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Exploring the inherent resilience of health districts in a context of chronic armed conflict: a case study in Eastern Democratic Republic of the Congo

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Abstract

Background In South Kivu (Eastern Democratic Republic of the Congo [DRC]), health districts (HDs) affected by chronic armed conflicts are devising coping mechanisms to continue offering healthcare services to the population. Nonetheless, this alone does not suffice to make them fully resilient to such conflicts. This study aims to explore the characteristics of these HDs' resilience.

Methods This study uses mixed methods (triangulation) and an extreme case study design to compare a HD with no history of armed conflict (Idjwi, Case 1) and another one experiencing armed conflict (Fizi, Case 2) in South Kivu. The Kruk et al. (BMJ 23:357, 2017) index was employed as a theoretical framework for exploring resilience characteristics. Qualitative data were collected through a document review using a pre-set review grid and semi-structured individual interviews with purposively sampled key stakeholders. They were subjected to deductive-inductive thematic analysis. Quantitative data were collected using a Likert scale questionnaire (administered to stakeholders in the selected HDs using non-probabilistic methods – purposive and snowball sampling). These data were subsequently analysed for comparative descriptive purposes.

Results Recurring short-term shocks as well as chronic stress factors whether or not linked to chronic armed conflicts were identified. According to most respondents (> 98%), essential components of a resilient HDs were prior knowledge of the strengths and weaknesses as well as the public health risk posed by the crisis (awareness), together with community and non-health actors' involvement during the crisis (Integration). Common resilience mechanisms (e.g. epidemic management plan, crisis management committee) were identified, and Case 2 implemented additional mechanisms, including DRC armed forces involvement, community healthcare sites and mobile clinics, specific warning system, and regular socio-demographic monitoring of displaced persons alongside promotion of activities for social cohesion strengthening.

Conclusions For meaningful resilience to emerge, HDs must be better resourced in "normal" times. If this condition is fulfilled, quality of care could improve and spare capacity could be created to withstand disturbances.

Keywords Inherent resilience, Health district, Chronic armed conflict, South Kivu, DRC

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Introduction

Resilience, previously employed in fields such as ecology, engineering, urban planning and psychology [1–4], has become an increasingly prominent topic in health sector systems [5]. It has, indeed, weathered several periods, the most striking of which were the Ebola epidemic in West Africa in 2014–2015. The health crisis that emerged from this epidemic has been explained by several factors, including a lack of resources and the organizational challenges inherent in health systems [6, 7]. The debate on health systems resilience continued afterwards, gaining new momentum during the COVID-19 pandemic. From the management of this pandemic, it emerged that also rich-country health systems may have vulnerabilities caused by misconceived policies and structural inequalities, which the virus exposed [8, 9]. The other types of shocks that stimulate debates on the health system resilience include economic crises [10], natural disasters [11, 12] and armed conflict-related crises [13–16].

Health system resilience has been defined in various ways. Kruk et al. propose the probably most comprehensive one: *“the capacity of health actors, institutions, and populations to prepare for and effectively respond to crises; maintain core functions when a crisis hits; and, informed by lessons learnt during the crisis, reorganize if conditions require it”* [7]. The Democratic Republic of the Congo (DRC) faces many socio-political and health issues. A large proportion of the population, often living in low-security rural areas, remains barred from consuming biomedical health services, due to their cost, physical accessibility, and precarious delivery [17]. Health system funding is largely provided by the poor population and donor organizations involved in numerous interventions that are sometimes disconnected from each other [18, 19]. Its latest national health development plan listed health facilities’ low resilience amongst its priority health problems [17]. Nonetheless, its resilience alludes more to emergency preparedness and response (epidemics and natural disasters) than to the consequences of armed conflicts. The latter has however triggered recurrent crises in the country’s Eastern Region for nearly three decades [20]. Recent studies undertaken in Eastern DRC have also demonstrated that these conflicts influence the population’s health status [21] and access to healthcare [22, 23], and that the health system can adopt certain mechanisms for addressing crisis resulting from these conflicts [24–26]. Regrettably, the ability to effectively respond to future shocks arising from armed conflicts remains insufficiently documented and lacks a suitable framework. Many frameworks have been proposed to explore health system resilience [27–30], which unanimously favour starting from capacities analysis. Kruk

et al. proposed an index for such capacity analysis [7, 31]. This index has previously been used in the context of acute shocks to measure hospitals’ resilience to Hurricane Maria in Puerto Rico [32], and to measure the inherent resilience (IR)—anchored to the system, enabling it to deal with routine challenges and unpredictable events—of 47 countries’ health systems within the African Region (AFRO) of the World Health Organization (WHO) [33].

The purpose of this study was to explore how health districts (HDs) materialize the concept of resilience on a daily basis. In this view, two objectives have been outlined: (a) to comprehend how health district stakeholders define a resilient health system, and (b) to explore health district IR capacities regarding their degree of crisis stemming from chronic armed conflicts, applying the resilience index of Kruk et al. [31].

Material and methods

Study settings

The study was undertaken in Eastern DRC, in the South Kivu province, which is one of the country’s provinces most affected by armed conflicts [34]. The health districts (HD), which are called health zones in DRC, represent the operational unit of the Congolese health system as per the national health development plan [17]. HDs are sub-divided into health areas, each comprising a health centre serving as first entry to healthcare. Secondary healthcare is ensured through a general referral hospital. Data were collected in July and August 2023.

Framework for exploring the health districts’ inherent resilience

Building on Kruk et al.’s framework [31] and some aspects of Karamagi et al.’s study on IR [33], we have developed a theoretical framework for analysing health district IR to shocks and/or stress (Fig. 1). A shock is understood as an acute factor, it is often unpredictable and rapid in onset and disrupts the health system’s functioning (e.g. epidemics, natural disasters). Stress is understood as a chronic challenge experienced by a health system (e.g. repetitive armed conflicts) [35, 36].

The framework consists of five characteristics describing the fundamental elements of a resilient system [7, 31]: (i) the consciousness of potential threats and risks to the population’s health from shock/stress (awareness), (ii) the capacity to address a wide range of health challenges that would arise from shock/stress, through diversity of providers, management arrangements, service delivery models, funding sources and supply lines (diversity), (iii) the capacity of containing

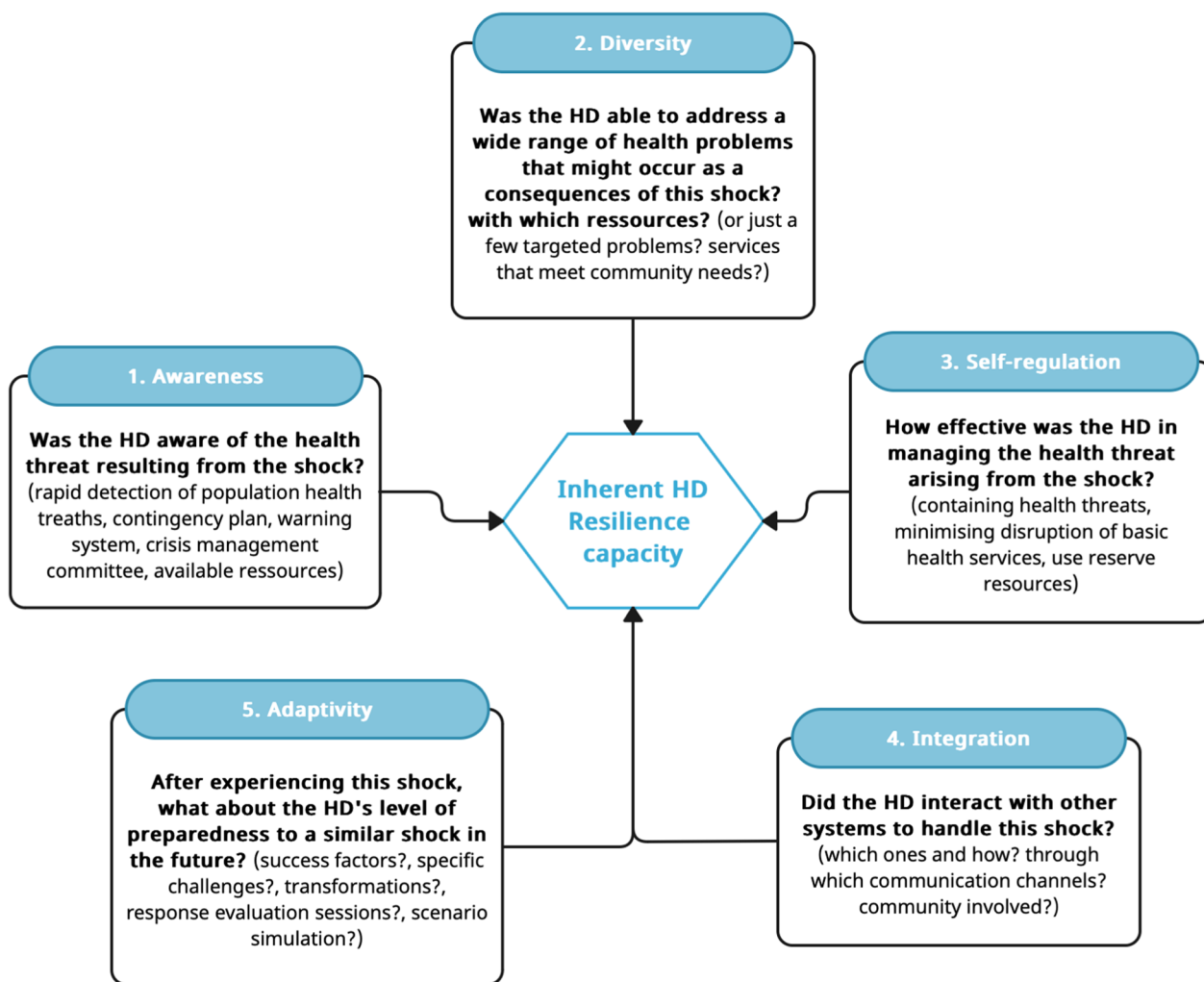


Fig. 1 Theoretical framework for exploring HD inherent resilience capacity (Adapted from Kruk et al. [31])

and isolating shock-related health threats, while providing basic health services and avoiding spreading the crisis throughout the entire system (self-regulation), (iv) the ability to undertake productive interactions between components and actors, within the HDs and outside them (integration), and (v) the ability to repurpose resources to address weaknesses, to learn from the shock management response and transform for better preparedness to future shocks (adaptivity). For each of the five characteristics, we formulated questions tailored to the Congolese health system context, according to the metrics proposed by Kruk et al. [31]. The advantage of this index lies in its ability to assess the process by which a system develops resilience after suffering a shock/stress, and its consistency with the WHO AFRO Framework for Health Systems Development [37].

Study design and cases selection

This is an extreme case study following Gerring’s classification [38], using a triangulation mixed method design (convergence model) [39]. Qualitative and quantitative data were collected simultaneously, analysed separately and then the results were pooled during the interpretation. This model enabled us to better understand how HD stakeholders materialize health system resilience in their context [39].

We used the health district as the case unit. The main selection parameter for cases was their level of exposure to armed conflicts. We used a previously established classification, whereby the number of battle-related deaths (BRDs) and the number of internally displaced persons (IDPs) were considered selection indicators [21]. The higher the BRDs and IDPs, the more unstable the HDs were judged to be. The advantage of an extreme-case design was to provide an in depth comprehensive

approach enabling to generate assumptions for HD resilience strengthening, based upon field actors’ opinions [40].

The Idjwi HD (Case 1) served as a “prototype” stable HD. It is situated on an island on Lake Kivu, approximately fifty kilometres from the lakeside. Its isolated location has relatively spared it from direct South Kivu’s armed conflicts [26]. The Fizi HD (Case 2) is regarded as a “prototype” unstable HD. It is a rural HD with a considerable number of armed groups involved in the destabilising events affecting the health system [26]. Table 1 illustrates some key differences between the two extreme cases.

Selection of participants and data collection

For the qualitative approach, we use two data collection techniques: document review and semi-structured individual interviews with key HD stakeholders. Purposive sampling targeting HD central office members (HD medical chief, nursing supervisor and pharmacist) and the general referral hospital’ executive committee members (medical director, director of nursing) was conducted to select potential interviewees. Then, using the snowball technique, these key informants pointed us towards other HD’s stakeholders likely to participate (technical and financial partners (TFP), health centre nurses, community health workers, private health sector stakeholders, traditional practitioners and local leaders). We conducted a total of 30 interviews with individuals having a minimum of 2 years of seniority in the HD, including 13 in Fizi (8 healthcare personnel, 3 community members and 2 TFPs) and 17 in Idjwi (10 healthcare personnel and 7 community members). Finally, an informal interview was

conducted with a senior staff from South Kivu’s national mental health program for further insight into psychologists’ role in shocks/chronic stress management.

The document review was carried out beforehand to feed the interview guide. We analysed HD’s strategic documents at both provincial and national level, using a pre-set review grid based on the Kruk et al.’s framework. They included the two HDs’ operational action plans (2022 and 2023), the mid-term evaluation reports on their 2023 operational action plans, their contingency plans, the compendium of organizational and operational standards for HD structures in DRC (2019), and the 2022 annual activity report of South Kivu’s provincial health division, as well as DRC’s national health development plan (2019–2022).

For the individual semi-structured interviews, we elaborated an interview guide whose questions drew on the theoretical framework presented in Fig. 1 and the document review. Once the type of shock or stressor had been identified based on their experience, respondents were asked to describe the HD’s response to the crisis to explore the associated resilience process. To ensure better suitability to the Congolese context, the interview guide content was revised by several co-authors with extensive experience in DRC’s health system. Originally written in French, the guide was later translated into Swahili and pre-tested for readjustment. Interviews were recorded using a dictaphone. Notes were taken during interviews where recording was refused. The interviews were conducted by researchers trained in qualitative methods and lasted an average of 30 min. Audio material was subsequently anonymized and stored on a password protected computer.

Table 1 Comparison of the study’s two extreme cases

Parameters	Case 1: Idjwi (21 HA)	Case 2: Fizi (31 HA)
Demography and security	<ul style="list-style-type: none"> • Population (2023)^a: 332 193 inhabitants • Surface area^a: 310 km² • Stable rural: BRD–/IDPs– 	<ul style="list-style-type: none"> • Population (2023)^a: 489 561 inhabitants • Surface area^a: 6 000 km² • Unstable rural: BRD+ + + + +/IDPs+ + + + +
Accessibility and performance	<ul style="list-style-type: none"> • Access only by lake (island) • Performance in 2022^b: 78.5% 	<ul style="list-style-type: none"> • Access by land and lake • Performance in 2022^b: 82%
Armed conflicts	<p>NO</p> <ul style="list-style-type: none"> • No armed group • No inter-ethnic conflict (one dominant ethnic group) 	<p>YES</p> <ul style="list-style-type: none"> • Presence+ + + + + of armed groups • Inter-ethnic conflicts (six ethnic groups)
Humanitarian aid	<p>Low</p> <p>Interventions aimed at:</p> <ul style="list-style-type: none"> • Health emergencies (epidemics) • Health system strengthening 	<p>High</p> <p>Interventions targeting:</p> <ul style="list-style-type: none"> • Conflict victims (wounded, displaced people) • Health emergencies (epidemics, natural disasters) • Health system strengthening

HA: health area; BRD: battle-related deaths; IDPs: internally displaced persons

^a Estimated population according to the health district’s operational action plan (2023)

^b According to the latest annual report on the activities of the South Kivu Provincial Health Division (financial year 2022): Performance based on achievement of 26 key HD indicators

Regarding the quantitative approach, we combined two non-probabilistic sampling techniques to mitigate selection bias. We first included all the 30 respondents from the qualitative phase (purposive sampling). Then, we used snowball sampling—that is, the respondents referred us to other actors in the health district who could respond to our questionnaire. A self-administered four-tier Likert scale questionnaire [41] was used to gather socio-demographic data and data related to the theoretical framework. The scale was used to assess the level of consensus amongst stakeholders as to their definition of a resilient HD.

Data analysis

We carried out a thematic analysis [42] using the previously established theoretical framework and drawing on Karamagi et al.'s study [36]. Following transcription of audio material and after further reading of the transcriptions for familiarization, we used Nvivo 12 software to code interviews according to our thematic structure. Memos of data extracted from the document review were appended to our Nvivo entry. As new themes emerged from the interviews data and the document review, we also adapted our original framework to incorporate these insights, blending deductive and inductive analysis approaches. Respondents' discourse was illustrated (quotes) using a blanket categorization (health personnel, TFP, community) with a random numbering system including their sex and age, to preserve anonymity.

Descriptive analysis of the quantitative data was performed using Stata 16. Categorical variables are represented as frequencies and proportions, and the quantitative variables are summarized as mean (\pm standard deviation) or median with extreme values (minimum–maximum), provided the distribution was either normal or not.

Results

Overall, 74 persons responded to the quantitative questionnaire as describe below. Three main themes emerged from the analysis of qualitative data based on 30 interviews and 11 documents consulted: (1) shocks and chronic stressors faced by the HDs; (2) differences in levels of consensus on the essential components of resilient HD related to these shocks/stressors; and (3) properties of HDs' inherent resilience experiencing the shocks and chronic stressors. The latter theme was organized into five sub-themes corresponding to the five characteristics of our theoretical framework of a resilient health system: awareness, diversity, self-regulation, integration and adaptivity.

General characteristics of the respondents to the quantitative questionnaire

Respondents were predominantly male (86.5%), with a median age of 42 years. The average seniority at HD was 11 years. In Idjwi, only 10% of respondents had previously worked in other HDs affected by armed conflicts, while 38% of respondents in Fizi came from a HD not affected by armed conflicts. At the time of the survey, there were no TFP representatives in Idjwi (Table 2).

Theme 1: Shocks and chronic stressors faced by the health districts

Both cases are facing repetitive short-term shocks and/or chronic stress (whether linked to armed conflict or not).

Case 1 is more prone to the repetitive short-term shocks related to its insularity (recurrent drownings of inhabitants crossing Lake Kivu by pirogue), natural disasters (erosion and field destruction), as well as epidemics of measles and cholera (owing to poor hygiene measures such as latrines availability and drinking water). A respondent reported that:

“Admittedly, we are an insular territory. We experienced a shipwreck last time, which cost the lives of 22 women and 12 men... Apart from that, we recently had a torrential downpour here, and erosion washed away all the arable land [...]” (Community 1: F, 18 yrs)

For Case 2, except for drowning, similar acute shocks were observed as in Case 1. There were additional stress factors linked to chronic armed conflicts: firstly, recurrent conflicts between ethnic groups (over land and/or property), or between the DRC armed forces (FARDC) and rebel groups. Secondly, there were acts perpetrated by rebel groups: plundering (in the community and health facilities), health facility destruction, and abductions of health staff and humanitarian workers for ransom. Finally, there is an increasing number (39 061 in 2022 and 50 847 in 2023) of internally displaced persons, within the HD from one health area to another, and of externally displaced persons from neighbouring HDs, together with the influx of Burundian refugees into the HD (6353 in 2022 and 6550 in 2023). A respondent sadly expressed the following:

“You know, we're in a zone where armed conflicts are being experienced, particularly inter-ethnic conflicts, and this means that the population is moving from one health area to another... There are people coming from other health districts to seek refuge in this health district. In addition to these displaced people, the health district also hosted refugees from Burundi [...]” (Health personnel 4: male, 64 years)

Table 2 Quantitative questionnaire respondents' general characteristics for both cases

Variables	Total [Number (%)]	Cases [Number (%)]	
		Case 1 (Idjwi)	Case 2 (Fizi)
Age (year) [Median (min–max)] (n = 73)	42 (22–73)	44 (25–73)	41 (22–59)
Sex (n = 74)			
Male	64 (86.6)	33 (84.6)	31 (88.6)
Female	10 (13.5)	6 (15.4)	4 (11.4)
Seniority (years) [Mean ± SD] (n = 74)	11 ± 8.5	12.2 ± 9.6	9.7 ± 7.1
Experience in an armed conflict district (n = 73)			
No	48 (65.6)	35 (89.7)	13 (38.2)
Yes	25 (34.4)	4 (10.3)	21 (61.8)
Position in the HD (n = 74)			
HD Central Office	15 (20.3)	8 (20.5)	7 (20.0)
Referral General Hospital	23 (31.1)	15 (38.5)	8 (22.9)
Health centre	10 (13.5)	6 (15.4)	4 (11.4)
TFP	4 (5.4)	0 (0)	4 (11.4)
Community	22 (29.7)	10 (25.6)	12 (34.3)

N: number of respondents; SD: standard deviation; HD: health district

Chronic stress factors specific to each case were listed (Table 3). Some of these factors are also encountered at the health system supra-operational level (province, country): high malnutrition prevalence, untimely drug stock-outs, poor access to drinking water, recurrent health personnel strikes.

Theme 2: Differences in levels of consensus on the essential components of resilient HD

Respondents from both HDs strongly agreed (> 98%) on three aspects characterizing a resilient health system: knowledge of strengths and weaknesses before the crisis,

and knowledge of the health risk entailed by the crisis for the population (awareness), as well as community and non-health actors' involvement in the HD activities during the crisis to bolster community trust towards the health system (integration).

Nevertheless, the major discrepancies in opinions between respondents from the two HDs related to some components of three characteristics (Table 4). Firstly, in Idjwi, 23.8% of respondents disagreed with the need of having a crisis management committee for shock/stress, and 10.2% disagreed with the need to have a specific communication system (awareness). Secondly,

Table 3 Shock and stress types recorded for each case

Shock/stress	Case 1 (Idjwi)	Case 2 (Fizi)
<i>Repetitive short-term shocks</i>	<ul style="list-style-type: none"> • Epidemics (+ + cholera, measles) • Erosion (fields destruction) • Recurrent drownings in Lake Kivu 	<ul style="list-style-type: none"> • Epidemics (+ + cholera, measles) • Erosion (fields destruction and deaths)
<i>Stress linked to chronic armed conflicts</i>	–	<ul style="list-style-type: none"> → Repetitive conflicts (inter-ethnic, FARDC versus rebel groups) → Looting, kidnapping, health facilities' destruction (armed groups) → + + + Internally displaced persons (between HAs of the HD) and externally displaced persons (from neighbouring HDs) → + + + Foreign refugees accommodated
<i>Other chronic systemic stress factors specific to each HD</i>	<ul style="list-style-type: none"> • Malnutrition • Untimely shortage of medicines 	<ul style="list-style-type: none"> • Malnutrition • Untimely shortages of specific drugs and consumables (TB, malaria, malnutrition, cholera, and HIV/AIDS) • Limited access to drinking water for a significant proportion of the population (78%) • Repeated health personnel strikes

FARDC: DRC Armed Forces; HD: health district; Has: health area; TB: tuberculosis; HIV: human immunodeficiency virus; AIDS: acquired immunodeficiency syndrome

Table 4 Respondents' level of consensus on the key characteristics of resilient HDs

Characteristics/components	Total [Number (%)]	Health district [Number (%)]	
		Idjwi (Case 1)	Fizi (Case 2)
1) Awareness			
<i>Knowledge of HD's health strengths and weaknesses</i>			
Strongly agree	45 (60.8)	28 (71.8)	17 (48.6)
Agree	29 (39.2)	11 (28.2)	18 (51.4)
<i>Knowledge of shock or stress-related health risks and the target population</i>			
Strongly agree	49 (66.2)	34 (87.2)	15 (42.8)
Agree	24 (32.4)	5 (12.8)	19 (54.3)
Disagree	1 (1.4)	0 (0.0)	1 (2.9)
<i>Having a proper communication and warning system</i>			
Strongly agree	38 (51.4)	22 (56.4)	16 (45.7)
Agree	32 (43.2)	13 (33.3)	19 (54.3)
Disagree	4 (5.4)	4 (10.3)	0 (0.0)
<i>Having a crisis management plan</i>			
Strongly agree	35 (47.3)	22 (56.4)	13 (37.1)
Agree	37 (50)	15 (38.5)	22 (62.9)
Disagree	1 (1.4)	1 (2.6)	0 (0.0)
Strongly disagree	1 (1.4)	1 (2.6)	0 (0.0)
<i>Having a crisis management committee</i>			
Strongly agree	29 (39.2)	17 (43.6)	12 (34.3)
Agree	35 (47.3)	12 (30.8)	23 (65.7)
Disagree	9 (12.2)	9 (23.1)	0 (0.0)
Strongly disagree	1 (1.4)	1 (2.6)	0 (0.0)
2) Diversity			
<i>Ability to meet a spectrum of population's health needs</i>			
Strongly agree	35 (47.3)	20 (51.3)	15 (42.9)
Agree	35 (47.3)	15 (38.5)	20 (57.1)
Disagree	4 (5.4)	4 (10.3)	0 (0.0)
<i>Adequacy between HD health expenditure and financial protection</i>			
Strongly agree	35 (47.3)	23 (59)	12 (34.3)
Agree	37 (50)	14 (35.9)	23 (65.7)
Disagree	2 (2.7)	2 (5.1)	0 (0.0)
3) Self-regulation			
<i>Prompt identification and containment of health threats</i>			
Strongly agree	43 (58.1)	29 (74.4)	14 (40.0)
Agree	30 (40.5)	9 (23.1)	21 (60.0)
Disagree	1 (1.4)	1 (2.6)	0 (0.0)
<i>Minimizing disruption of essential health services</i>			
Strongly agree	39 (52.7)	25 (64.1)	14 (40.0)
Agree	30 (40.6)	11 (28.2)	19 (54.3)
Disagree	5 (6.8)	3 (7.7)	2 (5.7)
<i>Mobilizing contingency resources</i>			
Strongly agree	49 (66.2)	34 (87.2)	15 (42.9)
Agree	24 (32.4)	4 (10.3)	20 (57.1)
Disagree	1 (1.4)	1 (2.6)	0 (0.0)
4) Integration			
<i>Coordinating HD's activities with "non-health" stakeholders</i>			
Strongly agree	41 (55.4)	31 (79.5)	10 (28.6)

Table 4 (continued)

Characteristics/components	Total [Number (%)]	Health district [Number (%)]	
		Idjwi (Case 1)	Fizi (Case 2)
Agree	31 (41.9)	7 (18.0)	24 (68.6)
Disagree	2 (2.7)	1 (2.5)	1 (2.9)
<i>Engaging with the community to build trust</i>			
Strongly agree	49 (66.2)	34 (87.2)	15 (42.8)
Agree	25 (33.8)	5 (12.8)	20 (57.2)
5) Adaptivity			
<i>Reallocating resources</i>			
Strongly agree	20 (27.0)	11 (28.2)	9 (25.7)
Agree	40 (54.1)	15 (38.6)	25 (71.4)
Disagree	14 (18.9)	13 (33.3)	1 (2.9)
<i>Encouraging local decision-making informed by received information</i>			
Strongly agree	30 (40.5)	18 (46.2)	12 (34.3)
Agree	39 (52.7)	16 (41.0)	23 (65.7)
Disagree	5 (7.4)	5 (12.8)	0 (0.0)
<i>Post-shock assessment of undertaken decisions to improve preparedness for future events</i>			
Strongly agree	34 (46.0)	18 (46.2)	16 (45.7)
Agree	29 (39.2)	10 (25.6)	19 (54.3)
Disagree	8 (10.8)	8 (20.5)	0 (0.0)
Strongly disagree	3 (4.0)	3 (7.7)	0 (0.0)

HD: health district

for diversity, in Idjwi 10.3% of respondents disagreed about the responsiveness to a spectrum of health needs potentially resulting from shock/stress within the HD. Lastly, 33.3% (Idjwi) and 2.8% (Fizi) of respondents were opposed to reallocating resources during the crisis, while 12.8% of respondents in Idjwi disapproved the fact of adapting local decision-making upon incoming information. Again, in Idjwi, 20.5% of respondents disagreed and 7.6% strongly disagreed with evaluating decisions taken during the shock/stress to better prepare for future crises (*Adaptivity*).

To the question: "Has an evaluation of the decisions taken during the period of shock been carried out in order to draw up recommendations?", a respondent answered:

"No, this evaluation meeting was not held, apart from the debriefing, but the big post-outbreak meeting to see how to contain the future epidemic was not organized." (Health personnel 3: male, 51 years)

Theme 3: Exploring HDs' inherent resilience to experienced shocks and chronic stressors

Sub-theme 1: Awareness

In both cases, there was sufficient knowledge and awareness of HDs capacity to respond to repetitive acute shocks. Awareness was found in all health facilities within the HD (whether integrated into the formal health system or not) and their personnel. There was also a detailed budgeted list of necessary supplies for responding swiftly to shocks (such as emergency kits), along with a list of TFP and their roles within the HD. This information is listed in the HD operational action plan and the epidemic contingency plan.

Furthermore, contingency plans have been updated in 2023 to prepare for epidemics, and they have been drafted in conjunction with various stakeholders, including the community. In Fizi, however, the plan only covers one shock (cholera), whereas in Idjwi it addresses several shocks (cholera, measles, coronavirus disease 2019 [COVID-19], and Ebola). These plans include scenarios simulating crises arising from these shocks, as well as the details of response coordination and local response capacities. Case 2 does not have a clear response plan for

any health issues resulting from chronic armed conflicts. A respondent indicated that:

“We have a contingency plan drawn up annually, and this plan outlines all the partners working with us in the health district, it identifies the numerous factors involved in cholera outbreaks, and it outlines available resources and equipment in the health district and involved stakeholders.” (Health personnel 2: male, 46 years)

In both cases, routine health indicators for service delivery and epidemiological disease surveillance are regularly monitored via the District Health Information Software 2 (DHIS2) and validation meetings at the HD central office. Epidemiological surveillance briefings are also organized with several stakeholders, and various communication and alert channels are used (“word-of-mouth” between community relays and health centre, telephone, HA development committee briefings, local radio stations, churches, hotline number in Case 2). A respondent reported that:

“[...] yes, there is the toll-free number from the HD central office where we ring free of charge to report on the situation [...]” (Health personnel 8: M, 43 yrs)

However, most respondents reported that despite their knowledge of available resources to address shocks and the existence of a contingency plan, the lack of financial and material resources delayed the plan’s implementation and the absorption of the shock. Moreover, the government failed to remunerate most health workers (only 36.0% in Case 1 and 22.4% in Case 2 received a government risk bonus). In addition, precision is lacking as regards the HD population, which is computed based on an annual increment (1.031) from 2012 headcounts.

In terms of chronic stress linked to armed conflicts (Case 2), the only relevant parameter monitored was the number of displaced persons and refugees. Health and social care for the latter are often provided by TFPs. A respondent explained that:

“[...] we visit these camps for displaced persons, and we assess their needs in terms of water, hygiene, and sanitation. Then, we submit a proposal to the donors. If the response is satisfactory, we intervene [...]” (TFP 2: male, 41 years)

Sub-theme 2: Diversity

Primary healthcare essential packages were not completely available in either case. According to mid-term evaluation reports of the operational action plans for 2023 (for both cases), none of the health centres or

general referral hospital provides a comprehensive services package. Moreover, some health personnel have been hastily trained to perform specific tasks (owing to a shortage of qualified staff) but are now of retirement age while continuing certain services (e.g. radiology). Private for-profit health facilities also played a role in crisis management, particularly by caring for patients and putting their facilities at disposal when needed. The operational action plan for Case 2 envisages the creation and accompaniment (supply of basic materials and equipment as well as specific consumables, support for group monitoring) of community healthcare sites to strengthen primary healthcare. Nevertheless, the earmarked budget (only 1.8% of the HD’s annual budget in 2023) for this purpose remains unavailable. In this same case, some TFPs have opted for mobile clinics to improve access to basic emergency care. A respondent highlighted that:

“We have a vast division called mobile clinic. Whenever needed we approach [the leaders] the HD, discussing on what needs to be directly addressed... If any group of people has any health issue within a site, we can deploy in less than 24 hours [...]” (TFP 1: male, 41 years)

Health system financing remains limited and highly reliant on external TFPs at all stages: before, during and after shocks or chronic stress. In 2023, 60.4% (Case 1) and 43.2% (Case 2) of the projected total budget was expected to come from TFP; while 24.0% (Case 1) and 30.7% (Case 2) from households. Sometimes, health facilities were compelled to treat patients at their own expense to avoid an outbreak spreading. A respondent indicated that:

“[...] We thought that charging people with measles would mean that they’d hang around in the community and transmission will continue. So, we had to agree to treat them free of charge [...]” (Health personnel 16: male, 54 years)

The TFPs are involved in numerous activities throughout the two HDs, including operational support, epidemiological disease surveillance, primary healthcare strengthening and community outreach cells. For Case 2 specifically, they are providing care for displaced persons and their host families (medicines, curative care, bonuses for care providers), bolstering community healthcare sites and promoting inter-ethnic peacekeeping activities. A respondent reported that:

“[...] I’m now involved in an activity with a local organization that also deals with resolving inter-ethnic and inter-community conflicts. We organize [football] games. These games are managed by a joint committee. I have to say that this facilitates

reconciliation, although it's a slow process [...]."
(Community 1: Female, 18 years)

In terms of population financial protection, in Case 2 no health insurance system exists, and in Case 1, a mutual health scheme exists, but with a low enrolment rate (4%). During chronic crises linked to armed conflicts (Case 2), relatives of community members living abroad (diaspora) may sometimes remit funds to their relatives to pay for healthcare. A respondent indicated that:

"[...] You know people here have children abroad, in Canada, the United States and other countries. They called on these children and they helped directly... each family sent [to caregivers] \$10 a month and this money helped us fetch additional supplies we might be short of." (Health personnel 11: Male, 46 years)

Sub-theme 3: Self-regulation

During a crisis, following an alert, the HD team investigates to rapidly detect health threats posed to the population by the shock (or stressor) and determine actions to be taken. This entails declaring an epidemic, triggering the contingency plan, recording displaced persons (Case 2) and advocating for funding. External funding often arrived belatedly during a crisis. Available resources were swiftly mobilized in the HD but proved to be insufficient. Assistance was primarily provided by TFP and the Provincial Health Division. A respondent indicated that:

"Aid to manage the epidemic arrived late, at a time when healthcare workers were working hard to deal with the cases using available resources. There have been many deaths particularly in remote areas."
(Community 4: Male, 32 years)

Some routine activities (e.g. supervision) were performed where necessary, whilst others (e.g. curative care, vaccinations) were regularly conducted, albeit at the cost of stretching already under-capacity medical staff. In health areas affected by armed conflicts (Case 2), population displacement disrupted immunization schedules, especially for pregnant women. A respondent said that:

"In the affected area [by the armed conflicts], there had been some disruption due to the population displacement. Though they hadn't gone too far, they couldn't respect the appointments.... especially for the women who had to attend antenatal visits."
(Health personnel 1: Male, 51 years)

The mid-term assessment of the 2023 operational action plans showed that the TFP very often undertake activities not foreseen in the plan and lag in disbursing

funds for scheduled activities (e.g. only 26% of released funds within 6 months for Case 1). Similarly, some TFPs intervening in emergency situations, as in Case 2 (9 TFPs out of 22, i.e. 41%), lack a clear disengagement plan and therefore abruptly suspend their support to the HD.

Sub-theme 4: Integration

A committee chaired by the HD chief medical officer oversees crisis management, which involves various stakeholders, including healthcare providers, TFPs, political and administrative authorities (territorial administrators, village chiefs, ethnic group chiefs) and various local leaders (churches, traditional chiefs). Only one health worker with a master's degree in public health was identified (Case 1) among the HD staff. A respondent reported that:

"Yes, we do have a discussion forum; we hold meetings with the district administrator and the chiefdoms to discuss these issues" (Health personnel 2: Male, 46 years).

In both cases, several community social groups (churches, local radio stations, traditional healers, administrative and traditional authorities, and youth groups) are involved in managing crises linked to shock or chronic stress. In Case 2, apart from their involvement in health activities, they also intervene by helping to strengthen social cohesion. Still in Case 2, the national armed forces (FARDC) are playing an essential role in managing armed conflict-related crises. They ensure medicine and medical equipment distribution to HAS affected by armed conflict, escort all humanitarian aid to needling sites, and provide security for health facilities. The FARDC has also officially appointed a nurse to the HD to serve as a liaison between the HD management team and the affected health areas. Promptly trained by the HD team, the nurse fulfilled various tasks (vaccination, supervision, medicines delivery, health risk detection, etc.). This was reported by one of our respondents:

"The HD resorted to the FARDC because there was no free access [to the health area]. For instance, they asked for a military nurse to supervise them, to ensure the delivery of immunization materials (COVID-19, polio vaccine) and other activities."
(Health personnel 11: Male, 46 years)

However, the other sectors (traders, agriculture, water and sanitation, education, law and order, etc.) were not involved. Some clinical psychologists have been trained by the provincial mental health coordination office. Unfortunately, their retention within the HD was not sustainable owing to a lack of funding and to the fact that psychosocial support (one of their tasks) had

already been assigned to health centre nurses according to relevant public health guidelines, as reported by a respondent:

“[...] Currently, all [clinical psychologists] who have been trained have left [...] We thought they would become part of the HD staff, and thus be paid according to their index. However, this didn’t work out. It turned out to be on a case-by-case basis, depending on individual projects. For example, in HDs where [naming a partner] is involved, legal clinics are set up with psychologists who are not from the HD.” (Health personnel 7: Female, 48 years)

Sub-theme 5: Adaptivity

To cope with crises, HD management teams reassigned their health personnel internally. Material resources stockpiled in health facilities were also mobilized to handle surges (particularly for Case 1). In Case 2, some of the HD tasks (e.g. supervision) were delegated to the military nurse, while others were partially entrusted to the TFP (curative care in mobile clinics, provision of care to displaced persons and their host families) or to private health facilities (surgical care of the injured). Nevertheless, the HD was able to follow-up the activities for which the partners were assigned responsibility. A respondent indicated that:

“We had to assign some of the providers to deal solely with the cases. These providers ought to come from the health centre or hospital team, who work on a precise schedule [...]” (Health personnel 2: Male, 46 years)

Most humanitarian relief efforts focused on HAs affected by armed conflict, through targeted actions. The remaining HAs in the HD keep on operating with locally available resources, albeit suffering from other chronic stressors associated or not with armed conflict (Table 3). A respondent stated that:

“We have many partners, which is a good thing for the HD. However, it makes the health district operate at two different speeds. This is the shortcoming of humanitarian organizations. The supported HAs are progressing, whereas the unsupported ones are going backwards [...]” (TFP 1: Male, 41 years)

During repetitive acute shocks, appraisal meetings were held where lessons were learnt to rectify actions where appropriate. The contingency plans provided several scenarios to be anticipated, but only for epidemics (cholera, measles, COVID-19, Ebola). A respondent reported that:

“We learnt many lessons. Firstly, on the importance of community dynamics, which we found to be very important in epidemic surveillance and especially in rapid communication. [...] we also deemed the contingency plan a very important and vital tool in preparing us to intervene in time. [...] Finally, we realized that if we are well-organized, even with limited resources, health workers, community and local authorities alike can assist in acting in time and achieving good operational results.” (Health personnel 2: Male, 46 years)

Respondents identified various success factors (TFP presence, sound organization and communication among stakeholders, community involvement, service providers’ consideration for their community, the HD management team’s strong leadership), alongside specific constraints observed when responding to crises (lack of timely and adequate funding, restricted access to health areas struck by armed conflicts, shortage of emergency kits). A respondent asserted that:

“If the health district has kept on functioning despite the crises, it’s because of the health workers’ love for the community, preventing them from dying [...]” (Community 6: Male, 59 years)

Discussion

Key findings

This extreme case study employing the Kruk et al.’s [31] resilience index aimed to explore the inherent resilience capacities of two HDs in South Kivu, in relation to their level of crisis whether or not linked to chronic armed conflicts: a stable Case 1 (Idjwi1) and an unstable Case 2 (Fizi). The results show that both HDs are exposed to repetitive acute shocks (epidemics, erosion) and chronic systemic stress factors (untimely stock-outs of medicines, poor access to drinking water, etc.). Case 2 is particularly exposed to chronic stress factors linked to armed conflicts (e.g., repeated wars, increasing numbers of displaced people and refugees). For respondents, two parameters are required to qualify a HD as resilient: (1) prior knowledge of its assets and weaknesses as well as the health risk posed by the crisis to the population (awareness) and (2) a strong community involvement during the crisis (integration). Resource reallocation during crises (adaptivity) provoked most dissent.

Some components of the HD inherent resilience are still missing in the various capacity dimensions: awareness and diversity (incomplete healthcare packages, lack of funding), self-regulation (shortage, underpayment, personnel exhaustion), integration (extremely limited involvement of other sectors, lack of psychological

support) and adaptivity (limited assessment and scenario rehearsal).

The inherent resilience of HDs in Eastern DRC: a “reductive resilience”

The resilience displayed across the studied HDs suggests a “reductive resilience” profile, as inspired by the theory of reductive adaptation of malnourished children. This theory postulates that severely malnourished children restrict non-essential activities (e.g. growth, movement) to survive [43]. Using this comparison, the Congolese HDs studied are equated with malnourished children. It emerges that these HDs perform their functions restrictively owing to the innumerable intrinsic deficiencies inherent therein. These include meagre human and material resources, non-comprehensive package of care and services, sub-optimal governance and virtually complete dependence on external aid funding. These HDs, in their reductive adaptation to shocks (armed conflicts, epidemics, etc.), rely excessively on their health personnel, local communities and diverse partners to maintain the care and services provision. Consequently, health personnel face serious strain, local communities are over-solicited and certain health activities are either neglected, delayed and/or entrusted to partners to implement [13, 44].

In Mauritania and Mali, a similar level of “reductive resilience” was described respectively during the COVID-19 pandemic [45] and in times of instability and health system chronic dysfunction [46]. On the one hand, such resilience illustrates the importance of caution regarding potential undesirable effects of the optimal coping mechanisms described by Kruk et al. [31], particularly in a context where health systems (as in Eastern DRC) are “malnourished”: i.e. deficient. On the other hand, the adaptation mechanisms deployed risk reassuring local stakeholders, thereby supporting a status quo that could be detrimental to field actors [47]. Finally, decision-makers could be tempted to shirk their fundamental role, namely ensuring health system resilience through sustainable structural change, i.e. rigorous and informed governance, long-term adequate resources and robust institutions [27].

Are the implemented resilience mechanisms “normative”? Talking about “good” and “bad” resilience

Our results corroborate the assumption that a well-functioning health system (backed by the community and higher levels), together with a strong political will to implement necessary mechanisms and provide resources, stands a greater chance of becoming resilient and more prepared to withstand future shocks [8, 48, 49]. Knowing one’s strengths and weaknesses and the public health risk posed by the crisis is a decisive feature of effective crisis

preparedness [7]. Our results show that the HD management team reflected on the HD’s weaknesses such as a lack of resources and first aid kits, etc. and strengths (health indicators monitoring, assessment of the needs of displaced people, etc.). It has also involved various stakeholders, such as TFP and community leaders in decision-making. The community assumed some tasks (awareness-raising, social reconciliation actions, patient transportation, manpower provision, etc.) and took ownership of crisis management [50].

Not approving the reallocation of resources during a crisis is more a reflection of stakeholders’ concern about the risk of interrupting certain activities to the detriment of crisis management (given the limited resources, scarcity of existing care alternatives and sometimes abrupt TFP disengagement). Furthermore, disagreement over setting up a crisis management committee and a dedicated communication system can be explained by the normative organizational structure of the HD itself (HD management team coordinating all HD activities with a well-established cross-level communication system) [51]. Yet organizational resilience is strongly influenced by the way information is processed and exploited [52]. Within the HD in crisis (Case 2), specific alert and information-sharing mechanisms were established: a military nurse acting as a bridge between the HD management team and crisis-affected health areas, a hotline at the HD central office, etc.

Conversely, some implemented resilience mechanisms within the HDs may result in unforeseeable negative effects [53, 54]. For instance, in Case 2, a military nurse was assigned to carry out preventive activities and supervision in conflicted-affected health areas. Yet sometimes the population and health workers suffered assaults perpetrated by unidentified men in uniform [55]. Consequently, this military nurse’s presence may contribute to heightening the population’s mistrust. Furthermore, planning actions during a crisis that rely extensively on TFP has revealed perverse effects, including non-alignment with the HD operational action plan, disbursement backlogs, as well as the abrupt aid pull-out, leading in many instances to organizational shambles [56]. This illustrates concerns over humanitarian aid failing to deliver intended benefits and sometimes reinforcing pre-existing inequalities.

Most of these resilience initiatives were launched during meetings, including with the community, but were also instigated by individuals (e.g. HD chief medical officer, hospital medical director) [57]. Furthermore, most healthcare providers, including community health workers, lacked financial remuneration and psychological support [44, 54]. Thus, resilience was compromised to a behavioural pattern of inaction from policy-makers

unable to devise lasting solutions to address health workers' difficulties [58]. The statement on the "love" motivating local health workers to operate in such dire straits could reflect the fact that they find it difficult to leave their workplace due to social bonds and actual earning opportunities, which might disappear when moving to other places [46]. Finally, the recurrent management of health emergencies in Case 2 exposes the HD to the danger of relinquishing its core planning and its ability to reflect on its actual development objectives [26].

Limitations and strengths

Opting for a non-probabilistic sampling approach in the quantitative component of the study opens up the risk of selection bias and renders generalization of the results difficult. We minimized this bias by combining two complementary approaches. However, this study was not aimed at generalization, given that resilience can be perceived differently depending on the context and type of shock experienced by a health system. The strength of our study, therefore, lies in the fact that we employed mixed methods in an extreme case-study design, not only to adapt the concept of resilience to the context of Eastern DRC, but also to understand adaptations and missing features for strengthening HD resilience. Moreover, the Likert scale used did not include a neutral category, which forced participants to position themselves.

Conclusions

The studied manifestations of resilience result from local dynamics between HDs, TFPs, communities and other participants. HDs were aware of many hardware shortcomings, not of how to address them to respond better. In unstable HD, the implication of the DRC's armed forces, the setting up of a special warning system, and regular monitoring of displaced persons needs and activities to foster social cohesion, were essential. To improve the situation, a serious engagement by the central government is needed. It entails expanded and predictable resources that can raise the baseline performance of health services and be easily redeployed in the face of adversity. Competent, constructive monitoring and supervision are recommended to support responses, enhance operations and mitigate those hindering them. HDs should be encouraged to share their positive and negative experiences with their peers.

Abbreviations

BRD	Battle related deaths
DHIS2	District Health Information Software 2
DRC	Democratic Republic of Congo
FARDC	Armed forces of Democratic Republic of Congo
HA	Health area

HD	Health district
IDP	Internal displacement persons
IR	Inherent resilience
TFP	Technical and financial partners

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Author contributions

S.M.L. substantially contributed to the conception, study design, data collection, gave significant input to data analyses and discussion, drafted the work, and significantly contributed to the manuscript revision. P.S.L. gave significant input to data analyses and discussion, and significantly contributed to the manuscript writing and revision. H.K., Enrico P. and D.P. substantially contributed to study design and substantively revised the manuscript. C.M.E., C.L. and R.B. substantially contributed to data collection, gave significant input to data collection and analyses and the manuscript revision. G.B.B., P.D. and Elisabeth P. substantially contributed the conception, the study design, gave significant input to data discussion and substantively revised the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the "Université Catholique de Bukavu" (UCB/CIES/NC/017/022). Prior to data collection, written authorizations were obtained from South Kivu's Provincial Health Division and the HDs. All respondents provided verbal consent before the interview.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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