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ABSTRACT

Organised sessions

World Federation of Parasitologists (WFP) and International Federation for Tropical Medicine (IFTM) Symposium: Exploring the One Health and Planetary Health Dimensions of Helminth Diseases

Track 2: Infectious diseases and (neglected) tropical diseases

One health–From a helminth point of view

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The One Health approach acknowledges that the health of us humans, animals, plants, ecosystems and environments are interdependent. Using a One Health approach often requires multidisciplinary or cross-sector collaborations, and looking at challenges from different point of views.
This talk aims to inspire discussions during the congress and beyond to include more One Health thinking and to encourage One Health collaborations.
Parasite life cycle illustrations typically show key connections between the parasites, their hosts and often also the environment. In addition to the characteristics of the parasites, the health of their hosts and the environment shape their story.
We can look at the life cycles and balance between hosts and pathogens from different point of views – including from a One Health point of view.
Parasitology provides brilliant opportunities to practice and develop One Health ways of thinking and working.

World Federation of Parasitologists (WFP) and International Federation for Tropical Medicine (IFTM) Symposium: Exploring the One Health and Planetary Health Dimensions of Helminth Diseases

Track 2: Infectious diseases and (neglected) tropical diseases

Schistosomiasis as a one health concern

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Schistosomiasis, caused by Schistosoma spp. trematodes, is a NTD of major medical importance. Despite decades of mass administration of praziquantel to school-aged children, the burden of schistosomiasis remains extremely high in certain regions. Whilst animal hosts are acknowledged as zoonotic reservoirs across Asia, within Africa or the Americas, in contrast, any zoonotic component of schistosomiasis transmission and its implications for disease control had been largely ignored.
We aimed to elucidate the transmission dynamics of Schistosoma spp., including notably the emerging risk raised by ongoing viable hybridization between Schistosoma species of both humans and animals across West Africa.
Through a combination of field surveys encompassing parasitological, epidemiological and molecular data, as well as model-based approaches, we evaluated the occurrence and distribution of Schistosoma species and hybrids across potential key definitive host species (humans, livestock and wildlife) and snail intermediate hosts in Senegal and Niger.
The prevalence of schistosomiasis was observed to be extremely high in human (both children and adults), livestock, wildlife and snail rodent populations. Viable hybrids between *S. haematobium* and *S. bovis* and/or *S. curassoni* occurred frequently in humans.
By elucidating the dynamics of inter-specific hybridization and zoonotic transmission, this research highlights the need for all age groups and all potential host species to be included in future efforts within SSA and beyond. A truly multi-disciplinary One Health perspective must be implemented in order to achieve the 2030 WHO Roadmap targets of elimination as a public health problem and ultimately towards interruption of schistosomiasis transmission.

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Track 2: Infectious diseases and (neglected) tropical diseases

A one health "sweet" perspective on advancing parasite vaccines: Unveiling the glycan composition of the zoonotic worm Fasciola hepatica

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Vaccine development against parasites has been greatly facilitated by the advancement of -omics tools that have identified many candidate target molecules by exploring their stage- and tissue-specific expression. While 'traditional' vaccines have been manufactured as either live, attenuated or more recently as recombinant proteins, an area of prime importance that has been largely neglected is the characterisation of parasites-derived glycans.
Glycans are highly immunogenic and often play roles in protecting parasites against immune attack and/or direct evasion of host responses by impairing immune functions; thus, they can present a major target for disrupting parasite-host interaction. We focus on an important zoonotic parasite, Fasciola hepatica, a worm that causes detrimental One Health consequences because it infects up to 17 million people and results in annual losses >€2.5 billion to livestock and food industries worldwide. Mass drug treatment campaigns in high-endemic areas have been undertaken, but the global emergence of anti-helminthic resistance, principally to triclabendazole, poses challenges to these efforts.
To address this gap, we utilized glycan and glycopeptide analyses, along with bioinformatics tools, to characterize the glycosylation of individual F. hepatica proteins. We found huge heterogeneity in glycosylation exerted by the 1727 N- and O-glycoforms we characterized, resulting in great protein variability in the fluke extracts, which are far more complex than anticipated by proteomic analysis.
Altogether, we glyco-mapped 123 glycoproteins associated with the parasite's invasive state, 71 of which are excreted-secreted proteins regarded as promising vaccine targets.
Our data provide a sounder foundation for improving future vaccine development to control fascioliasis.

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Track 2: Infectious diseases and (neglected) tropical diseases

Old hosts as treasure troves of worms, worms as tags for new hosts: The overlooked potential of helminthology in invasion biology

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Introduced alien species are major threats to biodiversity. Reasons may include parasite co-introduction and transmission, but this parasitological impact on local hosts and ecosystems is understudied. Moreover, origins and identity of introduced species/strains are often unknown, let alone of their parasite fauna. Monitoring only provides partial answers for want of baseline data: especially in the Global South, native parasite biodiversity is poorly known.
We studied introduced hosts (cichlids, sardines, frogs) in Central and Southern African inland waters, and the monogenean flatworms infecting them. Given their one-host lifestyle, these are hypothesized to be easily co-introduced with their hosts, and to be "tags" for host populations.
Monogeneans were collected from hosts retrieved from biodiversity collections and recent fieldwork. Parasites were morphologically identified to species level, and characterised using nuclear and mitochondrial markers, including some mitogenomes.
We showcase the potential of historical fish collections to establish pre-translocation baselines for parasite communities, allowing to distinguish native from co-introduced parasite species. Monogeneans can help trace origins and pathways of aquatic invasions. For the notoriously invasive Nile tilapia and African clawed frog, parasite mitochondrial markers provide higher resolution than host genetics.
"We offer a proof-of-concept of biodiversity infrastructure and helminths as sources of information in a One Health context. This contributed to media interest for using natural history collections in infectious disease research. However, a closer look at the parasitology of Nile tilapia, a fish of global economic and ecological importance, indicated that a One Health approach is mostly lacking.
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World Federation of Parasitologists (WFP) and International Federation for Tropical Medicine (IFTM) Symposium: Exploring the One Health and Planetary Health Dimensions of Helminth Diseases

Track 2: Infectious diseases and (neglected) tropical diseases

From local to global: Exploring the impact of schistosomiasis and helminth diseases on one health

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Helminths (Schistosoma, soil-transmitted helminths, etc.) affect around 25% of the world's population. They constitute a significant public health challenge, particularly in tropical and subtropical regions, where they affect millions of individuals. These neglected tropical diseases exert a profound impact on both human and animal health, highlighting the interconnectedness of ecosystems, human communities and animal populations.
Vaccine development emerges as a promising avenue for addressing helminth infections. We explore the challenges and advancements in vaccine research, including the

identification of key antigenic targets, the formulation of effective vaccine candidates, and the assessment of their immunogenicity and protective efficacy.
Furthermore, we address the complex considerations in vaccine deployment, including strategies for equitable distribution, community engagement and sustained impact within the context of One Health principles.
We present strategies employed by our laboratory in vaccine development against One Health helminth pathogens.
By comprehensively addressing the challenges posed by these diseases, we can pave the way for a healthier future that prioritizes the well-being of humans, animals and ecosystems.

Strongyloidiasis: challenges in endemic and non-endemic areas

Track 2: Infectious diseases and (neglected) tropical diseases

Molecular diagnosis of strongyloidiasis and the relevance of participating in an external quality assessment scheme

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Of all soil transmitted helminth (STH) species, the stool-based diagnosis of *Strongyloides stercoralis* is known to be most challenging. The number of larvae excreted is generally very low, in particular during the chronic phase of infection and in immune-competent individuals. Nucleic acid amplifications tests (NAATs), targeting species-specific DNA in clinical samples, are increasingly used because of their high sensitivity and specificity. The diagnostic value of NAATs have been demonstrated in endemic and non-endemic settings, with studies ranging from community based surveys and clinical trials to individual case management.
In this presentation the remaining challenges of different NAAT procedures will be discussed, with a focus on quality and reproducibility of the NAAT in use.
Although NAATs are generally highly accurate for the diagnosis of *S. stercoralis*, participation in an interlaboratory comparison scheme is crucial for laboratory performance validation and to reveal any scope for improvement

Strongyloidiasis: challenges in endemic and non-endemic areas

Track 2: Infectious diseases and (neglected) tropical diseases

Evaluation of parasitological, serological and molecular tests for in-field prevalence surveys: The ESTRELLA study

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The World Health Organization recently recommended the implementation of control programmes for strongyloidiasis, the neglected tropical disease caused by *Strongyloides stercoralis*. Specific recommendations on the diagnostic test(s) to be used in the context of such programmes, however, have yet to be defined, being assays routinely used for other soil-transmitted helminthiases not appropriate for the diagnosis of strongyloidiasis
The primary objective of this study was to estimate the accuracy of five tests for strongyloidiasis; secondary objectives were acceptability and feasibility of use in an endemic area.
School-age children living in remote villages of northern coastal region of Ecuador were enrolled in the study. Children supplied one fresh stool sample and underwent blood collection via finger prick. Faecal tests were a modified Baermann method and an in-house real-time PCR. Antibody assays were a crude antigen-based ELISA (Bordier ELISA), an ELISA based on two recombinant antigens (Strong Detect ELISA), and a recombinant antigen-based rapid diagnostic test (RDT). The latter two seroassays were evaluated prospectively in the field for the first time in this study. A Bayesian latent class model was used to analyse the data due to the lack of gold standard for *S. stercoralis* infection.
A total of 778 children from 16 communities were enrolled in the study and provided the required samples. The average strongyloidiasis prevalence estimated for the study area was 8.5%. Sensitivity ranged from 53.9% (Baermann) to 83.5% (Strong Detect ELISA); specificity ranged from 93.6% (RDT) to 100% (Bordier ELISA). The combination of Bordier ELISA plus either PCR or Baermann had the best performance in terms of positive and negative predictive values at the local estimated prevalence. Acceptability of the procedures by the examined communities was excellent; different aspects of the feasibility of each assay are discussed.
Our findings would support the decision on the adoption of a testing strategy for control programmes of strongyloidiasis, as recommended by the WHO.

How do we improve maternal and newborn health care in large cities? Case studies from research in sub-Saharan Africa

Track 5: Sexual and reproductive health and rights

How do we conceptualise cities for a context-specific approach to improving maternal and newborn health?

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Urban areas vary in the degree or urbanization–including city size, function and location. Maternal and newborn health outcomes vary with city level characteristics; for instance, studies have shown dynamic relationship between city size and mortality. Therefore, moving beyond the dichotomy of urban-rural disaggregation, there is a need to

examine horizontal health disparity within different groups of urban women and their babies.
We aimed to develop a framework through which to understand the features in the urban environment contributing to maternal and newborn health and inequities therein.
To capture specific challenges to maternal and newborn health in urban areas, we conducted a targeted scoping review of global literature. We complemented this by analysing secondary data (Demographic and Health Surveys, DHS) for 22 large cities in Africa to illustrate variety in care coverage and content across the continuum of care (antenatal, intrapartum, postnatal). We synthesise findings using Jabareen et al. approach for building conceptual frameworks.
We extracted studies from one or more cities which described various elements of maternal and newborn care provision, use and health outcomes. We identified a common theme in these studies and used it as an anchor for our framework: urbanisation is not just a matter of scale–that is, of meeting the demand for care with sufficient supply, but rather urban areas contain complex interactions and dynamics between various elements of the social, health system and geographical eco-system. Analysis of DHS showed that uptake of the initial phase of the continuum of maternal care–antenatal care–was very high (range 85%–99% across cities), but dramatically decreased (median 75%) when looking at four or more ANC visits. Private sector provided one-fifth of ANC and home-based ANC was negligible. Most cities showed gradually decreasing levels of utilisation as women moved through the maternal continuum of care."
Despite existing evidence suggesting policy implications and areas of focus, city-level and national decision makers pay inadequate attention to maternal and newborn health. This is exacerbated by complexity, competing political focuses, insufficient public funds, and lack of clarity stemming from siloed thinking.

How do we improve maternal and newborn health care in large cities? Case studies from research in sub-Saharan Africa

Track 5: Sexual and reproductive health and rights

How did you get here? Care-seeking pathways of women with obstetric complications admitted in health facilities in Kampala, Uganda

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Many urban settings in SSA have high numbers of facility-based maternal deaths despite high concentration of emergency obstetric facilities and physical access.
This study aims to assess care-seeking pathways of women with obstetric complications admitted in selected facilities in Kampala city.
A cross-sectional semi-structured survey was conducted among women with obstetric complications admitted in nine facilities in Kampala city at five levels of the health system. Using a sequential data approach, we asked women about what they did after onset of symptoms, where they went, and how long they spent in each location they visited. We asked about experiences with receiving childbirth care at the final facility and applied thematic analysis.
We interviewed 400 women, including 60 with postpartum haemorrhage, 95 with pre-eclampsia/eclampsia, 100 with obstructed/prolonged labour and 45 with complications of abortion. Average age was 26 years and they were predominantly Kampala residents. Most women who came directly from home or were referred from another facility had a total of two steps in their care pathway. Commonly, women stayed with symptoms related to complications for hours or days before seeking help. After recognizing symptoms (e.g., abdominal or back pain, headache), some women ignored them, while many asked advice from friends, neighbours or nearby clinics, and self-medicated. Some respondents reported having to wait for their partners to bring money or take them to the facility. Women who undertook more than two steps in the care-pathway reported circling between the woman's home and private clinics. The two-wheel motorcycle was the most reported mode of transport between steps in care pathways.
The role of private-sector clinics needs to be understood in order to inform structural interventions that reduce delays and improve birth outcomes for women in urban settings. Guidance for pregnant women about where to seek care with complications is needed. Studies estimating time to reach the facility where complications were managed should endeavour to capture extensive time spent seeking care in clinics, not only the time spent travelling during the final step.

How do we improve maternal and newborn health care in large cities? Case studies from research in sub-Saharan Africa

Track 5: Sexual and reproductive health and rights

What comes after childbirth? Women's experiences with immediate postnatal care in a large referral hospital in Dar es Salaam, Tanzania

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Providing quality postnatal care can prevent maternal morbidity and mortality. In urban settings, most women give birth in health facilities, but tend to leave earlier than the recommended duration due to crowding and lack of space.
This study aims to describe women's experiences with immediate postnatal care in a large referral hospital in Dar es Salaam, Tanzania.
This qualitative study used in-depth interviews with postnatal women. Women were invited to participate during their

hospital stay and interviews took place in women's households, 8–10 weeks after they were discharged from hospital (in August–September 2022). Interviews were conducted in Swahili, recorded, transcribed verbatim, translated to English, and content analysis was applied.

Forty-two women agreed to participate in the study at the time of recruitment and twenty-eight interviews were conducted. The minimum length-of-stay consisted of spending one night at the hospital, although most women or their newborns suffered complications and stayed longer. Accessing the adequate level of care meant that women who originally live outside Dar es Salaam had to move to the city during pregnancy/postnatally to be closer to the referral hospital. Being distant from "home" meant that less emotional support was available to women during their postnatal stay because relatives/family could not afford travel costs to visit. The lengthy bureaucratic process for receiving social assistance (i.e., free meals) meant that some women did not have access to adequate nutrition at the hospital. Women reported dissatisfaction with untimely attention from providers, uncleanliness of the postnatal ward due to crowding, and not receiving family planning counselling before discharge. Household visits in Dar es Salaam allowed the researchers to experience the lengthy journeys followed by women to/from the referral hospital. Flexibility in scheduling interviews was essential considering long travel distances and traffic.

Tertiary hospitals cater for a complicated case mix whereby many women need to recover for a long time after birth. Postnatal women report negative experiences due to crowding, inadequate resources and lack of family support, especially those who travelled from far. Multidisciplinary interventions that take women's needs into consideration are essential.

How do we improve maternal and newborn health care in large cities? Case studies from research in sub-Saharan Africa

Track 5: Sexual and reproductive health and rights

Assessing accessibility to emergency obstetric care in large Nigerian cities: Insights from the OnTIME project

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Better accessibility of emergency obstetric care (EmOC) facilities can significantly reduce maternal and perinatal deaths. However, pregnant women living in urban settings face additional complex challenges travelling to facilities. It is also well established that many women do not always go to the nearest facility, even in an emergency.

We aimed to estimate geographical accessibility and coverage to the nearest, second nearest, and third nearest public and private comprehensive EmOC facilities in the 15 largest Nigerian cities.

We mapped city boundaries, verified and geocoded functional comprehensive EmOC facilities, and assembled population distribution for women of childbearing age (WoCBA). We used the Internal Google Maps Navigation Application Programming Interface to derive driving times to public, private, or either facility-type. Median travel time (MTT) and percentage of WoCBA able to reach care were summarised for eight traffic scenarios (peak and non-peak hours on weekdays and weekends) by city and within-city (wards) under different travel time thresholds (<15, <30, <60 min).

City-level MTT to the nearest comprehensive EmOC facility ranged from 18 min (Maiduguri) to 46 min (Kaduna). Within the city, MTT varied by location, with informal settlements and peripheral areas being the worst off. The percentages of WoCBA within 60 min to their nearest public comprehensive EmOC were nearly universal; whilst the percentages of WoCBA within 30 min reach to their nearest public comprehensive EmOC were between 33% in Aba to over 95% in Ilorin and Maiduguri. During peak traffic times, the median number of public comprehensive EmOC facilities reachable by WoCBA under 30 min was zero in eight of 15 cities.

Cities are complex as they have unique peculiarities including the plethora of the private sector which leads to heterogeneity in the quality of care available in the sector, rapid rate of turnover of private facilities affecting health system's ability to know its nodes and connections, complex referral networks, difficulty with locating addresses of health facilities. However, this innovative approach provides more context-specific, finer and policy-relevant evidence to support improving comprehensive EmOC service accessibility in urban settings. To scale up, we need continued partnership with technology companies, integration of other machine-readable data including those related to care outcomes, and routinisation of service functionality data.

Digital optical devices–A new development in parasite diagnostics

Track 2: Infectious diseases and (neglected) tropical diseases

Addressing the WHO target product profile for soil transmitted helminths with a fieldable AI-based digital pathology platform

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WHO has published target product profiles (TPPs) to guide the development of diagnostic tools for neglected tropical diseases (NTDs) and achieve the targets set for the next decade. These TPPs outline the minimal and ideal requirements for diagnostics in various NTD use-cases. The use of artificial intelligence-based digital pathology (AI-DP) has the potential to address the limitations of current

microscopy-based diagnostics for NTDs, offering improved reproducibility, automated analysis, and reduced operational costs. However, a critical review and development pathway against the TPPs from the perspective of AI-DP has been lacking.
The aim of this oral presentation is to present an overview of how a fieldable AI-based digital pathology platform is being shaped to address the WHO TPP for STH and how the system is being tested against it.
The WHO TPP for STH was analysed to understand the diagnostic requirements. A proof of concept for an artificial intelligence-based digital pathology platform was then developed to meet these requirements, followed by the development of protocols for validation to ensure the system aligned with the TPP.
The diagnostic performance based on both the analytical results of the AI model and the clinical results from previous head-to-head tests are promising. Following the development of new protocols to validate the platform's requirements against the WHO TPP, field studies in resource-limited environments are now in-progress.
The presentation presents the development of a fieldable AI-based digital pathology platform aimed at meeting the diagnostic requirements outlined in the WHO TPP for STH. A protocolised method to achieve the TPP requirements has been defined. The system has shown promising diagnostic performance and has the potential to significantly improve parasite detection and quantification in low-resource settings.

Digital optical devices–A new development in parasite diagnostics

Track 2: Infectious diseases and (neglected) tropical diseases

Automated detection and staging of malaria parasites from cytological smears using a microscope, a mobile phone and machine learning

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Microscopic examination of blood smears, following staining with Giemsa, remains the gold standard for laboratory inspection and diagnosis of malaria. Smear inspection is, however, time-consuming and dependent on trained microscopists with results varying in accuracy.
We sought to develop an automated image analysis method/hierarchical methods to improve accuracy and standardization of smear inspection that retains capacity for expert confirmation and, critically, image archiving.
We developed a three-stage machine learning method that achieves red blood cell (RBC) detection, differentiation between infected/uninfected cells, and finally parasite life-cycle stage categorization, all from unprocessed, heterogeneous (multi-origin) Giemsa smeared images.
Based on a pretrained faster region-based convolutional neural networks (R-CNN) model for RBC detection, our model performs accurately (average precision of 0.99 at an intersection-over-union threshold of 0.5). Application of a residual neural network-50 model to infected cells also performs accurately (area under the receiver operating characteristic curve of 0.98). Finally, integrating a regression model successfully recapitulates intraerythrocytic developmental cycle with accurate lifecycle stage categorization.
Combined with a mobile-friendly web-based interface, called PlasmoCount, our method permits rapid navigation through and review of results for quality assurance. By standardizing assessment of Giemsa smears, our method markedly improves inspection reproducibility and presents a realistic route to both routine lab and future field-based automated malaria diagnosis.

Digital optical devices–A new development in parasite diagnostics

Track 2: Infectious diseases and (neglected) tropical diseases

Development & deployment of reliable AI based automated microscopy for field use: How close are we to reality?

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Rapid advances in miniaturization of optical systems, sensors and processors have enhanced research and development of digital and automated microscopes suitable for the detection of these diseases in resource-limited settings. Developed digital automated microscopes based on cell-phone, Raspberry pi and Jetson Nano technologies have demonstrated spatial resolution (1 μm) and system magnification of about (1×) sufficient to resolve target Schistosoma haematobium eggs in urine samples. Although the registered images clearly present the morphology of the target with a distinct characterization of the spines, field applicability of the device has suffered significant setbacks.
In this work, we aim to determine how close are we to reality in the development and deployment of reliable AI based automated microscopy in the detection of *S. haematobium* in endemic settings.
We collated and analysed the data obtained from the different iterations of the technical system development of the Schistoscope (an automated microscope for the diagnosis of Schistosomiasis) and the results obtained from the field testing of the developed devices in endemic settings. The limitation of the technical optics of cell phone microscopy and its influence on the achievable spatial resolution were compared with Raspberry pi and Jetson Nano based techniques. Computational complexities of the integrated AI algorithm and its implementation on general computers were analysed.

The control systems in the x, y and z dimensional plane of the integrated scanner and its applicability in field conditions were also reviewed. Besides the technical analysis, co-creation and usability research data gathered from field interactions with potential end-users were also analysed and quantify the efficiency of the deployment of automated microscopes in field settings.
We collated and analysed the data obtained from the different iterations of the technical system development of the Schistoscope (an automated microscope for the diagnosis of schistosomiasis) and the results obtained from the field testing of the developed devices in endemic settings. The limitation of the technical optics of cellphone microscopy and its influence on the achievable spatial resolution were compared with Raspberry pi and Jetson Nano based techniques. Computational complexities of the integrated AI algorithm and its implementation on general computers were analysed. The control systems in the x, y and z dimensional plane of the integrated scanner and its applicability in field conditions were also reviewed. Aside the technical analysis, co-creation and usability research data gathered from field interactions with potential end-users were also analysed and quantify the efficiency of the deployment of automated microscopes in field settings.
With the most recent field evaluation of the Schistoscope, it is safe to say that the realization of reliable AI based automated microscopy in the detection of *S. haematobium* in endemic settings is close to reality.

Contribution of multidisciplinary research to the equity and sustainability of social health insurance in Benin

Track 1: Planetary health and health systems

Evaluating the ownership and the implementation process of the ARCH health insurance in Benin: Methodological considerations

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In sub-Saharan Africa, most research and evaluations focus on the results of public health programmes. However, it is of utmost importance to better understand the processes at stake.
Our PhD research aims to evaluate the implementation process, including the gradual adaptation of the design of the ARCH insurance scheme, including its ownership by implementing stakeholders and beneficiaries.
We will conduct multiple case studies with several interlocking levels of analysis in order to gather the perceptions of beneficiaries and implementing actors. Data collection methods will include scientific and grey literature review, contextual observations, interviews and focus groups.
The theoretical framework developed by Carroll et al. in 2007 will be used to determine the level of fidelity and implementation gaps. Data analysis will be done using QDA Miner LTD mixed-mode software. Through a quantitative approach, we will determine the factors that influence implementation as well as the non-financial barriers limiting beneficiaries' access to care. Quantitative data will be collected through survey questionnaires and analysed using STATA software.
This evaluation study will generate evidence on implementation gaps, perceptions of different stakeholders, and factors that influence policy implementation. Its results will be useful to support policy decisions so as to improve and sustain health insurance in Benin.

Contribution of multidisciplinary research to the equity and sustainability of social health insurance in Benin.

Track 1: Planetary health and health systems

Equity in the health services expenditure and consumption in benin before the implementation of the ARCH

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Even following the implementation of its pilot phase since July 2019, little is known on the impact of the ARCH social health insurance on the wealth-related inequality in the utilisation of health services.
This piece of research is an empirical analysis of the state of equity in health care utilisation and health care expenditures before the implementation of the ARCH project.
This study uses data from the Demographic Health Survey (DHS) conducted in Benin in 2018 and measures inequalities in the use of maternal and child health services as well as other preventive care. Survey data are combined with administrative data on healthcare costs so as to measure inequalities in health care expenditure.
We first consider antenatal care, delivery in medical institutions, and postnatal care, along with HIV screening, blood pressure measurements, and four different vaccination uptakes. We then evaluate the average expenditure of individuals using reference prices. For all outcomes, we carry out an analysis of equity using the wealth index as a socio-economic variable to rank households from the poorest to the richest and applying well-known inequality indices such as the concentration index and the Erreygers index. We then decompose those indexes within contributing factors and compare the inequalities in health care use and expenses across various health care services, regions and wealth groups.

This study provides an overall picture of the magnitude of inequalities in health care across a large number of health care outcomes and the underlying global health care expenses in Benin before the implementation of the ARCH health insurance. It also reveals the population subgroups with catastrophic health care expenses that should be targeted by policy makers to close the gap between wealth quintiles in access to health services in order to achieve universal health coverage in Benin.

Contribution of multidisciplinary research to the equity and sustainability of social health insurance in Benin

Track 1: Planetary health and health systems

Health inequity in the three health districts of the pilot phase of ARCH: results from a household survey

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The ARCH project is aimed to cover the Beninese population that was not covered by a health insurance scheme before, that is, the poorest in the sectors of agriculture, commerce, transport, crafts, arts and culture, as well as inactive deprived people. At the time of the launch of the ARCH, in 2017, the "extreme poor" population were estimated at nearly 2.5 million and the "non-extreme poor" at nearly 1.9 million. A pilot phase of the health insurance scheme was launched in three health districts, namely Abomey-Calavi-Sô-Ava, Dassa-Glazoué and the Djougou-Ouaké-Copargo, in 2019.
To measure perceptions over and utilisation of healthcare services among ARCH target populations.
This cross-sectional field survey will be conducted among a representative sample of the population of the three health districts that were part of the pilot ARCH health insurance scheme. A representative sample will be estimated using Schwartz formula. The study will be carried out using a one-time structured questionnaire organised into sections dealing with household income and wealth, household expenditure, public health issues, access to care, quality of care, satisfaction, child health, and reproductive health.
The survey will enable to collect information, on the one hand, on the perceptions of beneficiary populations on their health status, access to healthcare, use of health services and quality of care; and, on the other hand, on the outcomes of healthcare, such as improved health literacy in relation to life circumstances.
This field survey will consist in the baseline of our broader research project, enabling to measure whether the ARCH health insurance has reached its objective of reducing inequities in healthcare.

Contribution of multidisciplinary research to the equity and sustainability of social health insurance in Benin

Track 1: Planetary health and health systems

What funding for the ARCH social health insurance in Benin?

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The Beninese health system is an institutional organisation characterised by a dominant role of the public sector. The development of the State-sponsored social health insurance is facing not only institutional and legal challenges, but also a major financing challenge in terms of ability to mobilise sufficient resources without jeopardizing neither the fiscal position of the government, nor the continuous funding of other health and social priorities.
This study aims to identify the possible resources (fiscal space) that can be mobilised to finance the ARCH health insurance scheme in the light of Benin's financial, budgetary and fiscal laws.
The study is based on a review of health policy, public finance and fiscal documents from Benin and elsewhere.
A comparative analysis will be made to define the optimal financing regime for Benin. In particular, the pros and cons of an earmarked tax system to finance the ARCH social health insurance will be discussed.
The funding mechanism of the ARCH health insurance scheme need to be adapted to the country's institutional but also socio-political context.

Border violence, detention and pushbacks in Europe: Determinants of health?

Track 1: Planetary health and health systems

Pushback practices and violence towards migrants crossing European borders: A systematic review

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The phenomenon of pushbacks has been increasingly documented by NGOs, human rights institutions, media and health practitioners across European borders, presenting a dire threat to the health, well-being and right to life of migrants. Pushbacks refer to various measures taken by States that force people back over a border without consideration of their individual circumstances, any possibility to apply for asylum, and any access to assistance including emergency medical care. Many international and European institutions have already stated that pushbacks are a denial of a state's obligation to protect the human rights of people seeking international protection at national borders. There is no shortage of media and NGO reports on incident events of pushbacks. However, there is a lack of consolidated reports which systematically compile, evaluate and synthesize the range of health consequences of the use of violence and pushbacks towards migrants who are crossing borders as part of securitization of immigration and border policies.

The aim of this systematic review is to synthesize from a health perspective the effects of use of violence (including physical, sexual, psychological and structural) towards migrants crossing borders in relation to pushback practices in the European context. It further seeks to obtain an evidence-informed estimate of the magnitude of pushbacks considering the diversity of practices, and to compile an overview of methods and digital technologies that are used to monitor such violence in support of health and integration.

A systematic search of peer reviewed articles published after December 2009 was conducted using English search terms in three databases, Web of Science Core Collection (WoS), PubMed/Medline and APA Psychinfo via EBSCOhost. The systematic search will be complimented by a grey literature search using Google search engine and search terms in additional relevant languages (English, German, French, Spanish, Italian, Greek, and Arabic) to include reports, policy briefs, newsletters, and other relevant documents from credible sources such as national and international humanitarian and human rights organizations (including volunteer networks), journalists, and governments. The search output was screened independently in duplicate using pre-defined eligibility criteria: (1) migrants as the main study population, (2) in a European context, (3) border management /policies /practices and the consequent violence as the exposure variable, and (4) health impacts or health service utilization as outcome variables. All grey literature, media and press publication underwent a quality assessment using the AACODS2 Checklist to examine reputability, validity, and credibility: only the articles with positive assessment results were considered for inclusion. Synthesis was performed following data extraction and quality appraisal. Reporting followed PRISMA guidelines. The review protocol is registered in PROSPERO (CRD42022369975). Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022369975

Results will be available by November 2023.

This report will provide a systematic overview of how, where, and to which extent violent border pushbacks in Europe have contributed to undue injuries, trauma, mental health, and loss of life among people on the move. The synthesised knowledge will help to identify any gaps in the evidence base and to hold the European Union (EU) and its member states into account in order to ensure that health and human rights are respected as integral part of EU border policies.

Improving practical training opportunities for students and young professionals interested in tropical medicine

Track 2: Infectious diseases and (neglected) tropical diseases

Awareness and perceptions of medical students and doctors regarding tropical medicine education and training in Europe: An international, online-based survey

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With increases in global migration, climate change, and a rapid spread of communicable diseases and antimicrobial-resistant organisms across borders, there is undeniably a substantial increasing demand for more Tropical Medicine-trained doctors in Europe. However, there has not been a comprehensive analysis of university curriculum nor postgraduate training concerning Tropical Medicine in the European region.

To contribute to the discussion on revision and harmonization of training schemes, and to identify opportunities for improving education and training, FESTMIH and EMSA jointly circulated a survey in the WHO European Region to evaluate the current and desired state of the subject.

An open online survey was circulated to medical students and doctors in Europe between April and June 2021.

Significance tests and a thematic analysis of the data were conducted.
Five hundred respondents (285 students and 215 doctors) from 27 countries were included. Only 17.2% of the doctors were unsure whether postgraduate training in Tropical Medicine was available in their country. A 20% of students and 10.7% of doctors said they were unsure whether they had been taught Tropical Medicine during university. A 67.7% of students and 79.1% of doctors stated that the amount of Tropical Medicine training they encountered was or had been "not enough".
Respondents demonstrated great interest in Tropical Medicine. Their self-reported knowledge, awareness and perceived competence were partly dependent on whether there is specific teaching accessible at the university. There is a pressing need for harmonized curricula and expanded postgraduate training to improve Tropical Medicine competencies across Europe.

Advances and potential of CAA detection for schistosomiasis diagnosis in non-endemic and endemic settings

Track 2: Infectious diseases and (neglected) tropical diseases

Experience with CAA detection in travel medicine in Italy

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Assessment of active infection with Schistosoma spp is of paramount importance, especially outside endemic areas, where re-infection cannot occur. In this context, persistence of active infection due to missed diagnosis or incompletely effective treatment exposes patients to avoidable disease progression and complications, and poses a public health risk of (re)introduction of infection in regions with suitable ecological conditions.
This presentation will illustrate the results of two studies carried out at IRCCS Sacro Cuore Don Calabria Hospital in Negrar, northern Italy, one investigating the performance of UCP-LF CAA test for the post-treatment follow-up of schistosomiasis in migrants and one parallel study evaluating the evolution of urinary bladder lesions after treatment in patients with *S. haematobium* infection.
In the first study, the performance of urine/faeces microscopy, two commercial serology tests (ELISA and ICT), and UCP-LF CAA was assessed on a cohort of 23 "confirmed" cases (positive microscopy and/or PCR) and 25 "possible" cases (serology-positive only) at diagnosis and at least at one follow-up visit at 6 or 12 months after praziquantel treatment. In the second study, 21 patients with confirmed *S. haematobium* infection (13 of whom also included in the cohort of the first study) were evaluated by US at diagnosis and at 1, 3, 6, 12, and 24 months after treatment with praziquantel.
In the first study, when compared to microscopy, ICT and ELISA showed 100% and 82.6% sensitivity, respectively. UCP-LF CAA was positive in 86.9% confirmed and 20% possible cases. Percentage positivity and median CAA levels decreased significantly post-treatment, with only two patients having positive CAA levels at T12. Percentage seropositivity and median antibody titers did not change significantly during follow-up. In the second study, all patients with bladder lesions on enrolment (10/21) had their lesion completely regressed by 6 months and no new development/re-appearance was observed.
Contrary to serology, the UCP-LF CAA test showed high accuracy for the diagnosis of active infections, with significant and rapid decrease over time after treatment. CAA-based tests could be the optimal tools to: (i) diagnose accurately active infection (thus avoiding overtreatment of patients not requiring parasitological cure as well as misdiagnosis of patients with low parasite burden not captured by current diagnostics), (ii) evaluate treatment effectiveness shortly after therapy (needed especially for highly mobile patients groups such as migrants and in the research context to assess efficacy of different treatment regimes), and (iii) aid evaluation and clinical management of complications (e.g., bladder lesions in patients with negative parasitological tests)

Advances and potential of CAA detection for schistosomiasis diagnosis in non-endemic and endemic settings

Track 2: Infectious diseases and (neglected) tropical diseases

Comparing CAA detection to worm-based diagnostics for determining PZQ efficacy in endemic settings

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Efficacy of praziquantel (PZQ) for the treatment of schistosomiasis is usually assessed by classical microscopic detection of parasite eggs in stool or urine. Due to low sensitivity, especially in case of low-intensity infections, the prevalence of infection is underestimated leading to an overestimated cure rate (CR) when using these methods.

In a repeated treatment trial, the efficacy of one versus four repeated PZQ treatments, given at 2-week intervals, was investigated in school-age children from Côte d'Ivoire by applying a range of diagnostic methods, including traditional microscopy as well as more sensitive DNA and circulating antigen detection methods.
Our results demonstrate that PZQ efficacy measurements vary based on the diagnostic method used: while egg-based diagnostics (stool microscopy and DNA detection methods) show an improved CR after repeated treatment, the CR determined by worm-based diagnostics (CAA and POC-CCA detection) remained poor over time. Although all four diagnostic methods showed a significant reduction in intensity of infection already after a single treatment, more accurate antigen diagnostics revealed that, in most cases, worms remain present even after multiple treatments.
Hence, using accurate diagnostic tools is essential to determine the true infection status and to monitor and evaluate treatment programs.

Advances and potential of CAA detection for schistosomiasis diagnosis in non-endemic and endemic settings

Track 2: Infectious diseases and (neglected) tropical diseases

Monitoring and evaluation of *Schistoma mansoni*: Modelling the link between circulating antigens and presence of worms

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Classical parasitology in the form of Kato-Katz (KK) is currently the recommended diagnostic tool for monitoring and evaluation (M&E) of schistosomiasis. Given the wide use of KK, the implications of KK-based survey results for policy are reasonably well understood, as well as their limitations (e.g., low sensitivity to detect low intensity infections). For antigen-based diagnostics, these insights are still developing. In this study, we analyse individual-level field data on KK and circulating anodic antigen (CAA) to evaluate how CAA-based survey results can be interpreted for control programme decisions.
In this study, we analyse individual-level field data on KK and circulating anodic antigen (CAA) to evaluate how CAA-based survey results can be interpreted for control programme decisions.
We modelled the CAA and KK data via a mechanistic model describing the link between adult worm pairs on one hand, and CAA and KK results on the other hand. Model parameters for variability in KK results were informed by a separate dataset on seven repeated sets of duplicate KK from 200 Burundian individuals. Conditional on the KK variance partitioning, and the assumed link between KK results and true worm counts as used in current mathematical models (0.34 eggs per worm pair per KK slide), we estimated the link between CAA and adult worms.
The sensitivities of single and duplicate KK to detect a single adult worm pair were in the order of 20%–40% and 40%–60%, respectively. Two single KK slides based on two separate faecal samples only outperformed duplicate KK for infections with at least four worm pairs. Compared to KK, the sensitivity of CAA to detect a single worm pair was similar to or even better than two repeated duplicate KK. Furthermore, the sensitivity of CAA increased more quickly with the number of worm pairs, quickly saturating at values in range of 90%–100%.
We will close by illustrating how based on the estimated performance of CAA, we use mathematical models and simulation models to optimise the design of CAA-based survey for decision-making in control programmes.

Advances and potential of CAA detection for schistosomiasis diagnosis in non-endemic and endemic settings

Track 2: Infectious diseases and (neglected) tropical diseases

Quality control aspects for CAA diagnostics

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Over the years several studies have shown that innovative new diagnostic methods, for which an excellent performance in sensitivity and specificity in research laboratory settings were demonstrated, performed substantially worse in clinical practice. This has been shown for both microscopic and real-time PCR methods to detect blood and intestinal parasites.
External quality assessment schemes (EQAS) are inter-laboratory studies in which stable and homogeneous samples are distributed for analyses by routine diagnostics. The resulting interlaboratory comparison allows evaluation of the performance a test in real clinical practice and allows detection of poor performing laboratories that then can improve their methodology. For a quantitative assay, such as the UCP-LF CAA, control by EQAS is even more important. Requirements and costs for the development and execution of an UCP-LF CAA EQAS will be presented.

Advances and potential of CAA detection for schistosomiasis diagnosis in non-endemic and endemic settings

Track 2: Infectious diseases and (neglected) tropical diseases

Developing of a point-of-care CAA test

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The World Health Organization (WHO) schistosomiasis control strategy focuses on large-scale treatment campaigns. Whilst these have successfully reduced the global burden of disease, the lack of adequate diagnostic tools for precision mapping has limited the efficiency and effectiveness of such campaigns.
To address this gap, FIND and its partners are developing a simple, accurate and affordable schistosomiasis rapid diagnostic test that detects circulating anodic antigen (CAA) which would support both precision mapping and monitoring and evaluation activities.
While a laboratory-based test (UCP-LF CAA assay) is available, it is not suitable for field implementation as it requires sample processing and a reader for detection. A point-of-care test would require only a drop of blood from a finger prick and allow bringing CAA testing out of the laboratory and into community settings, where community health workers can use it with minimal training. Large field evaluation studies of the prototype rapid diagnostic test are planned later this year, but this talk will focus on the journey of the diagnostic development so far and what remains to be done before it can be implemented in endemic countries.

Children on the move refugee children in Europe: Adequate and timely responses to specific health care needs

Track 1: Planetary health and health systems

Refugee children in Europe: Adequate and timely responses to specific health care needs

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Due to the worldwide increase in forcibly displaced people, the European countries are facing challenges in provision of timely, adequate and appropriate health care for refugees. Refugee children have increased health risks. Unfavourable conditions in their home countries, the flight and the uncertainty in the reception countries are factors influencing their health, perceived health and access to health care. Addressing these health risks and barriers is access to care is of key importance to improve the health status of refugee children.
The aim is to improve the health status of refugee children and improve the access to care.
Methods: Three studies were done prior the development of a National Guideline for the Medical and Psychosocial Care for Refugee Children in The Netherlands.
1. Results of the Dutch Surveillance System on Refugee Children: barriers in access to care for refugee children reported by Paediatricians
2. Systematic review on the Health Status of refugee children
3. The perspectives of refugee parents and minors on Initial Health Assessment
Results: Based on the data from the three studies a National Guideline was developed.
Based on the data from the three studies a National Guideline was developed, as well as an Expertise Centre for Children and Adolescents New to the Netherlands (ECANN). An screening of all refugee children upon entry and a tailored approach focussing on individual needs to the refugee child is promoted. Early detection of health needs results in better access to care. Frequent transfers to several asylum seekers' centres are a challenge in the continuity of care, especially for children with complex health care needs.
Refugee children have specific health care needs requiring specific expertise. Early detection and diagnosis leads to better provision, access and adherence to the health care system. A tailored approach is feasible. The health care system in the Netherlands is not ready to cope with the challenging for refugee children. And courage is needed to adapt to the specific health care challenges for refugee children.

Children on the move Refugee children in Europe: Adequate and timely responses to specific health care needs

Track 1: Planetary health and health systems

Cross cultural health team for children and adolescents in Denmark

Alexandra Kruse
Refugee children have specific health needs

To improve the health care for refugee children
A cross cultural health team was established.
We share our experiences and preliminary data setting up the cross cultural health team for children and adolescents in Denmark.
The why, whom, what, how was a challenge in the establishment of the cross cultural health team.
Children on the move Refugee children in Europe: Adequate and timely responses to specific health care needs

Track 1: Planetary health and health systems

Improving tuberculosis (TB) care for children in the context of migration: A project evaluation

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The recent surge in global migration has presented receptor countries with the formidable challenge of providing accessible and appropriate care for refugees, particularly children. In line with the implementation of the Protection against Infection Act, most newly arrived migrants undergo screening for TB infection, typically through chest x-rays, while younger children are assessed using Quantiferon or Tuberculin tests. However, the Public Health Department of Munich has encountered difficulties in effectively directing

children with suspected TB infection to specialized care, resulting in delays in diagnostic procedures and treatment initiation. Conversely, clinicians at the paediatric infectious diseases department of the Dr von Haunerschen children's hospital in Munich have faced obstacles in delivering timely care to this patient population. These challenges stem from escalating demand, inadequate staffing and the absence of migrant-tailored structures, including access to professional translators and social support networks. Hence, developing novel strategies to streamline the referral process, establishing linguistic and cultural support systems, and fostering collaboration between healthcare providers and public health authorities are critical steps toward enhancing the overall management of TB in this vulnerable population.

The primary aim of this project is to improve the quality of care provided to children with TB exposure and infection in the context of migration.

The PMPH was established in March 2023 through a shared doctor position between the public health authorities and the paediatric infectious diseases department. The doctor splits their time between the two entities, conducting two dedicated paediatric tuberculosis consultations twice a week.

The project implementation had several positive outcomes, including improved patient access to care, enhanced collaboration between clinicians and public health authorities, and the initiation of social and health support initiatives. The establishment of a culture-sensitive environment and access to translators played a crucial role. The time for the first consultation decreased, enabling early examinations, chemoprophylaxis and prevention. Collaborative research projects were initiated with primary care paediatricians focused on TB assessment in this setting. Lastly, cooperation with specialized mental health institutes adapted to the migrant context was established, which enabled clinicians to address underlying disturbances.

The project successfully enhanced care for migrant children with tuberculosis, improving access to specialized care, collaboration between institutions, and creating a culturally sensitive environment. In addition, the project generates a valuable context for clinical and public health research in the field of paediatric tuberculosis and migrant child health.

Children on the move refugee children in Europe: Adequate and timely responses to specific health care needs

Track 1: Planetary health and health systems

Timely assessment of psychosocial problems in refugee minors

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An unprecedentedly large number of people worldwide are forcibly displaced, of which more than 40% are under 18 years of age. Forcibly displaced children and youth have often been exposed to stressful life events and are therefore at increased risk of developing mental health issues. Hence, early screening and assessment for mental health problems is of great importance, as is research addressing this topic. However, there is a lack of evidence regarding the reliability and validity of mental health assessment tools for this population.

The present study synthesised the existing evidence on psychometric properties of patient reported outcome measures [PROMs] for assessing the mental health of asylum-seeking, refugee and internally displaced children and youth and elaborated this in a practical tool for youth care professionals.

Systematic searches of the literature were conducted in four electronic databases: MEDLINE, PsycINFO, Embase and Web of Science. The methodological quality of the studies was examined using the COSMIN Risk of Bias checklist. Furthermore, the COSMIN criteria for good measurement properties were used to evaluate the quality of the outcome measures.

The search yielded 4842 articles, of which 27 met eligibility criteria. The reliability, internal consistency, structural validity, hypotheses testing and criterion validity of 28 PROMs were evaluated.

Based on the results with regard to validity and reliability, as well as feasibility, we recommend the use of several instruments to measure emotional and behavioural problems, PTSD symptoms, anxiety and depression in forcibly displaced children and youth. The tool for youth care professionals was developed in order to support implementation. Subsequently, the applicability of these questionnaires in the youth care was investigated during a pilot study. Most youth care professionals were satisfied with the toolkit and found the questionnaires a useful addition. Parents and children were also mostly satisfied with them. For example, one Syrian adolescent said: "This way people can know how I really feel, even if I can't express it in words."

Children on the move refugee children in Europe: Adequate and timely responses to specific health care needs

Track 1: Planetary health and health systems

Guideline for paediatric care of refugee children, network for multidisciplinary approach for refugee children

Sara Sahba[1]
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Based on recent scientific research, it is known that refugee children have increased health risks, partly due to their origin and (flight) history but also because of challenges within the organization of healthcare in the Netherland. This data provided important insights into what is necessary to optimize healthcare for refugee children in the Netherlands. It led to the development of the Guideline for Paediatric Care

of Refugee Children and the foundation of the Expert Centre for Children and Adolescents New to the Netherlands (EKANN).
The mission of EKANN is to optimize the care for refugee children with health needs in the Netherlands
Between 2015 and 2020, paediatricians from all over the Netherlands made over 200 reports on bottlenecks in the care for refugee children through the former Dutch Signalling Center for Paediatrics. The data were analysed.
Important findings were that the transfer of knowledge and records between the different stakeholders involved in healthcare of refugee children is lacking, and that there was a need among health care providers to share experiences and knowledge about the health risks and care for refugee children. The Guideline for Paediatric Care of Refugee Children in the Netherlands provides know-how for paediatricians on the organization of healthcare for refugee children in the Netherlands and evidence-based knowledge to conduct tailored newcomer assessments for a refugee child. The specific services established for this purpose include an advice and report centre for medical doctors, education aimed at knowledge on health and healthcare of refugee children, research into challenges within healthcare, and regional networks of healthcare professionals taking a multidisciplinary approach to optimize care for refugee children locally. Thus far, over 54 cases were reported to EKANN, in some cases we were able to provide essential advice and coordination to prevent adverse outcomes. Furthermore, two regional networks have been established consisting of paediatricians, youth doctors and primary care doctors."
By taking an action-based approach, we were able to positively impact health care for refugee children in the Netherlands. Still, there is much to improve. The publication of the Guideline for Paediatric Care of Refugee Children. The foundation of EKANN and establishment of regional multidisciplinary networks are the first steps towards inclusive healthcare in which health risks of refugee children are adequately recognized and reduced by healthcare professionals.

How to scale up novel health interventions? An emerging field

Track 1: Planetary health and health systems | Track 2: Infectious diseases and (neglected) tropical diseases | Track 4: Mental health

Scalability of novel psychological interventions for refugees: A multiple case study

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Globally many people are suffering from poor mental health, with conflict-affected populations like refugees particularly affected. Training nonspecialists in providing evidence-based psychological interventions (i.e., task-sharing) and e-mental health interventions may offer innovative means to increase access to psychological support and improve the mental health of refugees. However, there is limited knowledge about how these innovations can be scaled up and integrated sustainably into routine services.
This PhD research examined the scalability of three novel psychological interventions for refugees in five different countries: a digital intervention called Step-by-Step (evaluated in Egypt, Germany and Sweden) and a face-to-face intervention called Problem Management Plus, including an individual and group version (evaluated in the Netherlands and Jordan).
A multiple case study design was used. Semi-structured interviews ($n = 145$) were conducted with individuals knowledgeable about the interventions and health systems for refugees in these contexts. Data collection and analysis were guided by a 'system innovation perspective'. This study conceptualized the context as landscape developments, and systemic considerations were divided into culture (shared ways of thinking) and structure (ways of organizing).
Numerous interrelated factors and actors influencing scalability were identified, which indicates that embedding these novel interventions into routine services will be a complex task, requiring multi-stakeholder collaboration. Many similarities in influencing factors were identified across case studies, but also some differences, with integration scenarios unique to the context.
The integration scenarios identified in this research need to be tested, evaluated, refined and reported in future implementation research.

How to scale up novel health interventions? An emerging field

Track 1: Planetary health and health systems | Track 2: Infectious diseases and (neglected) tropical diseases | Track 4: Mental health

Factors influencing the scale-up of TB interventions: Insights from TB REACH-funded projects in Nigeria and Kenya

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TB REACH-funded projects test and evaluate innovative short-term interventions for TB prevention, detection and care. The challenge of scaling-up small but effective interventions is a well-known phenomenon in global health, including TB programs. There is insufficient understanding regarding the process, and the multiple agents and

factors involved in sustaining and expanding such interventions.
The aim of this study was to improve the understanding of barriers and enablers that influence scale-up.
We adopted an embedded multiple case study design and purposively selected eight TB REACH funded projects: four in Nigeria, four in Kenya. A desk study was performed reviewing both project reports and quantitative data analysed using the TB REACH monitoring and evaluation framework. Primary qualitative data was collected via 14 semi-structured interviews guided by the WHO/ExpandNet framework for scaling-up, and was analysed thematically. Case studies were initially analysed independently. Subsequently, all were compared to draw cross-case conclusions.
Four of the eight cases had their activities partially or fully scaled-up. Although five projects demonstrated quantitative effectiveness using trends in TB notifications and the yield of interventions, two were not funded for scale up. One project that showed negative trends in notifications was however taken to scale. The qualitative analysis revealed that the process of scaling-up TB REACH funded interventions is context-sensitive and not based on results and impact alone. Demonstrating quantitative success from empiric results seemed to be less important than having the right relations, both with the TB programs and donors, as well as the larger community. In addition, dedicated funding, the compatibility of the interventions with the local TB program structures, sufficient time, and longer-term vision for scaling-up played key roles.
Scaling-up small-scale public health interventions is a difficult and not fully comprehended process. To optimize opportunities for scale-up, projects must leverage on contextual opportunities and mitigate potential barriers.

How to scale up novel health interventions? An emerging field

Track 1: Planetary health and health systems | Track 2: Infectious diseases and (neglected) tropical diseases | Track 4: Mental health

Lessons from scaling up a district health management strengthening intervention in Ghana, Malawi and Uganda

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The scale-up of health system strengthening interventions is essential to achieve Universal Health Coverage. It is widely acknowledged that there is a need to scale up such interventions to ensure equitable access to health car. How to scale up is, however, not straightforward.
This study aims to understand how scale-up of health system strengthening interventions in LMICs can be achieved to contribute to realizing Universal Health Coverage.
The study used a qualitative research approach, combined with a literature review. The qualitative component of the study used a case study approach. It focused on how the scale-up of a district-level health management strengthening intervention took place in Ghana, Malawi and Uganda, and which factors influenced the process.
It is challenging to achieve sustainable scale-up of health systems strengthening interventions in LMICs through donor-funded, solution-driven projects. Such projects, implemented in weak health systems contexts in LMICs, might contribute to reaching larger groups, or introduce new ways of working at a larger scale if the scale-up approach is contextualized, ownership by local user organizations is assured, and there is a clear scale-up strategy. Fully integrating complex interventions in a health system in a sustainable way is challenging, as dealing with or influencing the existing system is difficult, especially within short timelines with limited space for flexible approaches.
Through learnings from scaling-up a management strengthening intervention, the thesis proposes that a systems change perspective could represent a different way in which the scale-up of complex health system strengthening interventions can potentially be achieved and sustained.

Cost-efficient monitoring and evaluation of soil-transmitted helminths control programs.

Track 2: Infectious diseases and (neglected) tropical diseases

Moving from diagnostic test performance to cost-efficient survey design for decision-making in STH program

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Monitoring and evaluation (M&E) for decision-making in control programs against neglected tropical disease relies on a good understanding of what a diagnostic test measures and how uncertain those measurements are. However, for the longest time, the thinking about M&E design has been dominated by diagnostic test performance without much consideration for the extent to which a diagnostic test combined with a particular survey design can actually inform policy decisions. In addition, for helminth infections, discussions and our thinking about the value of surveys based on classical parasitological tests often halts at the point of diagnostic performance in terms of sensitivity, which is known to be low in low endemic areas. However, despite its limited sensitivity for detecting low intensity infections, classical parasitology can still be a very cost-efficient tool for M&E in control programmes. This requires consideration of survey design in terms of its bias, precision, as well as the feasibility and cost to perform

it. Comparisons of different diagnostic and survey strategies should therefore also ideally be compared based on cost-efficiency.
Using the case of soil-transmitted helminths (STH) and schistosomiasis (SCH), we will discuss a framework to evaluate combinations of diagnostic and survey strategies for drug efficacy monitoring and decision-making in control programs.
We will consider both classical and newer egg counting techniques, as well as tests for the detection of antigens. In addition, we will consider cost related to conducting a survey, including material costs as well as context-specific costs for personnel and transport. Importantly, the framework considers how diagnostic test performance for helminth infections changes dynamically with the intensity of infection in individuals.
The current survey designs for drug efficacy monitoring recommended by the World Health Organisation are suboptimal and yield biased results.
The review of the current WHO-recommended survey design for drug efficacy monitoring is warranted (an update of the guidelines is ongoing).

Cost-efficient monitoring and evaluation of soil-transmitted helminths control programs.

Track 2: Infectious diseases and (neglected) tropical diseases

Comparison of coproprevalence and seroprevalence to guide decision-making in national soil-transmitted helminthiasis control programs: Ethiopia as a case study

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WHO recommends periodical assessment of the prevalence of any soil-transmitted helminth (STH) infections to adapt the frequency of mass drug administration targeting STHs. Today, detection of eggs in stool smears (Kato-Katz thick smear) remains the diagnostic standard. However, stool examination (coprology) has important operational drawbacks and impedes integrated surveys of multiple neglected tropical diseases.
Therefore, the aim of the present study was to assess the potential of applying serology instead of coprology in STH control program decision-making.
An antibody-ELISA based on extract of Ascaris lung stage larvae (AsLungL3-ELISA) was applied in ongoing monitoring activities of the Ethiopian national control program against schistosomiasis and soil-transmitted helminthiasis. Blood and stool samples were collected from over 6700 students (median age: 11) from 63 schools in 33 *woredas* (districts) across the country. Stool samples of two consecutive days were analysed applying duplicate Kato-Katz thick smear.
At *woreda* level, qualitative (seroprevalence) and quantitative (mean optical density ratio) serology results were highly correlated, and hence seroprevalence was chosen as parameter. For 85% of the *woredas*, prevalence based on serology was higher than those based on coprology. The results suggested cross-reactivity of the AsLungL3-ELISA with Trichuris. When extrapolating the WHO coproprevalence thresholds, there was a moderate agreement (weighted $\kappa = 0.43$) in program decision-making. Using the same threshold values would predominantly lead to a higher frequency of drug administration.
This is the first time that serology for soil-transmitted helminthiasis is applied on such large scale, thereby embedded in a control program context. The results underscore that serology holds promise as a tool to monitor STH control programs. Further research should focus on the optimization of the diagnostic assay and the refinement of serology-specific program decision-making thresholds

Cost-efficient monitoring and evaluation of soil-transmitted helminths control programs.

Track 2: Infectious diseases and (neglected) tropical diseases

Development and execution of high throughput qPCR based detection of STH–Lessons for scaling up

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There has been significant expansion of deworming programs for prevention and control of morbidity associated with STH. This has led to low prevalence and mostly light-intensity infections in several endemic areas where conventional microscopy-based methods (recommended for parasitological surveys) would have poor sensitivity
To evaluate ongoing programs and interventions in endemic communities using DNA.
To evaluate ongoing programs and interventions in endemic communities, highly sensitive detection methods are required. DNA detection based methods rather than sub-optimal microscopy based methods that rely on morphology are more sensitive and specific, allowing for both quantitation and species discrimination but implementation at scale in low resource settings needs to be demonstrated.
While different pre-processing steps, DNA extraction methods, and nucleic acid detection methods have been described for STH, they are of limited throughput. Using the

example of Deworm3, the implementation of high throughput automated extraction and multiplexed qPCR for STH in a LMIC setting (India) with significant investments in specialized equipment, infrastructure, training and thorough standardization will be described along with the QA/QC steps taken for the laboratory and data management aspects. This platform offers the opportunity to accurately, effectively and independently monitor and validate progress towards the targets in the road map for STH in defined, appropriate settings.

Cost-efficient monitoring and evaluation of soil-transmitted helminths control programs.

Track 2: Infectious diseases and (neglected) tropical diseases

Development and validation of an AI-based method for detection of soil-transmitted helminths

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Soil-transmitted helminths (STHs) are parasitic worms that infect millions of people in low- and middle-income countries, especially in remote and resource-poor areas. Diagnosis and monitoring of STH infections traditionally rely on labour-intensive and time-consuming microscopic examination of stool samples, which can be challenging in remote field settings with limited access to laboratory facilities and trained personnel. In recent years, artificial intelligence (AI) has shown great potential in revolutionizing the diagnosis and management of various diseases, including parasitic infections.

This study describes the development and validation of an AI model for STH infections in re-mote field settings.

The model is based on deep learning algorithms and trained using a large dataset of digital images from stool-based samples prepared using the Kato Katz technique. We demonstrate how an AI model can be optimized for precision or recall, with the aim of achieving accurate and cost-effective diagnosis of STH infections.

The model was tested on a set of whole slide images collected from field settings, and the results were compared to a ground truth based on manual mark-up of the images. The AI model demonstrated high accuracy in detecting STH infections and the ability to differentiate between different types of STHs, including *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworm. The model showed a mean average precision (mAP) across all classes of over 90%.

In conclusion, the development and validation of an AI model for STH infections in remote field settings has the potential to revolutionize the diagnosis and management of parasitic infections in resource-poor areas. An AI model has potential to provide rapid and accurate results, reduce the burden on laboratory resources and improve patient outcomes. Further studies are needed to validate the model in different field settings and to explore its performance and cost-effectiveness in clinical use.

Cost-efficient monitoring and evaluation of soil-transmitted helminths control programs.

Track 2: Infectious diseases and (neglected) tropical diseases

Cost-efficient survey designs for monitoring and evaluation of soil-transmitted helminths control programs

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To monitor and evaluate soil-transmitted helminth (STH) control programs, the World Health Organization (WHO) recommends screening stools from 250 children across 5 schools, deploying Kato-Katz thick smear (KK). However, it remains unclear whether these recommendations are sufficient to make adequate decisions about stopping preventive chemotherapy (PC) (prevalence of infection <2%) or declaring elimination of STH as a public health problem (prevalence of moderate-to-heavy intensity (MHI) infections <2%).

Determine the cost-efficient survey design for stopping preventive chemotherapy or declaring elimination of soil-transmitted helminths as a public health problem

We developed a simulation framework to determine the effectiveness and cost of survey designs for decision-making in STH control programs, capturing the operational resources to perform surveys, the variation in egg counts across STH species, across schools, between and within individuals, and between repeated smears. Using this framework and a lot quality assurance sampling approach, we determined the most cost-efficient survey designs (number of schools, subjects, stool samples per subject, and smears per stool sample) for decision-making.

For all species, employing duplicate KK (sampling 4 to 6 schools and 64 to 70 subjects per school) was the most cost-efficient survey design to assess whether prevalence of any infection intensity was above or under 2%. For prevalence of MHI infections, single KK was the most cost-efficient (sampling 11 to 25 schools and 52 to 84 children per school).

KK is valuable for monitoring and evaluation of STH control programs, though we recommend to deploy a duplicate KK on a single stool sample to stop PC, and a

single KK to declare the elimination of STH as a public health problem.

Maternal health and non-communicable disease in low- and middle-income countries (LMICs)

Track 3: Non-communicable diseases

Maternal health and non-communicable disease in low- and middle-income countries (LMICs)

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An increasing body of knowledge strongly suggests associations between prior pregnancy complications and subsequent development of chronic non-communicable diseases later. In particular, a group of pregnancy complications generally referred to as the 'Maternal Placental Syndromes (hypertensive disorders in pregnancy, abruptio placenta, low birth weight/small for gestational age and gestational diabetes) are known to be strong predictors of poor long-term health of women from type II diabetes, cardiovascular diseases, metabolic syndrome and chronic kidney diseases. This creates double epidemiological disease burden in many LMICs from persisting infectious diseases coupled with rising non-communicable diseases prevalence. Although investigation and management into the relationship between maternal complications and future chronic diseases are beginning to receive attention in several High-income Countries (HICs), they are not yet priorities for policymakers in LMICs. In this proposal, we look into the current state of affairs in relation to previous hypertensive disorders in pregnancy, non-communicable diseases and their management under the following themes: (a) Association between previous hypertensive disorders in pregnancy and non-communicable diseases in LMICs; (b) Current efforts in preventing, detecting and managing non-communicable diseases following hypertensive disorders in pregnancy; (c) Recommendations and future research needs.

To discuss current evidence in prevention, management and future research needs in relation to hypertensive disorders in pregnancy and links to non-communicable diseases in low- and middle-income countries (LMICs).

We will conduct a systematic review to obtain current evidence on association between maternal health (specifically the hypertensive disorders in pregnancy) and chronic non-communicable diseases at relates to our themes of interest. We will search the following electronic bibliographic databases: PubMed/MEDLINE (MeSH terms and tiab searches), Embase and Cochrane Library for relevant articles using terms related to hypertensive disorders in pregnancy, non-communicable diseases, detection, management, recommendations, future research and low- and middle-income countries. Searches will be restricted to publications in English and articles published within the last 10 years (2013–2023) to reflect current practice and recommendations. No other restrictions will be applied. References of included articles will be assessed for eligibility. All relevant clinical and public health guidelines, prospective and retrospective cohort studies, case-control studies, cross-sectional studies and reviews that reported on hypertensive disorders in pregnancy and chronic non-communicable diseases will be analysed. Studies and reviews that reported on chronic non-communicable diseases and maternal health complications other than hypertensive disorders in pregnancy will be excluded. Reports retrieved from different search engines will be combined in Endnote to check against duplication. Titles and abstracts of studies retrieved from the search strategy will be screened using Rayyan software, as well as their references for additional sources. Two independent reviewers will screen all articles by title and abstract for inclusion and exclusion criteria. Any discrepancy between the two reviewers in this process will be discussed and full text accessed if necessary for further clarification. Full texts of eligible articles will be retrieved and assessed by one member of the review team per thematic area. Data extraction will be through a standardized data extraction-form designed based on predetermined objectives. Extraction will be done by a single reviewer, per theme, who will not be blinded for journal or author details. When results are published multiple times, the data will be used only once based on the most complete available resource. Lack of clarity during the extraction process will be resolved by consulting the second reviewer, and if necessary, other member of the research team. In case of incomplete data, one attempt will be made to contact the corresponding author by email. In order to minimize risks of bias, we will search a range of sources to identify all relevant studies. Study selection, data extraction, analyses and reporting will be performed in-line with the Cochrane guidelines for systematic review. For data synthesis, we will follow the PRISMA guidelines for a systematic review.

We will provide comprehensive summaries of current practices around links between hypertensive disorders in pregnancy and chronic non-communicable diseases, prevention, management and future research needs with focus on low- and middle-income countries.

This study will provide a robust assessment of the links between hypertensive disorders in pregnancy and the development of chronic non-communicable diseases in low- and middle-income countries. This will set the stage for the development of mitigating interventions to prevention and management in a timely and cost-effective manner.

Involving patients at different stages of product development and implementation for infectious diseases.

Track 2: Infectious diseases and (neglected) tropical diseases

Involving patients in drug development for neglected tropical diseases (NTDs): A qualitative study exploring and incorporating preferences of patients with cutaneous leishmaniasis into target product profile development

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Target Product Profiles (TPPs) are instrumental to help optimise the design and development of therapeutics, vaccines and diagnostics – these products, to achieve the intended impact, should be aligned with users' preferences and needs. However, patients are rarely involved as key stakeholders in building a TPP; current methodological guidance is limited and lacks practical examples.
To identify preferences in a range of cutaneous leishmaniasis (CL) patients, and to suggest a methodology on how they can be meaningfully involved as stakeholders in the construction of a TPP.
Thirty-three (CL) patients from Brazil, Colombia and Austria, infected with New-World Leishmania species, were recruited using a maximum variation approach along geographic, sociodemographic and clinical criteria. Semi-structured interviews were conducted in the patient's mother tongue. Transcripts, translated into English, were analysed using a framework approach. We matched disease experiences, preferences, and expectations of CL patients to a TPP developed by DNDi (drug for neglected diseases initiative) for CL treatment.
Patients' preferences regarding treatments ranged from specific efficacy and safety endpoints to direct and significant indirect costs. Respondents expressed views about trade-offs between efficacy and experienced discomfort/adverse events caused by treatment. Reasons for non-compliance, such as adverse events or geographical and availability barriers, were discussed. Considerations related to accessibility and affordability were relevant from the patients' perspective.
This exploratory study identified preferences in a broad international patient spectrum. It provides methodological guidance on how patients can be meaningfully involved as stakeholders in the construction of a TPP of therapeutics for NTDs. CL is used as exemplar, but the approach can be adapted for other NTDs.

Involving patients at different stages of product development and implementation for infectious diseases.

Track 2: Infectious diseases and (neglected) tropical diseases

Exploration of Lassa fever experience of survivors, community leaders and members and treating clinicians in Benin, Guinea and Sierra Leone, in consideration of therapeutic trial design and TPP development

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Currently, treatment for Lassa fever (Lf), a viral haemorrhagic fever found in West Africa, relies on the off-label use of the antiviral drug ribavirin, based on a weak evidence base. The West African Lassa fever Consortium (WALC) developed a clinical development strategy to support the trials, regulatory approval and other elements of the value chain of potential drugs in the development pipeline. In consideration of the design of phase 2/3 clinical trials and Lassa fever therapeutic TPP development, we conducted a series of qualitative exploratory studies with survivors, communities and treating clinicians in affected countries.
To explore the experiences of Lassa fever survivors, communities and treating clinicians, in affected countries in West Africa and in doing so inform clinical trial design and TPP development.
Lassa fever survivors, community members, community leaders and treating clinicians were identified through Lf treatment centres, and contacted by local healthcare workers. In-depth interviews were conducted by phone by experienced social scientists in each study country, and results analysed using qualitative methods.
(Preliminary results) Participants provided informative descriptions of their experiences of Lassa fever diagnosis and treatment, at-risk populations, the pathway to infection and care, and interactions within the communities, including varying degrees of stigmatization and mistrust, in some cases leading to late diagnosis and treatment, leading to poor health outcomes. In relation to TPP development, participants highlighted the expectation for

continued free-to-patient (or very low-cost) medicines and treatment based on new drugs, building on current practices; varying preferences for oral or injectable formulations, citing inconsistencies in patient adherence to pills, and consideration for local sanatory conditions; preferences for low-frequency administration of new drugs, and effective communication of side effects of medication which contribute to tolerability.
Engagement with survivors, their communities and those treating patients shines an important light on experiences and preferences required in developing clinical development strategies for Lassa fever therapeutics and implementation.

Involving patients at different stages of product development and implementation for infectious diseases.

Track 2: Infectious diseases and (neglected) tropical diseases

Engaging the community during PLATINUM: A randomised controlled trial of tecovirimat in non-hospitalised mpox patients

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Currently, no antiviral treatment for mpox (formally monkeypox) has been evaluated in a clinical trial. The PLATINUM trial is a randomised, placebo-controlled trial investigating the safety and efficacy of the antiviral tecovirimat, in non-hospitalised mpox patients in the UK. Mpox in the UK has disproportionately affected the gay and bi men who have sex with men (GBMSM) community, who have historically been impacted by stigmatising diseases and have since advocated to be involved in research which affects them. Therefore, it was imperative that this community was involved in the leadership, design and facilitation of the PLATINUM trial.
To meaningfully engage and involve GBMSM community members to increase the relevance and patient awareness of the PLATINUM trial.
Community members were recruited as lived experience experts for multiple aspects of the study design and application. Discussions with community organisations took place through regular update meetings and document reviews, and discussions with eight community members through advisory panel sessions alongside document reviews
Several patient-centred changes were implemented in the trial design and communication strategies. The community advisory panel contributed to the trial protocol, participant information sheet and consent form, recruitment materials, participant questionnaire, press release, and website. These materials are now patient-orientated, less stigmatising and more comprehensible to a lay audience. The community advisory panel, alongside supporting community organisations, increased engagement of the trial launch on social media and relevant websites, with 1.4 million views, in order to reach an at-risk population who might not be reached through traditional research engagement activities. The panel encouraged the research team to engage with the community in their own space through discussing the trial on the "What the Pox?" podcast and advertising the trial on GBMSM dating apps such as Grindr and SCRUFF. Community engagement is also embedded in the trial governance, with representation on the trial steering committee, resulting in the recommendation of stigma history training for the trial team. These interventions have ensured that patient-centred outcomes were considered in the trial design, that the language used in communicating with patients and potential participants was accessible and was not stigmatising, and awareness of the trial reached a broader community audience.
Community engagement and involvement activities have ensured that the PLATINUM trial considers and includes the views of mpox patients and members of the GBMSM community. Their views and suggestions have increased the relevance of the trial to the community.
Involving patients at different stages of product development and implementation for infectious diseases.

Track 2: Infectious diseases and (neglected) tropical diseases

Evaluation of treatment preferences in patients with cutaneous leishmaniasis in Colombia and Peru

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Despite the latest inclusion of oral Miltefosine as prefer option to treat patients with cutaneous leishmaniasis (CL) in Latin America, pentavalent antimonials continue to be the most widely used drug despite its toxicity and difficulties to administrate. Topical options exist however its implementation has been difficult due to different obstacles including the inexperience from both, health providers and patients about these modalities The patient reported outcomes (PRO) initiative has been developing and becoming an important source of information in the opinions and thoughts of people with specific health conditions. In the case of CL, the perspective of patients regarding therapeutic options and treatment preferences have been little assessed.
This study aimed to assess the treatment preferences of patients with CL treated with different interventions, including pentavalent antimonials, thermotherapy or the combination of thermotherapy with miltefosine.

A psychometric and prospective evaluation study was carried out, nested to the clinical trial code NCT02687971, and volunteer patients treated with pentavalent antimonials in the study sites. An instrument for assessing treatment options was used with eight cards containing different systemic and local treatment alternatives and treatment combinations, where the participant chose, in order of preference, the three options that he considered the best for the therapeutic management of the disease. This instrument was passed to the patients before and at the end of treatment.
A total of 75 volunteers participated in the study, distributed in three treatment groups: antimonials ($N = 10$), thermotherapy ($N = 32$) and a combined treatment ($N = 33$). All volunteers were comparable in sex, age, race and occupation (p-value > 0.05). Among the participants treated with thermotherapy as monotherapy or in combination with miltefosine, most patients, before and after treatment choose topical treatments as the preferred option to be treated for their CL lesions. In contrast, in patients who were not aware of other treatment options besides systemic antimonials the majority chose systemic treatment, either injections or oral. However, when re-assessed at the end of the treatment, the majority choose a topical option.
The study shown that when patients are aware of the existence of other treatment options for CL than systemic injections only, they would prefer to be treated topical treatments. End user treatment preferences are usually not taken in consideration when developing target product profile and this might prompt to a lower use and acceptance of a given new treatment.
Involving patients at different stages of product development and implementation for infectious diseases.

Track 2: Infectious diseases and (neglected) tropical diseases

Influenza vaccine uptake in Tunisia from two high-risk groups' perception and attitudes: A qualitative study

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Pregnant women (PW) and elderly with chronic diseases (ECD) are priority groups for the influenza vaccination in Tunisia.
This study was designed to have a better insight into the influenza perceptions and barriers of the vaccine uptake from these groups' perspectives.
This qualitative study consisted of 20 focus group discussions (FGDs) enrolled from five governorates across the country (north, centre, and south) between March 18 and July 10, 2019, in urban and rural areas of Tunisia. FGDs were conducted in Arabic (Tunisian dialect) and following the topic guide. Data were transcribed in the local language then translated into English and analysed using Nvivo12 Software. This permitted the analysis thematic approach, using codes determined by the focus groups.
A total of 170 individuals participated in the FGDs (84 ECD and 86 PW). Both groups recognized the weakness of the immune system as key determinant for severity. While PW raised the lack of information about the vaccine, the ECD emphasized accessibility problems. Five main barriers to influenza vaccination were identified: cultural barriers and use of traditional medicine, misleading or lack of information about influenza and the vaccine, advice against its uptake, problems of availability and accessibility of the vaccine as well as mistrust towards the vaccine including adverse effects, vaccine composition and effectiveness.
The study provided refined information from the perspectives of users to orient the policies regarding the promotion of influenza vaccine by decision makers among these two high risk groups.