care will therefore help reduce the burden of anemia in pregnancy and thus avert adverse obstetric and perinatal outcomes.

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Maternal and perinatal outcomes of visceral leishmaniasis (kala-azar) treated with sodium stibogluconate in eastern Sudan

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OBJECTIVE To investigate maternal and perinatal outcomes when pregnant women with visceral leishmaniasis (VL, also known as kala-azar) are treated with the antimonial sodium stibogluconate.
METHOD Forty-two pregnant women with VL were treated with sodium stibogluconate at Gadarif Hospital, Gadarif, Sudan, and mother and child were followed up for 1 year.
RESULTS The treatment began at a mean±SD of 24.4 ± 9.2 weeks of pregnancy. None of the patients had malaria or HIV. Two (4.7%) who received the treatment in the first trimester had miscarriages; 4 (4.9%) died from hepatic encephalopathy during the second week of treatment; and 2 (4.7%) had preterm deliveries. One of the newborns had a myelomeningocele and died at 2 hours, and the other died from VL at 2 months.
CONCLUSION Preventive measures against VL should be employed in the region, and more research on VL and its treatment during pregnancy is needed.
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8P66

Prevalence of latent tuberculosis (LTB) among pregnant women in high burden setting in Sudan using Interferon gamma (IFN- ɣ) releasing assay (IGRA)

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INTRODUCTION Tuberculosis (TB) is a significant contributor to maternal morbidity and mortality in eastern Sudan.
AIM To investigate the prevalence rate of latent tuberculosis (LTB) and its associated factors during pregnancy using gamma interferon (IFN- γ) release assay (IGRA).
METHODS A cross sectional hospital-based study carried out in Kassala hospital, Eastern Sudan between January and March 2015.
RESULTS Two hundred and forty nine women were approached during the study period and 18.1% (45/249) had confirmed positive for *M. tuberculosis* infection using gamma interferon (IFN- γ) release assay (IGRA). The mean age, parity and gestational age of the TB patients was 29.6 (4.4), 2.2 (1.2) and 21.9 (8.8) respectively. The vast majority of these patients were of rural residence (72.7%), housewives (91.1%) and illiterate (73.3%). More than half (25, 55.6%) gave history of contact with tuberculosis patients, 26.7% (12/45) were vaccinated and 11.1% (5/45) had medical history of diabetes mellitus. In logistic regression model, while age, parity, education, occupation, size of family members, smoking, BCG status and medical history of diabetes mellitus were not associated with LTB during pregnancy, history of contact with TB patients (OR = 13.5; CI = 5.6–32.5; $P = 0.000$) and rural residence (OR = 0.3; CI = 0.1–0.7; $P = 0.006$) were significantly correlated to LTB in pregnancy.
CONCLUSION Screening of all pregnant women living in high burden setting of tuberculosis is recommended even in the absence of overt clinical signs of the disease.
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Does gestational intake of adequate diets using the FAO women's dietary diversity indicator affect haemoglobin levels at delivery and newborn health outcomes? Preliminary findings from a prospective cohort study in Volta region, Ghana

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INTRODUCTION Despite gestational iron-folic acid supplementation in Ghana, anaemia in pregnancy remains a public health problem and is associated with adverse materno-foetal pregnancy outcomes. Thus nutritional factors may play an important role.
AIM To assess maternal intake of micronutrient-dense and dietary diversified foods during pregnancy and haemoglobin levels at delivery.
METHODS Pregnant women ($n = 810$) in their first and second trimesters of pregnancy were recruited from six antenatal clinics

in the Volta region of Ghana between June and October 2016 onto the prospective cohort study. For this analysis, 342 women with complete delivery records are considered. A ten-food-group food frequency questionnaire was designed according to the FAO Minimum Dietary Diversity indicator for women[1]. Dichotomous response was assigned each food item and the cumulative scores used to assess micronutrient adequacy of intakes. Daily intake of ≥5 food groups was rated adequate. Haemoglobin levels were measured and classified according to WHO guidelines[2]. Data variability and correlation was tested using principal factor analysis while determinants of adequate dietary intake were tested through binary logistic regression in SPSS.

RESULTS Mean dietary score was 5.07 ± 2.21 (CI: 4.83–5.31). Almost 53% consumed micronutrient-dense diets. Among the iron-rich foods, animal-source foods (86%) were most consumed whereas beans (36%), dark green leafy vegetables (29%) and eggs (23%) were less frequently consumed. Gestational age at delivery was 38.76 ± 2.12 weeks with 11.9% pre-term deliveries. Mean haemoglobin level was 10.77 ± 1.42 g/dl (CI: 10.59–10.96) while anaemia prevalence (Hb > 11) was 52.6% (severe: 0.3%, moderate: 25.2% and mild: 27.0%) making it a severe public health problem. Low birth weight was 9.4% whereas small-for-gestational-age and stillbirths were 5.5% and 2.0% respectively. Intake of iron-rich diet did not correlate with Hb levels (Pearson's $r = 0.05$, $P = 0.436$). Among mothers whose intake was iron-rich, none was severely anaemic. However 13.6% and 31.8% were moderately and mildly anaemic respectively. Of the maternal-newborn factors tested, underweight in the first-trimester was a significant risk for anaemia (risk ratio: 1.39; CI: 1.08–1.95).

CONCLUSION Although consumption of iron-rich foods was not associated with Hb levels, it reduced the severity of anaemia. Low maternal first trimester BMI affected Hb levels at delivery. This reiterates the role of both nutritional and non-nutritional pre-conception interventions on anaemia prevention strategies.

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Low birth weight or prematurity in teenage mothers from rural areas of Burkina Faso

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INTRODUCTION Adolescence is associated with adverse pregnancy outcome, more particularly in limited-resources settings.

AIM To assess the association between mother's age and low birth weight or prematurity in Nanoro, a rural district of Burkina Faso.

METHODS Participants of this study were enrolled in Nanoro sites for the "Safe and Efficacious Artemisinin-based Combination Treatments for African Pregnant Women with Malaria" (PREGACT) multicenter clinical trial. We collected data on mothers and their new-borns. Low birth weight or prematurity was defined as adverse pregnancy outcome. Bivariate logistic regression was used to compare this outcome between teenagers and women of 20 years and over.

RESULTS From June 2010 to November 2013, 870 women were treated for Plasmodium falciparum infection in the PREGACT study and received mosquito nets. They were followed-up until delivery.

Of the 823 women with singleton live-borns, 205 (24.9%) were teenagers including 44 (5.3%) minors (15 – 17 years). Half (50.2%) of them had a low body mass index (BMI ≤ 21 kg/m2), 91.7% presented with anemia, and 18.5% had fever at entry. During follow-up, 45 (22.0%) had a recurrent malaria infection.

The overall incidence of low birth weight or prematurity was 27.1%, rising up to 39.8% among teenagers and up to 50.0% in minors.

Regardless of their BMI, teenagers were significantly at higher risk of delivering low birth weight or preterm babies compared to women ≥ 20 years (BMI of 16–21, OR = 2.07, 95% CI: [1.30; 3.29]; BMI of 21–30, OR = 2.56, 95% CI: [1.54; 4.24]). Teenagers' babies had also an increased risk of low birth weight or prematurity within each level of fever at entry and also in case of recurrence of malaria. The risk of low birth weight or prematurity remained higher for anemic teenagers' babies than those from anemic adults (OR = 2.24, 95% CI: [1.54; 3.25]).

CONCLUSION In the rural setting of Nanoro (Burkina Faso), there is a high need to setup education programs for young girls in order to prevent pregnancy at a young age and to encourage a very early use of antenatal care in case of pregnancy, for preventing low birth weight and prematurity.

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Impact of maternal sth infection on infant height and weight gains at 24 months of age

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INTRODUCTION In many soil-transmitted helminth (STH)-endemic countries, in-hospital delivery is being widely promoted. Deworming in the postpartum period is ideal because women are more readily accessible, they no longer pregnant, deworming drugs are safe, and deworming administration can be easily integrated into routine postpartum care.

AIM To determine the effect of maternal STH infection on child anthropometric outcomes at 24 months of age.

METHODS Among the cohort of 1,010 mother-infant pairs recruited at delivery into a trial conducted in Iquitos, Peru (February 2014 to September 2016), 357 mothers were found to be positive for STH infection at 6 months postpartum and 605 were found to be uninfected (48 had not provided a stool specimen for Kato-Katz examination). At 24 months of age, child anthropometric measurements were recorded. Analyses included multivariate linear regression which adjusted for maternal age, maternal education, SES, gestational age, infant sex, and treatment group (albendazole or placebo).

Abstracts

RESULTS At 24 months of age, there was a statistically significantly lower mean weight gain (difference = −0.15 kg; 95% CI: −0.29, −0.02) and lower mean length gain (difference = −0.55 cm; 95%CI: −0.88, −0.22) in children of STH-infected mothers (n = 357), compared to children of uninfected mothers (n = 605). Within the infected group itself, there was no difference in infant growth outcomes by treatment group (118 in the albendazole group versus 239 in the placebo group).
CONCLUSION Maternal STH infection status was found to have an important impact on infant growth. Future research should explore the underlying mechanisms for this observation. Additional evidence would be valuable from areas of higher STH prevalence and intensity (especially hookworm and *Trichuris*).

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Prevalence, associated factors and evolution of gestational diabetes mellitus in Ouagadougou

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INTRODUCTION The prevalence of Type 2 diabetes mellitus is estimated at 4.9% in Burkina Faso. There is no estimation of the prevalence of gestational diabetes mellitus (GDM) and screening is not done systematically.
AIM To estimate the prevalence and risk factors for GDM in Ouagadougou, and describe the management arrangements and evolving in the short term both for the mother and the fetus.
METHODS Prospective study from july 2013 to december 2015, in volunteers recruited pregnant in two major motherhood of Ouagadougou: the Yalgado Ouedraogo Teaching Hospital and the Saint Camille Hospital of Ouaggadougou. A fasting blood glucose was made in pregnant seen in their first trimester, and the 75-gram oral glucose tolerance test (OGTT) was performed in those seen between the 24th and 26th week of pregnancy (WP). The criteria used were those of the International Association of Diabetes Pregnancy Study Group. Patients in whom we diagnosed GDM were treated and followed in the study up to 3 months after the delivery.
RESULTS We received 117 pregnant in the 1st trimester and 81 between 24–26th week of pregnancy. We diagnosed 9 cases (11.1%) of GDM, with an overall prevalence of 9.1%. The maternal age over than 35 years ($P < 0.001$), being overweight before gestation, and family history of diabetes were the main risk factors for GDM. 14 patients received insulin treatment (basal-bolus scheme), the other 04 had a good glycemic control by diet alone. Most of our patients had a good glycemic control. Macrosomia (5.6%), hydramnios (5.6%), acute fetal distress (11.1%) and stilbirth (5.6%) were the main complications. The prematurity rate was 11.1% and the caesarean rate was 16.7. At the 3rd postpartum month, 08 women (44.4%) still had an abnormal fasting plasma glucose.
CONCLUSION This study provides a first estimate of the prevalence of GDM in Burkina Faso at 9.1%. Risk factors were the maternal age over than 35 years, overweight and a family history of diabetes. A practice of targeted screening if presence of at least two ris factors is desirable to prevent obstetric complications by early and adequate GDM treatment.

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Sociodemographic, clinical and service predictors of post-surgical reintegration score among Ugandan women treated for obstetric fistula

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INTRODUCTION International attention to obstetric fistula, a traumatic birth injury with significant physical and psychosocial sequelae, has resulted in increased access to surgical treatment in sub-Saharan Africa and South Asia, where it is most prevalent. The growing population of women repaired for obstetric fistula necessitates developing the evidence base on facilitating post-surgical reintegration, particularly given the substantial challenges that women have endured while living with fistula, proportion of women experiencing persistent symptoms post-repair, and nascent evidence supporting increased risk of adverse perinatal outcomes among this population.
AIM To understand sociodemographic, clinical, and service predictors of 6-month post-surgical reintegration among women operated for obstetric fistula in Uganda.
METHODS We conducted a longitudinal study among women operated for obstetric fistula at Mulago Hospital, Kampala, Uganda, following them for 12 months post-repair and capturing data every three months in-person (baseline) or via mobile telephone (all subsequent). We assessed the relationship between sociodemographic, clinical, and service receipt at baseline and three months and standardized reintegration score at six months through linear regression analysis among the 55 women who participated in three and six month data collection.
RESULTS Accounting for baseline reintegration score, multiple sociodemographic (residence, age at fistula development, age at fistula repair, duration living with fistula, living children, partnership status, stigma) and clinical variables (pain with urination, skin irritation, weakness, vaginal pain, difficulty walking, and level of urinary incontinence) were significant predictors of reintegration at six months in models. Self-report of any service received (economic assistance, physical therapy, skills training, counseling, medical treatment, other social assistance) was not significantly associated with reintegration score. In multivariable models, independent predictors of increased reintegration included current age and other source of financial support. Factors inversely associated with reintegration were level of urinary incontinence and stigma. Report of skin irritation and difficulty walking at three months were marginally inversely associated with reintegration.
CONCLUSION The sociodemographic and clinical factors identified as important for post-surgical reintegration within this small longitudinal cohort of Ugandan women suggest that reintegration programming must be multi-factorial, incorporating components to address the continuing clinical, psychological, and economic needs of women affected by obstetric fistula.

Abstracts

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Safe motherhood at Endulen Hospital – a good practice public health example to introduce cultural-sensitive hospital care to improve mother and child health within the Maasai community in Northern Tanzania

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INTRODUCTION Endulen Hospital is located in the Ngorongoro Conservation Area in Northern Tanzania, where it is the only one serving 80,000 people. The hospital is serving mainly Maasai, which still follow their traditional way of life. Maasai women usually deliver at home with the help of Traditional Birth Attendants (TBAs). When complications occur, they need assistance of the hospital staff, but often arrive at the health facilities too late, which can increase maternal and neonatal mortality in the community.
AIMS Seeking methods to reduce child and maternal mortality and morbidity.
METHODS Between 2008 and 2010 semi-structured interviews were conducted within the Maasai community. Hospital fees, not accepting the TBA within the hospital system, ignoring the needs of the pregnant mothers during the hospital stay and lack of separate space were the biggest distractions not to deliver at the hospital. Hence, male elders, traditional healers, TBAs and pregnant mothers were invited to the hospital compound in several meetings to explore these issues more and expand the cultural knowledge of the hospital staff. With their help, a construction plan for building a maternity ward was developed in 2009. The new maternity wing for 24 patients was be opened in 2011. Complications can be handled better with new equipment. TBA meetings were held quarterly since 2009 at the hospital and were attended by up to 60 women. A local artist painted the walls of the maternity ward with culture sensitive illustrations. Inspired by these illustrations a German artist developed an educational broschure to be used in teaching sessions dealing with birth complications and the potential danger of home deliveries.
RESULTS The numbers of hospital deliveries quintupled over 8 years at Endulen Hospital. 186 deliveries were conducted between January 2008 and June 2010 and in 2016 until October already 260 babies (230 spontaneous deliveries, Caesarean sections 30) were delivered.
CONCLUSION Interviews, regular educational meetings for TBAs and the erection of a new maternity wing, including cultural and medical key facts, deconstructed cultural barriers and increased the acceptance of hospital service within the Maasai community. The numbers of deliveries increased, which resulted in an improved mother and child health.

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Frequency of malaria in pregnant women and rate of use of prenatal consulting services in Lubumbashi medical district 2011–2015 (D.R. Congo)

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INTRODUCTION Malaria remains a major health problem in low-income countries. Therefore, malaria control is a public health priority in endemic countries such as the Democratic Republic of Congo.
AIM The aim of this study is to determine the frequency of malaria in pregnant women and the rate of utilization of services at the PNC.
METHODS A descriptive study covered a five-year period (2011–2015) based on the annual PNLP / KATANGA data based on the monthly reports of the Health Zones. The software Excel and Epi Info 7.2.0.1 were used.
RESULTS During these 5 years of study, the CPN1 service utilization rate was over 75% with a SP distribution rate of 34.5%. The frequency of malaria varied between 42.83% and 25.14%. This frequency was >75% in the Lubumbashi Health Zone and <10% in the Health Zones of Kamalondo, Kowe and Tshamilemba.
CONCLUSION PNC1 services were sufficiently utilized between 2011 and 2015 although the expected threshold was not reached and a continuing decline in malaria cases was observed among pregnant women.

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Difficulties in implementing a HPV/cervical cancer screening programme in Kinshasa

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INTRODUCTION Cervical cancer is a major public health issue in LMICs such as the DR Congo. Organized screening programmes have contributed to lower the incidence of CC in countries where they have been established. In DRC, the prevalence of CC is still high due to the lack of effective screening programme.
AIM This study aims at evaluating pitfalls at trying to implement a cervical cancer screening and HPV testing programme in a resource-constrained area.
METHODS We will review all human, logistical and environmental difficulties encountered during the conduct of

cervical cancer screening programme in Kinshasa. They raised from a research study conducted in Kinshasa, DR Congo in which women aged 25 years old and over were invited to attend a cervical cancer screening program. This programme consisted in collecting cervical specimens for cytology, HPV testing and genotyping and doing visual inspection of the cervix as well as treating abnormal lesions with cryotherapy which uses a cooling gas.
RESULTS Research rules in DRC render difficult the conduct of studies. Research materials are scarce and must be imported from western countries. In this process the customs seem to be more expensive and exonerations are sometimes not took into account. Biological specimens are difficult to share between African countries as it is when they have to be sent to Europe because we sometimes are not set to perform all laboratory examination on site. Electricity is not stable and makes it difficult to store specimens or to run equipment without risk. Even for cryotherapy, the most inexpensive treatment method recommended for cervical dysplasia, the provision of cooling gas is difficult to assure. Cultural barriers constitute a pitfall for the success of mass campaign in the community.
CONCLUSION New health programmes are difficult to be started and maintained in resource-constrained areas. This situation highlights the need for a good appraisal in order to overcome all bottlenecks at different levels. Research and customs rules should be alleviated; citizens and institutions should be empowered economically and culturally; cryotherapy for the treatment of cervical lesions could be replaced by thermocoagulation.

8P75

Misuse of antenatal care and its association with adverse outcome of pregnancy in a southern rural area of Vietnam

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INTRODUCTION Antenatal care (ANC) is recognized as an important determinant of pregnancy outcome. Studies in Vietnam showed that there is a high percentage of pregnant women attending ANC at least one time, but an inappropriate utilization of ANC services still remains. The evidence to which these services affect pregnancy outcome is not documented in South Vietnam.
AIMS The purpose of this study was to investigate the misuse of ANC services and its association with adverse outcomes.
METHODS We conducted a prospective community based cohort study in 17 communes in the district of Trang Bom within the Province Dong Nai, during 12 consecutive months. Data of pregnant women and their use of ANC services were collected using a structured questionnaire and medical records. Women were followed up to delivery. Misuse of ANC services, related factors and its association with adverse events were assessed using logistic regression.
RESULTS Out of 3301 pregnant women, 91% initiated ANC visit within first trimester, 95% attended at least 3 ANC visits, but a low percentage of pregnant women underwent blood test and urine test at least once (20% and 39%, respectively). Pregnant women who didn't undergo blood test and urine test were more likely to have an adverse outcome. Other factors significantly associated with a higher risk of adverse outcomes were parity ≥ 3, ANC visits <3, history of adverse outcome, and having a clinical condition such as hypertension, diabetes. Blood test and urine test were less frequently undergone by young women, women from ethnic minority, women using only private facilities for ANC attendance, and a low number of ANC visits.
CONCLUSION Despite a high percentage of early entry into ANC and of at least 3 ANC visits as recommended by Vietnam National Guidelines, misuse of ANC services still exists and contributes to adverse outcomes. There is a need to increase the awareness of women on the benefits of ANC services by educating young women as well as women having several children. Health workers should be encouraged to proposed suitable ANC services to pregnant women. Health insurance should consider the fee of each ANC services.

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Assessing sexual health of very young adolescents in SW Uganda

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INTRODUCTION In most Sub-Saharan African countries, including Uganda, the Sexual and Reproductive Health burden remains high. Little is known about young adolescents' sexual and reproductive health (SRH).
AIM To describe attributes of sexual health in very young adolescents including sexual health knowledge, attitudes and behaviour.
METHODS A cross-sectional survey of young adolescents (10–14 years) was carried out (June-July 2016) in 33 primary schools in Mbarara district, Uganda. The questionnaire was pre-tested among 105 adolescents. Institutional ethical approval, parental informed consent and adolescents' informed assent were obtained. Multivariate logistic regression analysis was done to determine associations between personal and interpersonal determinants of sexual health.
RESULTS A total of 1096 adolescents (median age 12 years, 58% female) were included. Overall, 78.4% vs 71.6% of boys and girls respectively had low SRH knowledge scores (less than 50% of expected score). A higher education status and access to educative SRH media was associated with high SRH knowledge score. Girls had lower scores than boys. Majority (90%) of children had non accepting attitudes towards risky sexual practices. A higher SRH knowledge score was associated with having had non accepting attitude towards risky sexual behaviour. A total of 83 (7.6%) reported to be sexually active; of which 67 (81%) were boys. Adolescents who communicated with their mother about sexuality and girls were less likely to be sexually active and the reverse was true for those who watched pornography and were truant.
CONCLUSION Very young adolescents' sexual health knowledge is still low. Informal sources of SRH information such as media are associated with adverse sexual behaviour. Appropriate young adolescent SRH education that is gender sensitive tackling school factors, media influences and promoting parental involvement is recommended.

Abstracts

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Prevalence and distribution of hpv genotypes found in Kinshasa versus Flanders

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INTRODUCTION Human papillomavirus is the necessary and sufficient cause of cervical cancer. There exists over 200 HPV genotypes. A lot of efforts have been put in the characterization of genotypes involved in high- grade lesions and in invasive cervical cancers, since current vaccination should target the most involved genotypes. But recent researches suggest that circulating HPV strains are different across different regions of the world, with different cultural or sexual habits.
AIM The purpose of this study is to compare HPV genotyping findings of a recent study in Kinshasa compared to HPV genotypes encountered in Flanders. The reason is because the current study in Kinshasa has involved researchers of both regions.
METHODS In the setting of the KINVAV clinical trial (NCT02346227) which aims at evaluating the efficacy of the topical antiviral drug AV2 in the treatment of HPV-associated lesions of the cervix, HPV testing and genotyping were performed. Samples for these were collected in the PreservCyt® solution, stored at room temperature and shipped to AML Laboratorium for analyses. HPV testing and genotyping were done by real-time PCR. These results were compared with the available results database of the same laboratory covering the flanders region.
RESULTS In Kinshasa, the prevalence of HPV was 21.1%, and it was 15.1% in Flanders. The prevalence in Kinshasa is a little much higher to compared to Flanders. The genotypes of HPV found were in order of importance as follows: HPV 53, 68, 45, 67, 18, 52, 58, 35, 66, 16, 51, 31, 39, 59. There are large discrepancies between these results and those for the Flanders community where the most prevalent genotype was HPV 16 and HPV 18 was only the 7th most frequent genotype.
CONCLUSION HPV strains circulating in Kinshasa are different from those in Flanders. Taking into account that current commercially-available HPV vaccines target mainly the 16 and 18 genotypes, future vaccination dedicated for the Sub-Saharan Africa Region in general should integrate the most prevalent strains of the region if this tendency is finally confirmed through systematic reviews and meta-analyses.

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Mothers delivering under the stars: observations of facility deliveries and family planning procedures in community health centres of Uttar Pradesh, India

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INTRODUCTION Uttar Pradesh (UP), India's most populous state, is also among the poorest performing on a number of critical reproductive and maternal health indicators. Despite a significant shift towards institutional deliveries and widespread access to 'proven' best practices, maternal mortality continues to remain alarmingly high. Currently the state is implementing several schemes to improve quality of care with proven implications on maternal and neonatal outcomes.
AIM This study was undertaken to understand the status of provider and systems-level challenges in achieving quality of care.
METHODS We conducted 37 non-participant observations in two primary and seven secondary level public health facilities across 2 districts of UP. Observations were conducted at five stages - admission; pre-procedure; procedure; post-procedure and discharge - using a structured checklist by a team of two clinically trained nurses and one social scientist. The notes and completed checklists from each observation were thematically coded and analyzed to create a narrative description of the status of maternal and family planning care practices, gaps and challenges.
RESULTS Prominent themes appearing across most facilities included non-compliance with standard clinical procedures; compromised privacy on account of multiple procedures in a single designated labour room; demand for informal payments; patients forced to buy medical supplies from outside; verbal abuse during delivery process; lack of prompt attention, minimal interaction with patients and little or no counseling. Inadequate infrastructure and care led to patients leaving soon after delivery/procedure, thereby affecting post-procedure care.
CONCLUSION Government and health professionals must address quality of care in order to improve maternal and neonatal health outcomes. We recommend staff training and supervision to improve compliance with clinical procedures, patient-provider interaction and respectful care. Facility level quality improvement teams can be constituted to identify solutions tailored to facility needs. Patient helplines are essential to capture feedback on their experience of care.

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Users' and providers' perspective on quality of maternal care: a qualitative study of public health facilities in Uttar Pradesh, India

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INTRODUCTION Quality of care provided during delivery is a critical determinant of maternal and neonatal outcomes. Evidence shows that quality has been assessed either from the users' or providers' perspective. A comprehensive understanding of expectations and perspectives of both users and providers respectively is essential for holistic improvement in quality of health care. In India, as far as public health facilities are concerned the quality of care has not witnessed as impressive improvements as with coverage and access to institutional care for delivery.
AIM This study aims to assess the user's and care provider's perceptions of quality care to understand the common focus areas for quality improvement in public health facilities in India.
METHODS The study followed a qualitative design comprising five focus group discussions with pregnant women in their last trimester and in-depth interviews with 24 healthcare providers across two primary and seven secondary level public health facilities across two districts in Uttar Pradesh. Interviews were transcribed, coded and analyzed thematically to assess and

identify common themes of care from users' and providers' perspectives on facility based delivery care.
RESULTS Aspects of care most commonly cited by women as important while seeking delivery care included availability of health providers, assistance in accessing care at the facility, prompt care, constant attention, appropriate medical care (drugs, supplies and procedures), ability to manage complications, prompt and smooth referral; information sharing by providers, emotional support; privacy and monetary incentives that exceed expenses. In case of the providers, patient safety and appropriate medical care is of prime concern in providing quality care. Adequate physical infrastructure, human resources, materials and supplies; better staff living and working conditions, continuing medical education or training, and food and shelter facilities for attendants are common themes critical to enabling quality care.
CONCLUSION Common themes identified by both the groups can be prioritized in developing quality improvement programs in health facilities. A forum can be created for periodic patient-provider interaction to convey feedback and resolve issues of concern. The identified components of care can match supply with demand for care and make services truly responsive to both users' and providers' needs.

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The importance of a community based approach in reaching out to survivors of sexual violence. The experience of two coffee cooperatives in the DR Congo

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INTRODUCTION For decades the eastern provinces of the DR Congo have been affected by massive and wide-spread sexual violence (SV). Two cooperatives in the South-Kivu took the initiative to actively identify members who survived rape, sexual slavery and abduction with the aim to refer them for medical care, psychosocial support and legal aid as well as to support their social reintegration. The SV initiatives were developed with support of a local NGO using a participatory approach for assessing the needs and the strategy to be followed. The SV interventions disposed of a limited budget, provided by a Belgian donor, and had a duration of one year.
AIM To highlight the importance of a community-based approach to sexual violence as a prerequisite for ensuring aid effectiveness.
METHODS This paper is the result of the qualitative evaluation of the SV initiative of the coffee cooperatives. For the evaluation the following methods were used: document analysis, field visits, semi-structured interviews with key stakeholders, semi-structured focus group discussions with the cooperative members (male and female, including SV survivors).
RESULTS The cooperatives succeeded in identifying hundreds of survivors who had remained "hidden" for years. The SV initiative covered for 474 medical referrals and 611 referrals for psychosocial support. The vast majority of the survivors had access to medical care and psychosocial support for the first time. Family reunification was achieved through global awareness raising, home visits and economic aid. Support for income-generating activities largely contributed to the recovering of self-esteem. 33 women received legal aid, but none of the cases were withheld by the court. The cooperatives keep on identifying new cases in need of support, but cannot attend them because they are not eligible for support by the running SV programmes in the region.
CONCLUSION Proximity appears to be a key factor in breaking the silence and building a relationship of trust and respect with the survivors, their family and the community. In order to increase aid effectiveness in the area of SV prevention, donors should rethink their approach and be more flexible in the identification of local partners and beneficiary organisations.

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Maternal deaths surveillance system: a tool to guide action at regional level in Morocco?

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INTRODUCTION The Global Strategy for Women's, Children's and Adolescent Health, (2016–2030) launched in September 2015 aims to end all preventable deaths including maternal deaths by 2030. This requires improving the identification, measurement and quality of the data collected on maternal deaths. In Morocco, a nationwide maternal death surveillance system (MDSS) was implemented in 2009. So far, this system identifies about half of the estimated number of maternal deaths. However, the primary objective of the MDSS is to guide the decision at regional level by using maternal death review data for action. We have no information on the use of these data by regional decision makers.
AIM This study aims to explore the perspective of stakeholders on MDSS and factors that influence the use of the maternal death data in regional decision-making in Morocco.
METHODS A mixed-methods case study design is being applied. Data collection will be conducted between May and June 2017. The study population are stakeholders who are closely involved in the MDSS (regional focal points of MDSS, regional confidential audit committee members) and various data users (Regional Health Directors, heads of public health services, and heads of regional health observatories). Twelve semi-directional structured interviews will be carried out with the regional focal points at the Regional Health Directions to assess the MDSS implementation level. Five in-depth interviews will be undertaken in 4 selected regions for understanding stakeholders perception of MDSS's implementation and the utilisation of MDSS for action. Data will be analysed using a mixed approach including Epi Info and NVivo software (QSR International Pty Ltd. Cardigan UK).
EXPECTED RESULTS The preliminary results of this study will be ready by the end of September 2017. This study will contribute to better understand the process of monitoring maternal deaths at the operational level and to identify barriers to the compliance with the national standards. The factors that influence the utilisation of MDSS data could also be identified and the recommendation for optimal utilisation will be developed.

Abstracts

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Prevalence and predictors of health facility delivery of infants among mothers in Calabar, Cross River State, Nigeria

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INTRODUCTION Poor maternal health indices including high maternal mortality are among the major public health problems facing Nigeria. Most of these deaths can be prevented by timely access and utilization of maternity health care services by women.
AIM This study seeks to identify factors affecting utilization of health facilities for delivery of infants among mothers in Calabar metropolis, Cross River State, Nigeria.
METHODS The study is a community-based cross-sectional study conducted in Calabar metropolis, Cross River State, Nigeria. It targeted women of reproductive age, who are resident in the study area and had given birth at least once within the last five years prior to the survey. A well-designed 39-item structured questionnaire was administered to 422 women who were selected using the multi-stage random sampling technique. Data generated were analyzed using SPSS version 22.0 and results were presented in tables and charts. Chi-squared tests as well as Multiple Logistic Regression were used for identification of variables associated with health facility based delivery.
RESULTS The mean age of respondents was 27.3 (SD = 8.4) and most of the respondents (28%) were within the age group of 15–20 years. 52% of the women that completed the questionnaire utilized the health facility for delivery, 89.6% reported to have attended antenatal clinics (ANC) and 18.9% of ANC attendees completed at least 3 ANC sessions. Chi-squared test showed that there is statistical association between health facility delivery and marital status status (χ^2 (3) = 12.068, P = 0.007), education of respondents ((χ^2 (2) = 6.326, P = 0.042) and family size (χ (4) = 11.668, P = 0.002). Older women (OR = 0.7.CI = 0.169–3.714), Christians (OR = 1.9, CI = 0.093–41.1) and respondents who registered early (first trimester) for ANC (OR = 4.9, CI = 0.78–31.48) were found to be higher users of delivery services at the health facility.
CONCLUSION Early registration for antenatal care and completion of the WHO recommended minimum visits should be encouraged. Targeted community health intervention focusing on improving the knowledge and awareness on the significance of utilizing available delivery services at the health care facility should be developed and implemented and adequate training on how to handle complications during pregnancy and delivery should be provided for health care workers.

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Adolescent childbearing in Zambia: multilevel analysis of individual and community level factors

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INTRODUCTION Early childbearing predisposes an adolescent mother and her baby to negative social, economic and health related repercussions. The risks of early childbearing appear to be particularly pronounced among the youngest mothers. Gaining understanding on the complexities surrounding adolescent childbearing is critical for countries as they strive to improve the health of young girls and their children.
AIM To assess which individual and community factors are associated with childbearing before the age of 18 in Zambia.
METHODS Cross-sectional data from the 1992, 1996, 2001/2, 2007 and 2013/14 Demographic and Health Surveys conducted in Zambia were pooled. The study sample consisted of women aged 15–49 (n = 46,296). Multilevel models using multivariate logistic regression were used to take into account both community factors and individual predictors of childbearing before the age of 18.
RESULTS At individual-level, being married was associated with an increased likelihood of reporting first birth before age 18 among both urban and rural residents. Among urban residents, the likelihood increased with age, whereas it was lower among those with partial and complete secondary education as compared to those having no education, and among those that lived in highly educated compared to less educated communities. As for rural women, those with partial and complete primary and secondary education had reduced odds of reporting first birth before age 18 compared to those having no education.
CONCLUSION The study findings reveal that women's education and not being married are important determinants of adolescent childbearing in Zambia. Promoting educational attainment at least up to secondary school level and preventing marriages among the adolescent women may be valuable measures towards the reduction of early childbearing in Zambia.

8P85

Midwifery care, medical interventions during labour and childbirth and neonatal outcomes in the first-line public health facilities in Cambodia

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INTRODUCTION There have been enormous improvements in maternal and child mortality and in utilisation of facility-based health care services in Cambodia during the last decades. Maternal mortality ratio drops from 484 (2000) to 161 (2015) per 100,000 live births. Deliveries assisted by skilled birth attendants was 89% (2014) at the national level, therefore, it is practically 100% in urban areas. However, quality of care during delivery process in public health facility is still not clearly described yet. Our main concern is to what extent potentially harmful practices, which negatively alter physiological process of childbirth, is performed.

Abstracts

AIM We aim to describe practices during labour and delivery and to evaluate if there is any relationship between the acts and conditions of newborn infants immediately after birth.
METHODS Direct observation of pregnant women and health care providers from the admission until birth in eight public first-line health centres in Phnom Penh city was carried out. We employed eighteen external midwives as the observers. All the care and medical interventions from health care providers to the women were recorded. Umbilical arterial blood samples were collected by the observers for pH measurement (UA-pH) in order to assess foetal acidosis.
RESULTS 304 singleton delivery cases were observed. UA-pH data was obtained from 251 cases. 68% of women did not receive foetal heart rate check-up during the observation. Potentially harmful medical acts were frequently observed: Valsalva manoeuver (79%) and supine position during the second stage of labour (100%). These may disturb utero-placental blood circulation and ultimately cause foetal acidosis. Median and inter-quartile range of UA-pH were 7.264 and 7.211–7.296, respectively. Proportion of acidosis (UA-pH less than 7.20) was 20.5%.
CONCLUSION The prevalence of low UA-pH in this survey was relatively high, though the study participants were basically in low-risk pregnancy. Infrequent observation of foetal condition and high frequency of unnecessary medical acts could be the cause, though no specific factors for the acidosis was identified. Further trial, which aims to reveal that a combination of appropriate detection of non-reassuring foetal status and avoidance of potentially harmful practices contributes to improve maternal and neonatal condition, is required.

8P86

A catch-up visit increased coverage through home-based HIV testing in rural Lesotho but fails to reach 90%

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INTRODUCTION Reaching 90% HIV testing and counselling (HTC) coverage is the first of the three 90–90–90 targets set for 2020 by UNAIDS.However, UNAIDS estimates that globally less than 60% HIV-infected individuals are aware of their status.
AIM This cross-sectional study assessed HTC coverage achieved through two home-based HTC visits in rural Lesotho, the first on a working and the second on a weekend day.
METHODS To recruit participants, counsellors visited randomly selected villages in the district, moving from door-to-door enumerating household members (absent and present) and subsequently proposing HTC to those present. The first visit took place during the week, the second visit was on weekends to reach household members absent at first visit. Definition of household-member was individuals who spent at least one night at least twice a month in that household.HTC coverage was defined as individuals knowing their HIV-status out of all individuals enumerated (absent and present). Home-based campaigns were conducted from February 22 to July 17, 2016, data were captured on tablets and synchronized daily (www.visibleimpact.org/projects/1197-cascade-trial).
RESULTS 6662 households with 18349 household members were visited. During the first home visit, 71% of household members were at home. Among the household members at home, 1365 (7.4%) were known to be HIV positive. Among the 11,706 who had never tested positive, HTC uptake was 86%. HTC coverage after first visit was 63%.

2005 (30%) households were re-visited on the following weekend. During this second visit 1531 (32%) of the absent household members were encountered and proposed HTC. HTC coverage increased to 71% after the second visit. HTC coverage was lower among men because male household members were likely to be absent at both visits (OR: 0.44; 95%CI: 0.41 – 0.48, $P < 0.001$). First time testers were more likely to take up HTC compared to those recently tested (OR: 1.30; 95%CI: 1.17–1.45, $P < 0.001$).
CONCLUSION A catch-up visit on a weekend day increased the proportion of persons knowing their HIV status by 8% in rural Lesotho. Nevertheless, door-to-door HTC alone did not achieve the 90% target. In future, strategies combining door-to-door with approaches targeting household members who are seldom at home should be included.

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Predictors of mortality in HIV patients with severe PCP admitted to Intensive Care Unit: a systematic review

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INTRODUCTION Despite current developments in HIV medicine and wide scale use of HAART, PCP (Pneumocystis Carinii Pneumonia) still remains to be an important cause of respiratory failure requiring ICU (Intensive Care Unit) care especially in developing countries. To date, there have been published studies on mortality predictors in PCP patients in ICU but not systematic reviews.
AIM To look in to mortality predictors in severe PCP receiving ICU care.
METHODS A systematic review was done to look for predictors of mortality in HIV patients with severe PCP admitted to ICU. Eligible studies are cohort and case control study designs that report predictors or risk factors for ICU mortality. Studies that reported separate outcome for ICU patients with HIV/PCP were included. Pubmed, Embase and Medline search was made. In addition grey literature search was also made to address publication bias. Two authors independently screened titles and abstracts of all citations identified in the search. Quality assessment of relevant articles was made using CASP tool for cohort study appraisal.
RESULTS Initial search resulted 257 articles, out of which a final 8 were included in synthesis. Most studies were in the pre-HAART era. All studies had a cohort design. Overall mortality ranged from 53%–81% in the pre-HAART which reduced to 25% following introduction of HARRT. In the high quality studies, need of mechanical ventilator, development of pneumothorax [1,2] and duration of maximal therapy prior to ICU admission were significantly associated with mortality after adjusting for confounders.
CONCLUSION The results of this review indicate HAART improved intensive care unit mortality among HIV patients with

severe PCP. Those patients requiring mechanical ventilator, developing pneumothorax and receiving longer duration medical therapy prior to ICU admission had a worse prognosis. Mortality predictors were similar in pre and post HAART era.

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8P88

Vaginal carriage prevalence of group B streptococcus (GBS), GBS serodistribution, risk factors for carriage of GBS and *Escherichia coli*, and microbiological and immune correlates of vaginal GBS carriage in three African populations

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Introduction *Streptococcus agalactiae* (group B *Streptococcus*, GBS) and *Escherichia coli* are the leading causes of neonatal sepsis worldwide. In Africa, data on GBS and *E. coli* prevalence, risk factors for GBS and *E. coli* carriage, and knowledge on GBS serotype distribution, needed to design GBS vaccination trials and public health interventions, are scarce. Furthermore, there are few data on microbiological and immune correlates of vaginal GBS carriage.

Aim We aimed to assess the prevalence of vaginal GBS and *E. coli* carriage, GBS serotype distribution and risk factors for vaginal GBS carriage and *E. coli,* and the microbiological and immune correlates for vaginal GBS carriage in women from Kenya, Rwanda and the Republic of South-Africa (RSA).

Methods 424 women were tested for the presence of *S. agalactiae* and *E. coli*, GBS serotypes were determined. The vaginal microbiota was characterized using qPCR and cytokines were quantified using ELISA. Risk factors for GBS and *E. coli* carriage were examined.

Results The overall vaginal GBS and *E. coli* carriage prevalences were 16.3% and 28.0%, respectively. Serotypes Ia (36.8%), V (26.3%) and III (14.0%) were most prevalent. *Candida albicans*, bacterial vaginosis, vaginal washing and recent vaginal intercourse are risk factors for GBS carriage. GBS carriage, bacterial vaginosis, cervical ectopy and working as a sex worker are risk factor for *E. coli* carriage. GBS carriage was associated with IL-8, IL-12 and IP-10.

Conclusion Vaginal GBS and *E. coli* carriage prevalences in Kenya, Rwanda and RSA do not differ much from the ones in Western countries. GBS serotypes Ia, V, and III are most prevalent. Vaginal *C. albicans* carriage, vaginal intercourse, vaginal washing, working as a female sex worker and cervical ectopy are risk factors for vaginal GBS and/or *E. coli* carriage. GBS carriage was associated with a Th1-immune environment.

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Hospital admission among HIV-patients: causes and factors associated with AIDS-defining events in a referral tertiary care hospital in Antananarivo, Madagascar

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Introduction Madagascar remains an exception among sub-Saharan countries with a low HIV. However, the number of patients enrolled in care remains very low, attesting to low HIV testing. Therefore, patients presented advanced disease at diagnosis and were at high risk of being hospitalized.

Aim We aimed to describe causes of hospital admission in patients living with HIV (PLHIV) and to assess factors associated with AIDS-defining events (ADE) as cause of hospitalization.

Methods Patients admitted for at least 24 hours in the Infectious Diseases Unit of the University Hospital Joseph Raseta Befelatanana Antananarivo, a referral center in PLHIV care, from January 2010 to December 2016 were included. Patients discharged against medical advice were excluded. We considered as cause of hospitalization the diagnosis related to the symptoms on admission. Diagnostic criteria were based on criteria described in WHO guidelines. ADE were defined as diseases corresponding to WHO stage 4 or category C of CDC classification.

Results 252 hospital admissions of PLHIV out of 6187 (4.07%, 95%CI: 3.6–4.6) were recorded during the study period. Hospital admission of PLHIV increased from 0.7% (95%CI: 0.2–1.2) in 2010 to 11.2% (95% CI: 8.8–13.6) of total admission in 2016. 236 hospital admissions matching to 178 PLHIV were included in the study. Median age at admission was 37 years (IQR: 30–45) with 63.6% (n = 150) of men. HIV was diagnosed during hospital admission in 93/236 (39.4%). Duration of symptoms before admission was ≥ 4 weeks in 32.2% (n = 76). Median CD4 at admission was 119 per mm^3 (IQR: 58–222.75). ADE were diagnosed in 61.9% of hospital admission (n = 146) including extrapulmonary tuberculosis (n = 46), pulmonary tuberculosis (n = 21), pneumocystis pneumonia (n = 27), cerebral toxoplasmosis (n = 17) and cryptococcosis (n = 13). Non- ADE were mostly caused by infections (n = 22). In multivariate logistic regression, ADE were associated with patients who were not on ART at admission (OR = 2.2, 95%CI: 1.0–4.5), persistent fever (OR = 4.3, 95% CI: 2.1–9.0), duration of symptoms≥ 4 weeks (OR = 2.6, 95% CI: 1.3–5.5) and CD4 < 200/mm^3 at admission (OR = 3.5, 95% CI: 1.7–7.4). Overall in-hospital mortality was 19.5%.

Conclusion ADE mostly represented by tuberculosis were the main causes of hospitalization of PLHIV. Factors associated with ADE reflected delayed HIV diagnosis.

Abstracts

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Priority fast tracking HIV response in West and Central Africa to halt human and medical consequences of low ARV coverage

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INTRODUCTION While access to HIV treatment expanded worldwide, Médecins Sans Frontières (MSF) witnesses first-hand serious delays in scale-up in West and Central Africa (WCA), where only 28% people living with HIV (PLHIV) have access to treatment. MSF released a report in 2016 calling for acceleration of treatment scale up efforts through key changes in models of care, tackling financial access barriers and supply problems. Without urgent acceleration for the region, worldwide plans to reach the 90–90–90 targets by 2020 are in jeopardy.
AIM A comparison of key elements of the 2016 report with current situation (2017) in WCA will identify key obstacles, enabling factors and innovative strategies for the much needed scale up.
METHODS We investigated key obstacles for expanded ART initiation and retention in care in WCA, focusing on contexts where MSF provides HIV services, including three in-depth case studies (DRC, CAR, Guinea). Systematic review of key indicators for ART coverage, enabling factors and alternatives strategies was done, an overview of acceleration plans of key countries in the region and the international support provided to them.
RESULTS Effective, timely and quality HIV-services continue to be hampered by frequent stock-outs, financial barriers and lack of staff motivation. Relatively lower HIV prevalence decreases priority for government and international actors, with low interest from bilateral donors, in particular European member states, Global Fund being the main or only funding source. Reluctance to task shifting, longer periods of drug refills, community service monitoring prevails but figure as priority measures in the acceleration action plans.
CONCLUSION Governments and international actors need to step up fast track responses to close treatment gaps by adapting existing approaches. Urgent mobilization of all health actors is needed to mitigate barriers to ART initiation and adherence, including ensure HIV testing and treatment free of charge for all PLHIV, decentralized & simplified ART provision, task-shifting, guaranteeing uninterrupted supply of HIV-commodities.

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8P91

Epidemiology of human coccidial infections in HIV positive women and children in Lagos state

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INTRODUCTION Human coccidial infections are caused by *Toxoplasma gondii*, *Cryptosporidium parvum* and *Isospora belli*. They are transmitted to man by eating food or drinks containing the oocysts of these parasites or vertically from mother to child in the case of *T. gondii*.
AIM This study sought to examine the distribution and seroprevalence of coccidial infections and associated risk factors in HIV positive and negative women and children in Lagos State.
METHODS Two hundred and nine (209) blood and faecal samples were collected for four months. The serum samples were tested for anti-toxoplasma antibodies using Enzyme linked Immunosorbent assay while the faecal sample were examined for enteric parasites by microscopy. The risk factors were tested for significance using Chi square analysis. P value < 0.05 was considered statistically significant.
RESULTS Of the 209 samples, 30.6% were positive for anti-toxoplasma antibody and 13% were positive for intestinal coccidian parasites. Among the HIV positive individuals, 36.8% were seropositive for toxoplasmosis and 16.0% were positive for intestinal coccidian parasites while the HIV negatives had 8.7% seropositive for toxoplasmosis and 9.0% positive for intestinal coccidian parasites. Associations were observed between seropositivity to toxoplasmosis and age, occupation, education, marital status, HAART status, raw meat consumption.
CONCLUSION There is a high burden of coccidial infections among women in Lagos and routine screening for these infection is recommended.
REFERENCE:
1. Author A., Author B., Author C.D. Title of the scientific work. Title of the Journal year; number; page-page.

8P92

The use of manual vacuum aspiration in the treatment of incomplete abortions: an interventional study from Malawi

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INTRODUCTION Malawi has a high maternal mortality rate and unsafe abortion is one of the top five causes of maternal death. Incomplete abortion is a common complication after abortion, which can be treated surgically or medically. In the first trimester, manual vacuum aspiration (MVA) is the preferred surgical method because it is safer and cheaper. Still, many hospitals in Malawi continue using curettage, which requires more resources and leads to more complications. Some hospitals in Malawi use little or no MVA in spite of recommendations from WHO and Malawi Ministry of Health.
AIM The aim of this study was to investigate if an intervention of training health staff could increase the safer and cheaper method of MVA by 15%.
METHODS A prospective cross sectional assessment of the pre/post use of MVA was performed at three public hospitals in Malawi. Health personnel at these hospitals were trained in MVA using theory and practice in April 2016. Two hospitals served as controls. Ethical approval was obtained from Malawian and Norwegian Ethics Committees.
PRELIMINARY RESULTS In two of the hospitals, nearly no MVAs were done before the intervention. It increased shortly after training to 6.4% in one and 25% in the other. The referral hospital had fluctuations in the use of MVA. No MVA was done in the control district hospital, while data collection in the referral hospital is yet to be done.
CONCLUSION This study investigated the treatment of incomplete abortion after an intervention. A significant increase has been achieved so far in one of the smaller hospitals. A limitation is that the intervention could have been extended, including more hands-on patients' training. However, the training was planned as a refresher, as all health personnel should have been taught MVA during their education. There may be other factors influencing the results. Focus group discussions were conducted with staff to

understand their perceptions of the intervention. A constant rotation of staff and lack of equipment has been mentioned as major limiting factors to doing MVA.

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A game-changing drug: access to misoprostol and medical abortion in Dar Es Salaam, Tanzania

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INTRODUCTION The prostaglandin analogue misoprostol has recently been introduced in several East-African countries to prevent and treat post-partum hemorrhage. In this context the drug has reportedly also been accessed clandestinely by women with unwanted pregnancies for pregnancy interruption.
AIM With the overall aim to understand the role of misoprostol in safe abortion care in a legally restrictive context, we explored how misoprostol as a medical abortion drug, was perceived, accessed and used among young women in Dar es Salaam. We wished to look into the space that legal restrictions and socio-economic constraints leave for women with unwanted pregnancies to act on this change and access medical abortion.
METHODS The study was explorative and involved five months of fieldwork in Dar es Salaam, individual qualitative interviews with women under 25 years having performed medical abortion (15); post-abortion care providers (16); drug vendors (11) and other central stakeholders within the field of abortion (17). 10 focus group discussions (FGDs) were carried out with young women from low-income areas and with students and client simulation was performed in drug stores across Dar es Salaam (64).
RESULTS In Dar es Salaam misoprostol is well known, available and commonly used for abortion purposes. For young women interviewed misoprostol was the preferred option due to its accessibility, safety and simple, non-invasive self-administration that ensures that the abortion can be kept a secret. Together with the shift among women towards medical abortion practices health workers in Dar es Salaam reported experiencing fewer and more manageable abortion complications. However, the illegal context prohibits an open and informative sale of the drug and problematic access to post-abortion care.
CONCLUSION In Dar es Salaam misoprostol has rapidly been adopted by women and abortion providers, offering women access to safe abortion and providers a tool to better meet women's needs. Access to misoprostol shifts power from clandestine abortion providers to women who gain greater control over their own body and fertility, but the unregulated market simultaneously leaves women to themselves with little guarantee for safety, and thus of unsafe abortion practices and post-abortion complications.

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Quality assessment of partograph recording in Mnazi Mmoja Hospital, Zanzibar: a nested cross-sectional study

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INTRODUCTION The majority of perinatal deaths (98%) occur in low- and middle-income countries and many are related to suboptimal intrapartum care. The partograph can be used to improve care for women in labour.
AIM The aim of this study was to determine the quality of partograph use at the maternity ward of Mnazi Mmoja Hospital, Zanzibar, Tanzania.
METHODS During October-November 2016, 160 women were observed in active labour until childbirth. Inclusion criteria were ≥4 cm cervical dilatation and provided informed consent. Medical records including partographs were photographed. Quality of recording was determined through assessment of administrative and medical data. Administrative data concerned date, use of alert line, time intervals and line adherence (i.e. examinations and actions reported at one time are on the same line). Reliability of medical data was determined by comparing partographs with observations for assessment of completeness (sensitivity) and correctness (positive predictive value) of recorded time, examinations and actions. Sub-analysis by type of examinations was performed. Ethical approval for this study was obtained.
RESULTS Of the 160 women observed, 140 had a partograph available. In 30 partographs (21%) administrative data was according to local agreements. There were 459 observed timepoints (i.e. time with corresponding examinations and actions) of which 221 timepoints (48%) were missing in the partographs. However, in the partographs were 337 timepoints identified: 227 timepoints were both observed and recorded, and 110 timepoints (33%) were overreported (i.e. not observed). There was a strong correlation ($R^2 = 0.61$) between number of observations and overall reliability (i.e. total of missing and overreporting relative to total observations), with lesser recording when observations increased. Foetal heart rate monitoring was reported best (completeness 95%, correctness 69%), whereas contraction monitoring was recorded least optimal (completeness 59%, correctness 13%).
CONCLUSION The quality of partograph recording was suboptimal. Given the importance of partograph use for intrapartum management, this warrants increased vigilance, specific training and addressing barriers experienced by front-line health workers in its use. If the paragraph is used for research purposes pre-study training and validation of partograph recordings is recommended.

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8P95

Understanding maternal and neonatal vaccination acceptance in the Gambia

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INTRODUCTION Pneumococcal disease (PD) is a major public health concern and the use of conjugate vaccines is expected to result in significant reductions in death. In The Gambia, pneumococcal polysaccharide conjugate vaccine [Prevenar13®, PCV13] is administered as part of the national Expanded Programme on Immunization (EPI). A randomized, phase 3 trial with the aim of assessing the effects of administering PCV13 in pregnancy and early life for carriage acquisition as a surrogate for

disease is currently ongoing in The Gambia by the Medical Research Council Unit The Gambia (MRCG). Although maternal and neonatal vaccination may prevent from PD in early life, the acceptability of vaccinations, especially in pregnancy, is not well understood.
AIM To explore sociocultural factors influencing the acceptance of maternal and neonatal PD vaccinations.
METHODS Qualitative in-depth interviews and focus group discussions were conducted with theoretically sampled women participating in the PCV13 trial and additional key informants including women refusing to participate in the trial, their relatives, and health staff. Data were managed and analysed using NVivo 11 Qualitative Data Analysis Software.
RESULTS Women participating in the trial and key informants perceived the neonatal dose of PCV13 to be safe as it was already being routinely given to new-borns. The maternal dose was accepted as it was (i) perceived to improve the health of the mother, fetus and new-born and was (ii) administered by the MRCG who were seen as a trustworthy health care provider. Furthermore, the vaccine was perceived as preventive for illnesses beyond pneumonia and meningitis such as vaginal infections and AIDS in mothers and ear pain, malaria, fever and chest pain in new-borns. These findings were further corroborated by health staff who perceived the PCV13 vaccine to be safe and preventive for both pregnant women and new-borns.
CONCLUSION Vaccine acceptance behaviours should be viewed in their local context and our findings show that receiving vaccination in pregnancy was perceived to be safe and additionally preventive for the mother, fetus and new-born. These findings provide insight to enable a more evidence-based decision and guidance on future recommendations of vaccination policy during pregnancy.

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Implementation of a community engagement program in the pathogenesis and treatment of nodding syndrome study in Uganda

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INTRODUCTION Community engagement (CE) is a key but often overlooked component for successful implementation of community-based studies and trials. The Nodding Syndrome (NS) study in Uganda seeks to examine if NS is a neuro-inflammatory disorder and whether doxycycline may be used as treatment. As part of this study, we initiated a CE program to support implementation.
AIM To build dialogue between communities and the research team, help the community understand research, encourage participation, the objectives and procedures of the study, and adherence to the study interventions and schedules.
METHODS Between August 2016 and January 2017, the study team worked with four communities, five health facilities and the leadership of Kitgum and Pader districts. We held dialogues on NS and the study with the community, health workers and district leaders and conducted focused group discussions with health workers and village heath teams and interactive question and answer sessions with the communities.
RESULTS There was initial hostility towards research in NS and research scientists due to failure to feedback research results by previous research groups and the limited community participation in NS interventions. Affected persons felt abandoned. Since initiation of the CE, negative attitudes have reduced and there is increased willingness to participate in the study, positive feedback about the study team and excellent adherence to study medications and follow-up visits. The community is particularly positive about CE the process.
CONCLUSION Community engagement has improved the community perceptions, uptake and participation in the study. We anticipate improvement in outcomes and the lessons learnt will be incorporated in future recruitments and studies.

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Logistics for field studies in resource-limited settings: challenges and outcomes in DRC

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INTRODUCTION Infectious diseases represent the main factor of morbidity and mortality in developing countries, including DRC. DRC, the largest Sub- Saharan country, has many inaccessible regions due to geographical obstacles, lack of communication and other logistical issues. For outcome expectancies, all field and laboratory activities have to successfully overcome many challenges.
AIMS The aim was to produce and carry out a consistent, coordinated plan for all activities in the field, and attempt to replicate in various conditions.
METHODS From September 2015 to August 2016, we conducted 5 field trips for an Ebola antibody study in Boende, Bumba, and Yambuku. Challenges were to successfully conduct research activities under field constraints: rainy forest and harsh conditions such as natural obstacles, flooding, insect bites, lack of passable roads and bridges, lack of transport means, lack of electricity to run and charge electronic devices, and many others.
RESULTS Despite very challenging situations faced, we were able to construct a fully functional laboratory (including refrigerators, centrifuges – refrigerated, dry shippers, portable deep freezer (−80C), tablets for data collection, and required materials) in 4 different places covering an area of 16,954Km^2. The outcome was: 49 isolated viable PBMCs from Ebola survivors and HCW, and serum, plasma and buffy coat from over 1200 HCWs and questionnaire data.
CONCLUSION Research and public health activities can reduce morbidity and mortality in resource-limited settings such as the DRC. Although DRC's size and geographical obstacles do not allow for easy field deployment, it is possible to deploy high quality field activities by creating consistent and sustained global plan. Once the plan is completed and replicated, valuable data can be produced despite suboptimal work conditions.

Abstracts

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Implementation research on acceptability of physicians using a tele expertise network in Mongolia

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INTRODUCTION Since 2001, the Luxembourg Government has supported the Mongolian Government in cardiologic care. During two phases, a pilot telemedicine model for cardiologic care was tested in a restricted number of provinces, and during the last phase the model was expanded to the whole country. The project includes an electronic patient's medical record and a mean of communication linking physicians vertically (tele expertise) and horizontally (peer to peer), thus creating a network. Conceptualizing innovation in healthcare is not just about building the technological structure and capacity, but fundamentally about its social environment and interrelations among actors involved.
AIM This research aims to better understand what factors contributed to the successful implementation and scale up of the Mongolian Cardiovascular Diseases Project through the three phases. Our study focuses on acceptability of users. Therefore, we study how the project has changed physicians' practices using the tele-expertise network since its implementation and fostered its acceptance.
METHODS Implementation research describes the processes used in implementing innovations and the contextual factors that affect these processes. We used qualitative methods to study implementation and reaction of users. We gathered physicians' insights through participant observation and in-depth interviews of nineteen physicians out of the sixty-eight doctors working with the project, added to focus group discussions of nine physicians from remote provinces.
RESULTS The project has changed physicians' practice in improving their professional competencies to manage patients autonomously while allowing collaboration among them. It is observed that a community of cardiologists was created that established a collaborative environment. Moreover, the participatory approach was central in developing the technological structure according to needs of the physicians' practice.
CONCLUSION The technological structure put in place by the project is supported by strong collaboration between physicians and the participatory approach involving physicians. It results in structuring a community of cardiologists with a great sense of belonging and ownership that created a social environment for the technology to work.

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Cognitive determinants of multiple sexual partnerships and non-condom use using multi-stage stratified random cross-sectional survey in South Africa

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INTRODUCTION South Africa (SA) has a high HIV prevalence. While HIV risky behaviours including multiple sexual partnership (MSP) and non-condom use (nCU) are known to be drivers of the spread of HIV; cognitive factors including perceived susceptibility of HIV, perceived monetary or material benefits of having sex for material gain, self-efficacy and attitudes play a significant role in influencing risky sexual behaviours. Little is understood about cognitive and behavioural factors.
AIM We sought to investigate personal beliefs, perceptions and other ideas, thoughts and actions that are associated with MSP and nCU in SA.
METHODS We analyzed nationally representative data from the 2012 National HIV Communication Survey that included about 10 000 participants aged 16 to 55 years. Five constructs were created to measure psychosocial and cognitive determinants. Cronbach's alpha coefficient for internal consistency reliability was used to assess the correlations between the items that made up each construct. A composite score was obtained for each construct and a dichotomous variable created. Multivariable logistic regression was used to determine factors associated with MSP and nCU. Forward selection, variables with P-value <0.05 and improved fit model were retained in the final model. Analyses were adjusted for clustering and done using STATA. Results were summarized using Adjusted Odds Ratios (AOR) with their corresponding 95% confidence intervals.
RESULTS Of the 6061 sexually active respondents, 13% (95%CI: 11.47–13.12) reported MSP and 52.7% (n = 3158/6039) (95%CI: 51.0–53.55) non-condom use at last sex. Factors associated with MSP were perceived benefits, adjusted Odds Ratio aOR = 2.16 (95%CI: 1.80–2.58), perceived susceptibility to HIV, aOR = 2.22 (95%CI: 1.83–2.69) and engaging in intergenerational sex aOR = 2.14 (95% CI: 1.78–2.56). Predictors of nCU were perceived benefits aOR = 1.25 (95%CI: 1.09–1.43), perceived susceptibility to HIV aOR = 1.6 (95%CI: 1.39–1.83) and personal beliefs aOR = 1.35 (95%CI: 1.13–1.62).
CONCLUSIONS Cognitive and behavioural factors were found to be predictors of risky sexual behaviours for HIV. This highlights the importance of considering personal perception and reasoning when attempting to understand and influence individual's sexual behaviours. This could be done through enhancing awareness of HIV risk in the general population and other cognitive behaviour change interventions through community mobilization, advocacy and creating activities to improve self-esteem.

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Sociocultural dimensions of hypertension in Merida (Yucatan, Mexico): preliminary findings of an anthropological research

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INTRODUCTION Hypertension is a commonly undiagnosed chronic disease in many inhabitants of the Yucatan region. Deep- seated sociocultural dimensions play a fundamental role in the social representation and understanding of this condition, which in turn determines population health-seeking behaviour.
AIM To investigate the social representations of hypertension and to identify the main sociocultural categories related to metabolic risk factors and to hypertension care.
METHODS A qualitative study was conducted. A series of ethnographic observations and in-depth interviews were

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performed in the urban south area of Merida city. The study population consisted of diagnosed adult hypertensives as well as normotensive people.
RESULTS From our preliminary data, we identified manifold cultural practices that foster the prevalence of risk factors for hypertension. Salt is a key component of local food preparations and its consumption part of a deep-rooted gastronomic identity linked to flavours. Traditional local dishes which reinforce cultural identity and gastronomic social memory are rich in saturated fats. Alcohol consumption reveals gender rituals such as "becoming a man" and "female liberation" and also ways of reinforcing social bonds between communities. Smoking behaviour has changed after the introduction of laws banning smoking in indoor public areas. Cultural perception of "a fat body as healthy-wealthy body" rejects the biomedical discourse of overweight, or at least re-signifies it. Finally, interviewed people perceived hypertension as a symptom of diabetes rather than a disease itself and as a deadly illness for the elderly and women.
CONCLUSION These social representations should be taken into account in order to optimize preventive and hypertension care strategies.

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How rumours of 'placentas sellers' led to the decline of a malaria in pregnancy trial in Benin: an ethnographic study

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INTRODUCTION A multi-country community-based trial on scheduled screening and treatment (SST) for malaria in pregnancy (MiP) was conducted in Benin, The Gambia and Burkina Faso. Despite similar design and procedures, trial participation proved to be problematic in Benin where the study became the subject of "rumours".
AIM Ethnographic research was carried out in Benin, Burkina Faso and the Gambia on the effectiveness of SST for MiP with a specific emphasis in Benin on factors leading to the deterioration of the trial.
METHODS Data from group discussions, semi-structured interviews, and participant observation were triangulated and analyzed with NVivo 10 qualitative analysis software.
RESULTS After rumours started of placentas being sold by the trial research team, community members refused to participate or continue in the trial. In Benin, the placenta is considered sacred and is object of several rituals that aim at assuring the new-born's general well-being later on in life. Cultural conceptions on the placenta, however, were similar in all three trial countries and could therefore not be a sufficient condition to have generated trial refusal and drop-out rates. Instead, the rumors were set in motion by a confluence of factors initiating after a trial-related adverse event and caused by the historical distrust in governmental organizations, socio-economic inequality, sociocultural beliefs in the sacred nature of the afterbirth, and challenges in communication during the informed consent procedures.
CONCLUSION An improved understanding of study participants' concerns and of historical and geo-political factors can be decisive for a trial's efficacy.

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What is the major issue to tackle neonatal infections in low income countries – evidence from a community-based cohort study in Madagascar

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INTRODUCTION Tackling neonatal sepsis is extremely challenging in low-income countries. Critical data on the burden of severe bacterial infections in neonates is scarce because neonatal deaths may occur rapidly when access to care may be limited. There is a particular lack of data regarding infections occurring in the community, which may differ from cases admitted to the hospital. Also, the role of the different factors involved in the transmission of multiresistant bacteria remains unclear, particularly mother-to-child. Data are needed for these countries to prioritize interventions to decrease neonatal infections.
AIM We aimed to provide data on the burden of neonatal infections, including a population-based incidence of neonatal infections, etiologies and resistance patterns. These detailed estimations allowed us to question the major issue to address and which interventions to prioritize to tackle bacterial infections in neonates in a LIC.
METHODS We conducted a prospective cohort of 981 newborns in Madagascar between September 2012 and October 2014. Exhaustive identification of pregnant women on a geographic basis allowed us to enroll newborns at birth. Children were followed-up using active (home-visits) and passive monitoring. Data on clinical symptoms developed by the children and all results of biological and bacteriological samples taken were collected.
RESULTS The prevalence of extended-spectrum beta-lactamase producing Enterobacteriaceae and *agalactiae streptococcus* carriage among pregnant women was 18% and 13%, respectively. The incidence of community-acquired neonatal infections was 35.8 cases per 1,000 live births [95% CI, 25.4–50.8], with a great majority during the first week of life (85%). The incidence rate for multiresistant neonatal infection was 5.5 cases per 1,000 live births [2.2–13.2]. Almost two-thirds of the pathogens isolated were resistant to current WHO-recommended treatment for neonatal sepsis.
CONCLUSION In Madagascar, the incidence of bacterial neonatal infections is alarmingly high in the community. No evidence of high rates of multiresistant infections was found. The role of the mother as a potential reservoir of transmission of multiresistant neonatal infection has been highlighted. Public health measures should prioritize interventions to improve the prevention, early diagnosis, and case management of neonatal infections to decrease neonatal mortality due to severe bacterial infection, rather than bacterial resistance.