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Community health system capacities and capabilities within an evolving community health policy framework: mixed methods study of stakeholders in central Uganda

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ABSTRACT

Objectives Empowering communities through identifying and unlocking community capacities and capabilities is vital for improving community health systems. This study assessed the community health system's status quo and readiness for implementing a government-led, partner-supported community health worker project.

Design A mixed methods cross-sectional study.

Setting Two districts and one city in central Uganda.

Participants 21 key informants (KIIs) with district leaders, 4 focus group discussions (FGDs) with community health workers (CHWs) termed as village health teams in the Ugandan setting and a survey of 487 CHWs and 419 pregnant women who had childbirth 12 months before.

Study measures KIIs and FGDs explored community health system resources using the WHO health systems building blocks and the UNICEF health system strengthening maturation model. However, the surveys explored the work-related attributes and services delivered by the CHWs and to the community, respectively.

Analysis A framework analysis was used for qualitative data in NVivo 14. While descriptive and stratified analyses were conducted for quantitative data in Stata I/C 15.0: proportions for the varied geographical entities were compared using the t-test with p values <0.05 considered significant, one-way ANOVA was used to compare means.

Results Overall, all sites had relatively strong governance of community health only challenged by multiple implementing partners that were weakly coordinated. There was an exclusive paper-based information management system that linked to the national DHIS-2 software. Community reporting rates varied between 20% and 80%. Community health financing was weak, similarly to commodities availability. The mean age of the community health workforce was high at 50.9 (SD 11.9); the majority reported adequate skills in service delivery except for community first aid, Kangaroo mother care and noncommunicable diseases. Households' most received CHW services included home visits, treatment for sick under-five children and child immunisation.

Conclusions The existing CHW system has governance and reporting strengths but could be enhanced through revitalization, enhanced coordination of stakeholders, providing appropriate training, work tools, supervision and engaging the community for accountability of results.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This cross-sectional study derives strengths from the use of mixed methods, multiple data collection tools and a triangulation of findings from a range of stakeholders (providers and beneficiaries) in a decentralised health system.
⇒ Stakeholder perspectives are explored using two theoretical frameworks that are widely used in low- and middle-income countries, thus offering an opportunity for transferable learnings.
⇒ The cross-sectional design limits any temporal inferences between potential predictors and the given findings.

INTRODUCTION

Recent pandemics such as COVID-19 (2019–2022) and Ebola virus disease (EVD) in West Africa (2014–2016) demonstrated how fragile health systems are, particularly in low- and middle-income countries (LMICs), and the vital role of community health systems.[1 2] Specifically, governments urgently borrowed from disease surveillance and response methodology to institute strategies, such as epidemiological investigations, risk profiling, risk targeting and risk communication,[3] but critically found a need to depend on community engagement to enhance the adoption of healthier behaviours and cascade preventative interventions, such as handwashing and reducing vaccine hesitancy.[4] Typically, community health worker programmes gained prominence in high-income countries and LMICs alike during these pandemics.[5 6]

While there is a growing consensus for optimising community health worker programmes in LMICs as the pathway to achieving Universal Health Coverage (UHC),[7–9] by majorly increasing the delivery of Primary Healthcare (PHC) services at the community level.[10] Health systems are weak in these settings, exhibiting poor planning, coordination and consequently failing to exploit partnerships that have potential for improving community health systems,[11] mostly weaknesses in leadership and governance functions. A major limitation to exploiting the potential partnerships for community health programmes is the perception by actors that community health systems represent informal, complex adaptive systems[12] where linkages to the formal health system are obscure. Additionally, several LMIC governments are concerned about the economic burden of fully financing large-scale CHW programmes,[13 14] as the latter often hold larger staff numbers compared with the formal health workforce. Yet the health workforce, which is already in severe shortage, is estimated to consume over 60% of the health sector budgets in LMICs.[15] Accordingly, the existing guidance supports the consideration of both financial and nonfinancial incentives for motivating the community health workforce.[8 16 17]

The Global Fund and the UNAIDS community health system frameworks include the components of leadership and governance; the community health workforce capacity and resources; community networks including linkages, partnerships and coordination; community service delivery activities; and enabling environments and advocacy encompassing community engagement.[18] Community engagement espouses the nexus of provider-beneficiary interactions. The community engagement literature suggests that effectiveness revolves around multisectoral collaborations, community involvement, ownership, mutual accountability for results and solid government stewardship.[19–21] Multisectoral collaborations involve, for example, the education, water sanitation and health sectors jointly framing problems, codeveloping and implementing solutions. The recent conditioning of national plans towards program-based budgeting in the health and related sectors in Kenya and Uganda is a step towards nationally led multisectoral collaboration.[22] Further, for accountable delivery of health services, feedback loops to and from the community are vital, with examples of success from innovations such as the use of community scorecards, where communities rate the quantity and quality of health services received based on their values and expectations.[23 24]

In sum, attributes of a strong community health system revolve around strong leadership and governance, which drive the other system building blocks. Uganda, in February 2023, saw the birth of the first-ever National Community Health Strategy (NCHS) whose priorities include increasing access to community health services, equipping and compensating the community health workforce, improving commodity availability, sustainable financing, quality data, multisectoral collaboration and community empowerment.[25] To date, the strategy development and approval have provided a wake-up call for evaluating the feasibility of various incentives for the community health workforce,[26 27] including piloting a new supervisory cadre of community health workers. Also, the community health information system has received substantive attention with urgency for shifting towards digital reporting and the adaptation of the Village Health Team tool kit linked to the national data archive DHIS-2,[28] all supported by the development of the first national Health Information and Digital Health (HIDH) strategy.[29] These advances point to policy shifts where the community health workforce is focal, including considerations for keeping up with technological advancements.

While these advances are vital and constitute major health sector reforms, key challenges remain, such as the need to assess existing community health system capacities and capabilities, learning from over two decades of working with a voluntary community health workforce in Uganda,[30 31] for which this study aimed to contribute.

METHODS

Context

This study was conducted as a baseline in central Uganda before exploring community health problems and for strengthening the community health system of three neighbouring local governments: Masaka City, Masaka District, and Bukomansimbi Districts. The three entities have a joint mid-year population in 2023 of 523 200 people served by 1,436 CHWs.

Study design

We used a mixed methods approach to gain a broad set of providers' and beneficiaries' understanding of the existing community health system capacities and capabilities in two districts and one city of central Uganda. Mixed methods are known to unpack complex processes and systems in healthcare[32] and were used in this study through the triangulation of design, data collection and analysis of results to enhance validity. As community health systems are not new but have seldom been studied holistically in Uganda, we aimed to provide a rich account using three data collection methods: (1) key informant interviews, (2) focus groups and (3) community health worker and household surveys.

Data collection

Sources of data and data collection: Informed by a preceding desk review of policy-relevant documents for the local context, purposive qualitative key informant interviews were conducted with district/city health officials (online supplemental file 1) and focus groups with CHW members (online supplemental file 2). Qualitative research assistants used key informant interview and focus group guides that had a detailed section exploring context and using standard ice-breaking questions such as '(let every person) please describe yourself and what

Table 1 Study participants and sample categorised by method

Method	Category	Participants (n)
Key informant interviews	District 1 health officials (*4), IPs (1), other leaders (1*)	21
	District 2 health officials (*4), IPs (2), other leaders (1*)	
	City health officials (*3), IPs (2), other leaders (3*)	
Focus groups	District 1 CHWs groups (*Group 1, n=8; Group 2, n=9*)	43
	District 2 CHW groups (*Group 3, n=8; Group 4, n=8*)	
	City CHW groups (*Group 5, n=10*)	
CHW survey	District 1 CHW survey, *n1=171*	487
	District 2 CHW survey, *n2=166*	
	City CHW survey, *n3=150*	
Household survey	District 1 HH survey, *n1=125*	419
	District 2 HH survey, *n2=109*	
	City HH survey, *n3=185*	

CHW, community health worker; HH, household; IP, implementing partner.

you do'. Such questions were followed by a reading of the participant information sheet, followed by a question-and-answer reflection session and then consenting before the interviews. Concurrent with the qualitative work, surveys were conducted for CHWs (online supplemental file 3) and for women who had childbirth in the preceding 12 months (online supplemental file 4). Table 1 summarises all participants by data collection method. A total of 12 research assistants with a minimum of a bachelor's degree were trained in research ethics and survey methods to conduct the study between January and February 2023. Qualitative data were digitally audio-recorded, while quantitative data collection was aided by REDCap-enabled digital tools on tablets that were linked to a secure local server at Makerere University School of Public Health. Research ethics principles of consent, voluntary participation, autonomy, confidentiality and data privacy were followed. The study had received ethics approval from the Makerere University Research and Ethics Committee and the Uganda National Council for Science and Technology (MakREC Ref: SPH-2022–314; UNCST Ref: HS2545ES), respectively. It was not appropriate or possible to involve patients or the public in the design, conduct, reporting or dissemination plans of our research.

Sampling and sample size: Purposive sampling was done for the qualitative interviews guided by the study objectives, with samples determined by the saturation of data among participant categories. The CHW survey used sampling proportionate to size to derive from a listing of all eligible CHWs in the district/city. Simple random sampling of subcounties was conducted in Stata I/C 15.0 using random digit allocation. Thereafter, all accessible CHWs in the selected sub-counties were included to participate in the survey. For the household survey, we computed the sample size using access to community healthcare, specifically the proportion of under-fives treated within 24 hours by CHWs (43.3% nationally), the test statistic to achieve a two-tailed test of significance with 95% CIs and a 5% margin of error was used to arrive at a sample size. Participants were obtained by screening households for eligibility within the geographical locations of eligible CHWs.

Data analysis

For the qualitative data, after verbatim transcription, coding followed in NVivo 14 using a framework analysis where a priori codes were adapted. The global fund community health systems strengthening framework formed the broader supraordinate themes, while within the study objectives, the WHO health system building blocks formed the subthemes. Both constant comparison and deviant cases were isolated within each of the themes. For both surveys, data from REDCap were directly imported to STATA I/C 15.0, where cleaning was done. Descriptive exploratory analyses were done to assess data distribution, normality, statistics of central tendency and dispersion, which were later followed by a stratified analysis between the geographic entities to provide locally relevant findings. For comparisons between the three groups, χ^2 tests were run to assess for differences between proportions of the categorical variables for the varied geographical entities (eg, sick under-five children treated, women visited by CHWs during pregnancy). Since the data were normally distributed, χ^2 test values are reported with p values <0.05 considered significant. To compare for differences of means between the three groups (such as for age, duration of work as a CHW and household visits), one-way ANOVA was used, providing an F-statistic and corresponding p values, with significance reported at p<0.05. Additionally, post hoc pairwise comparisons are conducted to assess whether differences in the ANOVA are significant, using the Bartlett's test of equal variance through the Bonferroni method, which provided a χ^2 value and corresponding p values.

Patient and public involvement

None.

RESULTS AND FINDINGS

The community health workforce capacity and resources

Table 2 shows background characteristics of the CHWs, while table 3 shows similar characteristics of the household members (women who had childbirth in the past 12 months). The mean age of the CHWs was 50.7 (SD 11.9) years, higher compared with that of the household members, mean 27.8 (SD 6.9). Similarly, although purposively selected, the focus group participants had CHWs aged between 46 and 64 years. Some district health leaders voiced concerns about the advanced age of CHWs as quoted by a district manager: *(CHW) enrolment was done around 2011, the biggest number of the CHWs in the district were getting old and they were 70 and 80 years old. They were no longer seeing, not able to walk and so on (KII_11 District health team member, District 1)*.

At least two-thirds of CHWs were female, and about 40% had attained some primary or completed primary level education, a similar proportion having had some secondary education. On average, CHWs had worked for at least 11 years (significantly higher for the districts compared with the city, p=0.032), and about half of them were periodically supported by an NGO-like implementing partner (higher in the rural location).

Related to training, nearly all CHWs reported prior training by the government before commissioning them 10 years ago. Two-thirds reported prior training on how to fill their register, but only one-third had received first-aid training, and less than 1% (09/487) had received any training relating to the care for patients with chronic conditions, including noncommunicable diseases and HIV.

Considering what resources CHWs had in place to conduct their mandate, table 3 shows that nearly all had household registers and reporting tools; two-thirds had nutrition assessment MUAC bands; and only half reported essential items such as uniforms and usually T-shirts. Further, about one-third had either gumboots or an essential commodity (such as oral rehydration salts, paracetamol and family planning items) or the integrated Community Case Management of Childhood illnesses (iCCM) medicines (oral rehydration therapy (ORT), amoxicillin and coartem) among others. Barely half of the CHWs (45%) received any form of compensation, and only one in six received financial compensation, highest in the rural locations compared with the city.

Leadership and governance

Table 3 shows that two-thirds of all CHWs uniformly reported supervision in the past quarter as required for their functionality, signalling support from the government or the implementing partner. Accordingly, CHWs reported work processes depicting positive work engagement, with about four in five reporting the performance in the last quarter of home visits, submitting reports, following up with pregnant women and newborns or reporting disease outbreaks. Only half the CHWs reported a role in following up HIV+ persons, and only one-quarter for providing first-aid services.

From the qualitative data, the district managers reported existing structures that support the community health systems to include staff within the health facilities, health assistants who are health facility staff that oversee CHW activities in the communities, and among the CHW member groups, there are informal parish (the administrative level that aggregates villages) level CHW coordinators who collectively form supervisory structures for CHWs. Specifically, district managers and stakeholders reported that almost all villages in the study area have at least two CHW members. Each village consists of about 100–200 households.

> Each village has two CHWs. Then in each sub-county, we have either a Health Centre II or a Centre III. And then at the district level, we have one Health Centre IV. We don't have a hospital. Though they are, anyway, they are all part of the community health system because I know it is from the village to those facilities (KII_01 District health team, District 3).

Similarly, one of the implementing partners indicated that *I commend the districts because they have fully built the structures, they know the village health teams and they know their details (KII_09, Implementing partner 2)*.

However, a majority of the CHWs had initial training spanning from over a decade ago. Despite this, the reporting structures for CHWs were well understood, as quoted for a district manager below, signalling strong accountability, considering that CHWs are a voluntary structure.

> At a parish level, we have a parish coordinator who coordinates all the CHWs in that parish. Her/his job is to relay information from the health facility to the CHWs by informing them what is happening, what we need and what they need to do and s/he also collects the reports from these people. So now, this parish coordinator reports to the health facility focal person, who could be any health worker; it could be a nurse or a health assistant attached to a health facility that has a passion for the CHWs. Hence, her/his job is to make sure that she/he links the whole CHWs system with our health facility (KII_03 District health team member, District 1).

A perhaps larger challenge for the governance of the community health system was inadequate government financing, where disease prevention and promotion activities are designed for delivery through PHC grants to the health facilities, but resources are meagre as indicated by one of the DHT members below:

> As a district we don't have any facilitation to our CHWs since we can't pay them, we don't have funds

Table 2 Community health worker background characteristics

Variables	District, freq (%)					
	Total, n=487 (%)	Bukomansimbi (n=171)	Masaka City (n=166)	Masaka District (n=150)	χ^2 test, p value	One-way ANOVA, F-statistic, p value
Age						
Mean	50.7	49.6	51.4	51.3		
SD	11.9	11.5	12.6	11.5	1.79 (0.409)*	1.14 (0.32)
Sex						
Male	149 (30.7)	64 (37.4)	44 (26.7)	41 (27.3)		
Female	336 (69.3)	107 (62.5)	121 (73.3)	109 (72.7)	6.13 (0.047)*	
Education						
No education/some primary	100 (20.5)	32 (18.7)	30 (18.2)	37 (24.7)		
Completed primary	93 (19.1)	23 (13.5)	36 (21.8)	34 (22.7)		
Some secondary	202 (41.5)	90 (52.6)	55 (33.3)	57 (38.0)		
Completed secondary/higher level	92 (18.9)	26 (14.2)	44 (26.7)	22 (14.7)	38.19 (<0.001)***	
Mean years worked as a CHW						
Mean	11.0	11.1	10.8	11.2		
SD	4.7	5.2	4.4	4.6	235.2 (<0.001)****	3.47 (0.032)*
Currently supported by an IP						
No	246 (50.5)	75 (43.9)	87 (52.7)	83 (55.3)		
Yes	237 (48.7)	96 (56.1)	76 (46.1)	65 (43.3)	5.38 (0.068)	
Main source of income						
Farmer	400 (82.1)	154 (90.1)	124 (75.2)	121 (80.7)		
Business/other	83 (17.1)	17 (09.9)	26 (22.4)	29 (19.3)	16.86 (0.078)	
Organisations reported to in the past 1 year						
RHSP	247 (50.7)	111 (64.9)	67 (40.6)	69 (46.0)	3.76 (0.153)	
BRAC	78 (16.0)	22 (12.9)	25 (15.2)	31 (20.7)	2.32 (0.314)	
Other (such as Living Goods, KOFIH, UNICEF and PACE)	202 (41.5)	54 (31.6)	82 (49.7)	65 (43.3)	4.17 (0.214)	
Health facility (level) of work affiliation						
HC II	95 (19.5)	15 (08.8)	50 (30.3)	30 (20.0)		
HC III	274 (56.3)	118 (69.0)	91 (55.2)	64 (42.7)		
HC IV	95 (19.5)	19 (11.1)	20 (12.1)	56 (37.3)	62.57 (<0.001)***	
Other (mostly direct with NGOs)	20 (04.1)	19 (11.1)	01 (00.6)	00 (00.0)		
Mode of transport from home to HF						
Walking	179 (36.8)	78 (45.6)	53 (32.1)	48 (32.0)		
Public motorcycle/car	171 (35.1)	59 (34.5)	70 (42.4)	42 (28.0)		
Other	107 (27.1)	34 (19.9)	39 (23.6)	58 (38.7)	28.31 (<0.001)***	
Mean household visits in a typical day						
Mean	10.1	10.6	11.8	08.0		
SD	11.5	11.6	12.9	09.3	99.5 (<0.001)***	4.14 (0.016)*
Received CHW training						
Basic CHW training	469 (96.3)	167 (97.6)	159 (96.4)	142 (94.7)	1.31 (0.519)	
Filling the community register	330 (67.8)	118 (69.0)	111 (67.3)	100 (66.7)	0.22 (0.896)	
First Aid provision	186 (38.2)	73 (42.7)	71 (43.0)	42 (28.0)	9.69 (0.008)**	
Role with chronic condition (eg, NCDs or HIV)	09 (01.8)	01 (00.6)	04 (02.4)	04 (02.7)	2.35 (0.308)	

*p<0.05, **p<0.01, ***p<0.001.
*Bartlett's χ^2 and p value.
ANOVA, Analysis of variance; BRAC, Bangladesh Rural Advancement Committee; CHW, community health worker; HC, Health Centre; HF, Health Facility; IP, implementing partner; KOFIH, Korea Foundation for International Healthcare; NCD, Non-communicable disease; NGO, Non-governmental organisation; PACE, Program for Accessible Health Communication and Education; RHSP, Rakai Health Sciences Program.

Table 3 Community health worker work resources and care processes

Variables	District, freq, yes (%)				
	Total, n=487 (%)	Bukomansimbi (n=171)	Masaka City (n=166)	Masaka District (n=150)	χ^2 test, p value
Work tools					
T-shirt/uniform	265 (54.4)	90 (52.6)	88 (53.3)	86 (57.3)	0.810 (0.667)
Gumboots	196 (40.3)	88 (53.3)	86 (57.3)	196 (40.3)	3.34 (0.118)
Kit/commodities bag	191 (39.2)	67 (39.2)	57 (34.6)	66 (44.0)	2.95 (0.229)
First-aid supplies	67 (13.8)	20 (11.7)	24 (14.6)	23 (15.3)	1.01 (0.603)
iCCM medicines	175 (35.9)	57 (33.3)	58 (35.2)	60 (40.0)	1.62 (0.445)
Bicycle	33 (06.8)	08 (04.7)	16 (09.7)	09 (06.0)	3.56 (0.169)
Work supplies					
Have reporting tools	167 (97.7)	151 (91.5)	143 (95.3)	462 (94.9)	7.52 (0.11)
Have CHW register	462 (94.9)	167 (97.7)	151 (91.5)	143 (95.3)	6.60 (0.037)*
MUAC band	346 (71.1)	117 (68.4)	116 (70.3)	112 (74.7)	2.45 (0.294)
Glucometer	81 (16.6)	17 (09.9)	36 (21.8)	28 (18.7)	9.30 (0.010)*
Work compensation					
Compensation (any)	218 (44.8)	92 (53.8)	66 (40.0)	60 (40.0)	6.72 (0.035)*
Financially compensated	77 (15.8)	47 (27.5)	13 (07.9)	17 (11.3)	22.6 (<0.001)***
Work support					
Supervised in the past 3 months	325 (66.7)	113 (66.1)	115 (69.7)	96 (64.0)	5.04 (0.283)
Work processes					
Home visiting	423 (86.8)	149 (87.1)	137 (83.0)	136 (90.7)	16.8 (<0.001)***
Submit quarterly reports	427 (87.7)	156 (91.2)	145 (87.9)	125 (83.3)	3.56 (0.168)
Follow-up of pregnant women and newborns	44 (85.0)	150 (87.7)	139 (84.2)	124 (82.7)	14.7 (0.001)**
Report disease outbreaks	407 (83.6)	155 (90.6)	132 (80.0)	119 (79.3)	10.8 (0.004)**
Follow-up of HIV+ persons	258 (53.0)	87 (50.9)	90 (54.6)	84 (54.0)	1.52 (0.467)
Provide first aid services	119 (24.4)	41 (24.0)	34 (20.6)	44 (29.3)	6.45 (0.040)*

*p<0.05, **p<0.01, ***p<0.001.
CHW, community health worker; iCCM, integrated Community Case Management of Childhood illnesses; MUAC, Mid-Upper Arm Circumference.

for them, we depend on our Implementing partners to motivate them (KII_13 District health team member, District 3).

Similarly, one of the city health team members narrated:

> One of the biggest challenges that we face is the low resources that we have. Even at times, we may end up not getting any or having any budget for CHW activities. Hence, we are always just there waiting for any implementing partner to come in and implement (KII_10 City health team member).

Community health services delivery

Antenatal care attendance was near universal; however, only one-third of pregnant women had a home visit by a CHW. Also, for the entire preceding year, about one-sixth (16.2%) of all households had no home visit by a CHW.

As observed in table 4, about 18% of women who had childbirth in the past 12 months reported ever being diagnosed with hypertension, nearly all during their last pregnancy. Similarly, about 15% of the women respondents reported ever being diagnosed with diabetes; nearly all reported it within their last pregnancy.

Concerning child health, nearly all households had more than one under-five child, and about half of these children were sick in the preceding 2 weeks to the survey (higher in Bukomansimbi, the most rural district). Of the sick children, four-fifths suffered from either fever or cough with or without fast breathing, while one-third had diarrhoea. Altogether, Masaka City, the most urban locality, significantly had the least child morbidity, depicting rural-urban disparities in health status. However, in relation to child immunisation, Bukomansimbi, the most rural, had significantly higher immunisation completion rates (80% vs 62%), depicting difficulties in immunisation programme penetration within urban localities.

From a CHW's perspective, it appears that a huge burden of demands from multiple implementing partners, in addition to government, stifles their effectiveness as narrated below:

Table 4 Household member (women who had childbirth ≤12 months) key characteristics

Household member (women who had childbirth ≤12 months), characteristics, health status and care seeking						
	District, freq (%)					
Variables	Total, n=419 (%)	Bukomansimbi (n=125)	Masaka city (n=109)	Masaka District (n=185)	χ^2 test, p value	One-way ANOVA, F-statistic, p value
Age (mean (SD))	27.8 (6.9)	28.3 (6.6)	28.1 (5.8)	27.1 (7.6)	9.86 (0.007)***	1.27 (0.282)
Marital status (married)	352 (84.2)	103 (83.1)	97 (89.0)	151 (85.7)	7.00 (0.32)	
Highest education (primary)	198 (47.5)	66 (53.2)	45 (41.3)	87 (47.5)	30.93 (<0.001)***	
Has at least one child under five (freq, yes %)	407 (97.1)	120 (97.8)	107 (98.2)	180 (97.3)	0.55 (0.75)	
Had sick child in past 2 weeks (freq, yes %)	213 (50.8)	81 (65.3)	49 (45.0)	83 (44.9)	15.45 (<0.001)***	
Sick child had diarrhoea (n=213; freq, yes %)	68 (31.9)	30 (14.1)	14 (6.6)	24 (11.3)	1.68 (0.43)	
Sick child had cough/fast breathing (n=213; freq, yes %)	173 (81.2)	69 (32.4)	40 (18.8)	64 (30.0)	0.88 (0.64)	
Sick child had fever (n=213; freq, yes %)	172 (80.8)	65 (30.5)	37 (17.4)	70 (32.9)	3.83 (0.43)	
Sick child accessed care within 24 hours (n=213; freq, yes %)	192 (45.8)	72 (58.1)	49 (45.0)	71 (38.4)	5.35 (0.06)	
Sick child accessed care within 24 hours from a CHW (n=192; freq, yes %)	123 (64.1)	37 (51.4)	39 (79.6)	47 (66.2)	17.06 (0.09)	
Sick child vaccination up to date (n=213; freq, yes %)	146 (68.5)	65 (80.2)	31 (63.3)	50 (60.2)	8.01 (0.09)	
Household had no CHW visit in past 12 months (freq, yes %)	68 (16.2)	25 (20.2)	21 (19.3)	21 (11.4)	40.30 (<0.001)***	
Attended at least one ANC visit (last pregnancy) (freq, yes %), missing n=2	397 (94.8)	119 (96.0)	101 (92.7)	175 (95.1)	1.65 (0.438)	
Had a CHW home visit during the last pregnancy (freq, yes %)	135 (32.2)	31 (25.0)	21 (19.3)	83 (44.7)	24.4 (<0.001)***	
Ever diagnosed with diabetes (freq, yes %)	62 (14.8)	19 (15.3)	19 (17.4)	24 (13.0)	4.64 (0.326)	
Had diabetes in the last pregnancy (freq, yes %)	61 (14.6)	19 (15.3)	19 (17.4)	23 (12.4)	4.97 (0.29)	
Ever diagnosed with hypertension (freq, yes %)	75 (17.9)	29 (23.4)	19 (17.4)	27 (14.6)	15.47 (0.004)**	
Had hypertension in the last pregnancy (freq, yes %)	79 (18.9)	29 (23.4)	20 (18.4)	30 (16.2)	13.86 (0.008)**	
Overall satisfied with CHW services (yes %)	363 (86.6)	100 (80.7)	93 (85.4)	170 (91.9)	6.71 (0.035)*	

Level of significance *p<0.05, **P<0.01, ***p<0.001.
*Bartlett's χ^2 and p value.
ANC, Antenatal care; ANOVA, Analysis of variance.; CHW, community health worker.

> Once, my supervisor clearly gave me a role to make sure that I register pregnant mothers and register new births. I am supposed to treat the children that come in and along the way maybe at 10:00 AM someone comes from [NGO named] and wants me to arrange or mobilize for him people going for family planning and then shortly after someone comes from [NGO2 named] and wants to know the people defaulting on ART [anti-retroviral treatment]. They are all coming to me to look [execute tasks] for them. Then maybe shortly someone [Government official] calls and says that they received information that there is a problem of cholera and that I should investigate for them (FGD 04, Participant 3).

While the delivery of community health services could be enhanced, the limitations revolve around a weak community health system and workforce governance, including irregular training, a mismatch between job demands and job resources, threatening job strain for CHWs, which are all critical prerequisites for a functional system, as discussed subsequently.

DISCUSSION

Summary of findings: For this study which assessed existing community health system capacities and capabilities in three local governments of central Uganda, we found relatively high levels of community health leadership and governance for all entities with existing structures, clear roles and reporting lines but only majorly undermined by limited community health financing.[11] Existing community networks, including NGO partnerships, were being harnessed and, to an extent, supporting majorly the most rural district for improving reporting rates, but also service delivery, such as immunisation completion rates.[13] The community health workforce capacity and resources

were limited[7 9]: while an adequate community health workforce existed as per recommended 'staffing' norms, the majority were of advanced age. Also, two-thirds were women, suggesting gendered roles in the workforce. For the resources, there was limited equipping and tooling of the CHWs, inadequate stocking with iCCM supplies and commodities and minimal evidence of compensation for their work,[25] yet with a burgeoning list of work demands from both government and the implementing partners. Regarding community service delivery, CHWs had the capacity to complete routine screening of pregnant women and newborns, treat sick children, support child immunisation and investigate disease outbreaks;[33] however, they weakly supported first-aid response[34 35] and chronic disease care or follow-up,[36 37] despite the high prevalence of diabetes and hypertension.

To harness the strong leadership and governance of community health systems and to confront scaling challenges,[14] a district-led coordination of partners is required to harness resources for strengthening community health workforce capacity, information management, commodities and coordinated services delivery, where community scorecards can be used to track progress for results.[23 24] Existing evidence suggests that community health partnerships with the numerous actors at this level promise stronger community health systems,[11 18] which enhance ownership and accountability for results. While partnerships are key for all community health actors, a convergence point when demanding results is the community health worker whose job demands need to be supported with adequate training, supervision, equipment, tooling and compensation for supporting PHC activities which drive the UHC agenda.[17 33]

In light of the advanced age of the community health workforce, a bold recruitment plan is required alongside a retention plan that adequately attracts the most suitable people willing to serve their communities. There has been a relative neglect in the literature to confront the issue of the advancing age of CHWs, when proposing recruitment, succession planning and training for professionalising CHWs in LMIC settings.[38 39] Evidence has shown that CHWs' community connections and embeddedness build trust, which supports the onward provision of quality health services, accessible to those in most need.[10 20] Implicit in the connections and embeddedness with community members is not only the professionalism but also the trust accorded to CHWs of a given age, due to their experience and commitment to the job.[39] Therefore, findings in a setting where recipients of CHWs' care are concerned about the effective performance of CHWs aged 50 years and above suggest a need for succession planning and the provision of fair compensation that motivates both the new entrants and the existing workforce.

Community health service delivery related to maternal and child health can be improved by strengthening iCCM components such as commodity availability and including community first-aid response.[34 36 40] Gauging from the high burden of NCDs, particularly diabetes and hypertension in association or in co-existence with other chronic conditions such as TB and HIV, there is a need to equip CHWs with simple but highly engaging health talking points that can support community health education for early screening, provision of supportive care, follow-up of specific persons and linkage to appropriate care.[36 37] In other programmes in several countries, the landscape of community health services delivery is gradually shifting from a predominant disease focus, where PHC services are delivered, to include advice on behavioural modification of risk factors for chronic disease. A new era of programming (eg, training of CHWs in chronic care support), tooling (eg, developing simple case definitions for screening) and monitoring of care quality is required. This approach aims at integration into the existing design of UHC, essentially rethinking efficiencies from CHW programme designs.[36 37 41] In this study, self-reports of noncommunicable disease commencing during pregnancy appear slightly lower for hypertension but much higher for diabetes than the average for Ugandan females (18% vs 22.9% and 15% vs 1.1%, respectively) compared with the WHO STEPS survey on NCDs for Uganda.[42] Findings suggest an important role of the community health system in the surveillance and screening of probable cases of noncommunicable diseases, as well as the possible improvement in surveillance to increase the validity of self-reports.[43]

Programmatically, a revised recruitment plan for the CHWs workforce, coupled with a revised training plan that incorporates aspects of chronic disease care, first-aid response and potentially other skills such as technological adoption, requires a major reform. This requires a rethink about the adequacy of the community health workforce or the workload ratios,[14] the appropriate age and qualifications at selection,[31 39] the full range of training modules, duration and models of training[38] and the retention strategy.[44 45] The existing national community health strategy for Uganda is silent on issues of succession planning, evolving skill needs and the requisite toolkit.[25] There is a need for an increased policy-practitioner debate on these evolving CHW policy needs where CHW programmers, who are mostly the non-governmental actors, should actively engage.

Methodologically, this study has inherent limitations. First, the cross-sectional design limits any temporal inferences[46] between potential predictors, such as community resources and outcomes such as community health system's resilience. Second, while mixed methods studies have considerable explanatory power for providing nuanced accounts and for theoretical immersion, this study used a concurrent design where both qualitative and quantitative methods were deployed simultaneously, and triangulation was completed at analysis. In this regard, there is limited exploratory or explanatory capacity of the methods in theoretical building or validation as there would have been if the mixed design used a sequential method with qualitative or quantitative stages preceding,

respectively.[47 48] Finally, this study had three populations: the households, community health workers and district health leaders; however, the households were not necessarily matched to the respective community health workers, and likewise, the latter were not mapped to their respective health facilities that resource them, limiting comparisons across contexts for the populations.[49] In fact, the community health system in Uganda is still regarded as an informal establishment, requiring stronger linkages to the formal health system. Therefore, the learning from this study of the community capacities and capabilities needs to be interpreted within an evolving community health system that is weakly governed.

In conclusion, this mixed methods study set out to examine the community health system capacities and capabilities within an evolving local policy framework in three decentralised settings in Uganda. The study found that the existing public governance structures and leadership were able to sustain a poorly coordinated community health system comprising a voluntary workforce, weakly resourced and poorly skilled for noncommunicable diseases and first-aid but demonstrating effective performance for PHC services and with varied reporting rates. Several local NGO partners existed but were perceived to provide fragmented support that overburdened the community health workforce. Effective district leadership in the coordination of existing partners is vital for harnessing scarce resources to better the community health system. Future studies exploring improvements in community health worker programmes should examine how the various community health system inputs affect the motivation of the workforce. Also, consideration is needed for the evolving landscape of health services delivery, especially regarding CHWs' capacities and capabilities to offer noncommunicable disease and first-aid services. Further, as noted from this study, future work should design and test simple chronic disease behaviour change messaging targeting averted risk behaviour and improving care processes such as adherence to, and continuity of care.

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