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ORIGINAL PAPER

Implementation of the Community Health Assistant (CHA) Cadre in Zambia: A Process Evaluation to Guide Future Scale-Up Decisions

Katharine D. Shelley[1,3] · Yekoyesew W. Belete[2,3] · Sydney Chauwa Phiri[3] · Mutinta Musonda[4,7] · Elizabeth Chizema Kawesha[5] · Evelyn Mutinta Muleya[6] · Caroline Phiri Chibawe[7] · Jan Willem van den Broek[3] · Kathryn Bradford Vosburg[3]

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Abstract Universal health coverage requires an adequate health workforce, including community health workers (CHWs) to reach rural communities. To improve healthcare access in rural areas, in 2010 the Government of Zambia implemented a national CHW strategy that introduced a new cadre of healthcare workers called community health assistants (CHAs). After 1 year of training the pilot class of 307 CHAs deployed in September 2012. This paper presents findings from a process evaluation of the barriers and facilitators of implementation of the CHA pilot, along with how evidence was used to guide ongoing implementation and scale-up decisions. Qualitative inquiry was used to assess implementation during the first 6 months of the program rollout, with 43 in-depth individual and 32 small group interviews across five respondent types: CHAs, supervisors, volunteer CHWs, community members, and district leadership. Potential 'implementation moderators' were explored using deductive coding and thematic analysis of participant perspectives on community acceptance of CHAs, supervision support mechanisms, and coordination with volunteer CHWs, and health system integration of a new cadre. Community acceptance of CHAs was generally high, but coordination between CHAs and existing volunteer CHWs presented some challenges. The supervision support system was found to be inconsistent, limiting assurance of consistent quality care delivered by CHAs. Underlying health system weaknesses regarding drug supply and salary payments furthermore hindered incorporation of a new cadre within the national health system. Recommendations for implementation and future scale based on the process evaluation findings are discussed.

Keywords Community health workers · Human resources for health · Qualitative process evaluation · Zambia · Health systems strengthening

Introduction

A critical shortage of human resources for health (HRH) limits coverage of essential health services, particularly in rural areas, and is associated with a variety of factors: geographic mal-distribution of healthcare workers (HCWs); poorly funded and functioning healthcare systems; insufficient training capacity; mismatched skills related to population healthcare needs; low retention; and out-migration of HCWs from rural to urban areas and to higher income countries [1–3]. There is increased recognition that CHWs can play an important role in moving

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✉ Katharine D. Shelley
katharine.shelley@jhu.edu

1 Department of International Health, Johns Hopkins University Bloomberg School of Public Health, 615 N. Wolfe St, Room E8009, Baltimore, MD 21205, USA

2 MDG Acceleration Initiative, UNICEF, Lusaka, Zambia

3 Clinton Health Access Initiative, Lusaka, Zambia

4 Human Resources Administration, Ministry of Foreign Affairs, Lusaka, Zambia

5 Disease Surveillance, Research and Control, Ministry of Health, Lusaka, Zambia

6 Human Resources and Administration, Ministry of Health, Lusaka, Zambia

7 Mother and Child Health, Ministry of Community Development, Mother and Child Health, Lusaka, Zambia

towards universal health coverage by increasing access to health promotion and prevention [4–6]. Expansion of community health worker (CHW) programs is supported by a growing body of evidence that highlights the link between CHWs and improved population health outcomes in large-scale programs in low-income settings [3, 7, 8].

There are many definitions of CHWs, but a key characteristic is they provide services outside of health facilities, such as in homes, villages, or community gatherings, serving as a bridge between the community and the health facility [9]. The World Health Organization states that CHWs "should be members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of its organization, and have shorter training than professional workers" [8]. CHW programs vary widely in terms of work environment, training scope and duration, remuneration, supervision, tasks, and integration within the health system.

Zambian Setting

Zambia is a lower-middle income country in Southern Africa with a population of 14.6 million mostly residing (60 %) in rural areas [10]. Communicable, maternal, neonatal, and nutritional diseases comprise Zambia's leading causes of disability-adjusted life years and years of life lost due to premature death, including morbidity and mortality due to: HIV/AIDS, malaria, lower respiratory infection, diarrheal disease, protein-energy malnutrition, and tuberculosis [11]. The health system is strained by the infectious disease burden of HIV/AIDS and malaria, with an estimated 1.1 million Zambians living with HIV/AIDS in 2014 and over five million reported cases of malaria in 2013 [12, 13]. While the under-5 mortality rate declined from 168 to 75 deaths per 1000 live births over the last decade, diarrhea and acute respiratory infections remain leading causes of child mortality, with treatment from a facility/provider sought for only 65–70 % of sick children with fever, diarrhea, or acute respiratory symptoms [14]. Zambia's achievement of key health targets continues to be hindered by a shortage of qualified healthcare workers, particularly dire in rural areas. In 2011 there were only 12.4 public sector physicians, midwives and nurses per 10,000 population, and it was estimated that an additional 21,000 additional HCWs would be needed to close the health workforce gap [15–17].

Development of Zambia's Community Health Assistant Strategy

In 2009 the Ministry of Health (MOH) and Clinton Health Access Initiative (CHAI) conducted a situational assessment of Zambia's CHW landscape, confirming common pitfalls described in CHW literature [4]. The assessment documented a large workforce across various CHW programs, that generally had a vertical, single-disease focus, but lacked regulation, standardized training, adequate supervision, or a clear remuneration policy [18]. Many programs were developed and implemented by partners without significant MOH authority or coordination with the national health system.

The Government of Zambia committed to quality community-level healthcare with the strategic aim of "repositioning and expanding the CHW cadre" [19]. Zambia drew on the best practices from Brazil, Ethiopia, India, Malawi, Pakistan, Rwanda, and South Africa to guide their national CHW strategy. Characteristics of successful programs included a strong supervisory system with dedicated CHW supervisors to reinforce clinical skills, a career progression strategy, and government commitment to remuneration of CHWs. In August 2010, Zambia launched the National Community Health Worker (NCHW) Strategy to justify a formalized community cadre. These community health assistants (CHAs) were to be recruited from their communities and trained for 1 year using a comprehensive primary health care (PHC) curriculum to match Zambia's disease burden [19, 20]. The CHA program aimed to reduce maternal and child mortality through providing PHC services as close to the family as possible. The CHA scope of work includes preventive and curative services related to disease prevention and control, behavioral health, environmental health, reproductive health, child health, and medical and surgical conditions (Table 1).

A pilot program was designed to gather evidence for developing a clear strategy for large-scale investment in scale-up of the CHA program. In addition to Zambia's MOH, the General Nursing Council of Zambia, Health Professions Council of Zambia, implementing partners, academic institutions, bilateral donors and other government ministries contributed to the pilot program design. The lessons learned and recommendations gathered from key stakeholders during the first 6 months post-deployment of the pilot CHAs should help inform programmatic decisions to improve CHA program implementation and guide future scale-up.

Methods

Process evaluation is a research approach used to verify program activities and operations, and determine whether a program is being implemented as planned, also known as *fidelity* [21]. While program coverage, consistency and duration may be assessed, process evaluation methods also

Table 1 Summary of tasks within scope of CHA work

Disease prevention and control
• Identify and report outbreaks
• Collect and report community health and service delivery data
Behavioral health
• Identify and refer at-risk persons
• Provide basic mental health counseling
Environmental health
• Promote hand washing, water safety and food hygiene
• Inspect construction of latrines
• Distribute insecticide-treated bed nets
Reproductive health/safe motherhood
• Provide pregnancy and HIV testing
• Promote antenatal and postnatal care visits
• Educate on prevention of mother-to-child-transmission of HIV care and breastfeeding
• Counsel pregnant women on diet, vitamins, self-care and substance abuse
• Attend emergency deliveries outside of health facilities[a]
• Manage post-partum hemorrhage with misoprostol
• Provide an Essential Newborn Care package including management of asphyxia during delivery
• Counsel and provide family planning options, including Depo-Provera injections[a]
Child health
• Utilize the integrated community case management approach for care to sick children
• Provide ORS and zinc for diarrhea, deworming and vitamin supplementation
• Promote immunizations
• Identify signs and refer children to clinics for neonatal sepsis, pneumonia, diarrhea with dehydration, measles, cancer, meningitis, mumps, tetanus, and leprosy
Medical and surgical conditions
• Provide rapid diagnostic tests and treatment for malaria
• Collect and transport sputum for TB testing
• Distribute condoms
• Perform HIV tests
• Promote adherence to treatment for HIV, TB and other chronic diseases such as diabetes
• Treat respiratory infections and schistosomiasis
• Assist facility-based care taking patient histories and vital signs
• Provide basic first aid and palliative care

[a] Items added during the September 2012 curriculum review

explore and document barriers and facilitators to fidelity, called 'implementation moderators', which are helpful to informing the design of program improvement efforts [22, 23]. This evaluation assessed implementation by documenting the first 6 months of the CHA program rollout, to guide future improvements in key processes during possible scale-up.

Study Setting

Students were recruited from 47 rural districts across seven of Zambia's nine provinces through advertisements placed in those communities. These districts identified health posts (Zambia's lowest level of health facility) with poor results in key indicators, either staffed by at least one trained HCW, or unstaffed but near a rural health center (RHC) with a trained HCW. District staff shortlisted qualified candidates for interviews, with preference given to females and/or applicants with prior or current experience as volunteers in the community [19]. Candidates were interviewed and selected by a panel composed of one district staff, one supervising health center staff, and three Neighborhood Health Committee members. The pilot class of 307 CHAs graduated in July 2012 after 1 year of standardized, pre-service training. They were equipped with MOH uniforms, backpacks, mobile phones, and a bicycle.

Table 2 Sample selection of province and health post catchment areas where interviews occurred at 2 and 6 months post-deployment

Province	Health post	Number and CHA gender	Interviews		Supervisor qualification	Supervisor location	Interviews	
			2 month	6 month			2 month	6 month
Eastern	HP1	2 males	X	X	Enrolled nurse	HP	–	X
	HP2	1 male, 1 female	X	X	Enrolled nurse	HP	X	X
Northern	HP3	2 females	X	X	Enrolled nurse	RHC	X	X
	HP4	1 female	X	X	Enrolled nurse	HP	X	X
Luapula[a]	HP5	1 male, 1 female	X	X	Registered nurse	RHC	X	X
	HP6	1 female	X	X	Registered nurse	HP	X	X
	RHC1	2 males	X	X	Midwife	RHC	–	–
Western[b]	HP7	1 male, 1 female	X	X	EHT	RHC	–	–
	HP8	2 females	X	X	Clinical officer	RHC	X	–
Western[c]	HP9	2 females	–	X	EHT	RHC	–	X
	HP10	2 females	–	X	EHT	RHC	–	X

EHT environmental health technician, *HP* health post, *KM* kilometer, *RHC* rural health center

[a] One health post originally selected from the district in Luapula had been upgraded to a rural health center (RHC1); we interviewed the CHAs at this RHC during both data collection cycles, but did not interview other types of respondents. An alternate health post (HP6) in this district was sampled

[b] During the second round of data collection, CHAs in this district could not be accessed due to flooding. They were interviewed in Copperbelt Province during April 2013 at the CHA refresher training session

[c] An alternate district was selected in Western Province due to flooding conditions which prevented access. The accessible health posts in the alternate district were staffed by CHA alongside other qualified HCWs, but supervisors were not located on-site

By September 2012, CHAs were deployed to begin work in 161 health posts in their home communities. Given that health posts in rural areas are intended to serve a population of 500 households (3500 people) [24], a conservative estimate of the CHA pilot reach is roughly 565,000 people.

Sampling and Data Collection

Four of the seven provinces (Eastern, Northern, Luapula, and Western) were purposively selected for geographic representation of the country. Random selection of one district within each province was followed by purposive sampling of two health posts per district to include posts staffed by CHAs only versus posts staffed by CHAs plus $\geq$1 trained HCW (a clinical officer, nurse, or environmental health technician). Health post staffing patterns were hypothesized to be related to how the CHAs divide their time between the health post and within the community. The gender composition of the CHA pair was also taken into account. Health posts with two female, two male, or one male and one female CHA were represented. Characteristics of the sampled health posts, number and gender of CHA, qualifications of supervisors, and post-deployment timing of interviews are presented in Tables 2 and 3.

Interview guides included open-ended questions in seven thematic areas: district ownership of the CHA program; deployment and introduction of CHAs to the community, health facility and district; community acceptance of CHAs; CHA working environment, including commodity availability; coordination among CHAs and existing volunteer CHWs; CHA scope of work and role; and supervision. Semi-structured qualitative individual and small group interviews were conducted with five types of respondents: CHAs, CHA supervisors, district focal point persons for the CHA program, volunteer CHWs, and community members. District Medical Offices received an official letter from MOH announcing the visit date and requesting participation. The interview team called the district focal person and CHAs in advance of the scheduled visit dates to ensure their availability for interviews. CHAs were asked to contact volunteer CHWs to relay the visit date. Community members were identified through convenience sampling with the help of the village chief and volunteer CHWs.

During November 2012, a team of three interviewers led the first round of small group interviews (2–4 persons) in local Zambian languages with community members and volunteer CHWs. The first and second author conducted individual interviews in English with supervisors and district focal persons, and two-person interviews with each set of CHAs at a health post (in a few instances, CHAs were interviewed individually). Interviews (25–50 min in length) were audio-recorded and field notes were documented by the interviewer; the field team debriefed after

Table 3 Summary of facility characteristics collected at 6 months post-deployment

Province	HP	Distance (km)		Pop[a]	HHs[b]	Staffing	No. beds[c]	Functional water source	Latrine type	Functional electricity
		RHC	DHO							
Eastern	HP1	7	45	3864	645	1 EN, 2 CHA, 2 CDE	–	Yes, hand pump	Water-wash	No
	HP2	20	20	4649	915	1 EN, 2 CHA, 2 CDE	8	Yes, hand pump	Pit	Yes, solar
Northern	HP3	30	137	4144	?	1 EN, 2 CHA, 4 CDE	–	Yes, piped	Water-wash	No
	HP4	35	60	5784	1125	1 EN, 1 CHA, 3 CDE	7	No, well	Water-wash	No
Luapula	HP5	35	33	3250	1412	2 CHA	–	No, well	Pit	No
	HP6	7	35	13000	?	1 RN, 1 EN, 1 CHA, 1 CDE	4	Yes, borehole	Water-wash	No
	RHC1	0	6	8787	1345	2 EN, 1 EHT, 2CHA, 1 CDE	6	Yes, river	Water-wash	No
Western	HP7	20	88	1753	?	2 CHA, 1 CDE	2	No, hand pump	Water-wash	Yes, solar
	HP8	20	40	3326	?	2 CHA, 1 CDE	2	Yes, hand pump	Water-wash	Yes, solar
Western	HP9	10	10	5972	450	1 EN, 2 CHA, CDE	0	Yes, hand pump	Water-wash	No
	HP10	15	30	4000	?	1 EN, 2 CHA, 1 CDE	0	Yes, hand pump	Pit	Yes, solar

DHO District Health Office, *EHT* environmental health technician, *HP* health post, *HH* household, *KM* kilometer, *Pop* population, *RHC* rural health center, *CDE* certified daily employee (non-qualified staff)

[a] For HP7 and HP8, the catchment population size could not be obtained through process evaluation facility assessment, and was therefore pulled from Zambia's 2012 list of health facilities [25]

[b] A '?' denotes an unknown number of households in the health post catchment area. This is an indication that CHA had not yet completed the village and household-level numbering and mapping at the time of the process evaluation interviews

[c] Source from data on number of beds is the 2012 list of health facilities [25]; '–' indicates a new health post that was not yet constructed at the time of Zambia's facility inventory assessment in 2012

each data collection event. A quantitative facility-based assessment tool was administered to document the infrastructure and availability of drug supplies and commodities in order to contextualize the interview findings.

At 6 months post deployment, April 2013, the interview team returned to the same facilities to conduct a second round of interviews. Many prompts remained similar across both rounds of data collection, but the second round revisited emergent issues and explored perspectives on CHA program accomplishments to-date. In Western Province, flooding prevented return access; therefore, an alternate district for round two was selected with assistance from the Provincial Medical Office. With the exception of interview participants from Western Province, in most cases the original district focal persons, CHAs, supervisors and volunteer CHWs were interviewed a second time, which allowed for continuity of perspectives. For community members, identifiers were not collected, but we assume unique individuals participated during each round of data collection.

Data Analysis

Audio-recorded interviews were transcribed into English by the interviewer using ExpressScribe [26]. Personal identifiers were removed from transcripts to ensure confidentiality. MaxQDA software was used for data management, coding, and thematic analysis [27]. Thematic analysis included familiarization with all interview transcripts and field notes, leading to development of an initial codebook based on overarching topics. Codes were applied to textual segments, and reorganized and reapplied as new themes emerged [28]. Deductive coding was used by the first and second authors to develop the codebook structure through independent coding of two interviews from each respondent type. Modifications to the codebook were discussed until agreement was reached and finalized, after which, interview transcripts were divided and independently coded. Coded segments were reviewed within each theme and sub-theme to uncover patterns in the data, utilizing illustrative quotes to justify reported findings and conclusions.

Ethical Considerations

The MOH Permanent Secretary approved the process evaluation protocol and granted permission to conduct interviews, which were voluntary. Field staff read an MOH-approved consent form describing the process evaluation objectives and interview process, and asked each respondent for verbal consent. Participants were informed they could skip questions they did not wish to answer and/or stop the interview. Personal identifiers were not collected and assurance was given that responses would be presented in aggregate to maintain confidentiality.

Results

During two rounds of data collection in November 2012 and April 2013, 43 individual and 32 small group interviews were conducted (Table 4). Findings from the first 6 months of CHA program implementation focused on potential 'implementation moderators', including community acceptance, supervision support mechanisms, and coordination within the health system. Operational challenges that hindered implementation were related to remuneration and the supply chain, briefly discussed as weaknesses in the underlying health systems.

Community Acceptance

In many other countries, community acceptance of health workers is essential to successful program implementation [29]. This includes creation of ownership by community members, as well as accountability of CHWs to their communities. We sought to understand how community members and volunteer CHWs engaged with CHAs, exploring attitudes and perceptions of CHAs. Interview feedback indicated the majority of CHAs were well-accepted by their communities. CHAs described community acceptance as a motivational factor, which in turn helped them to better serve their community:

> The feedback [from community members] was quite overwhelming because people they didn't know that when we will be doing home visits we will be having drugs. So now people are very happy because it's like we are delivering health services on their doorsteps. (CHA, Eastern Province)

A community member highlighted the strong relationship between CHAs and the community:

> These people [CHAs] have a very good interaction with the community. From the time they started working, I have never heard any reports that they are rude nor have we heard of any complaints of how they work. (Community Member, Western Province)

Two key reasons were mentioned for acceptance of CHAs by their communities: recruitment from the community they serve and access to health care closer to their homes. A CHA district focal person explained:

> I think we didn't have major problem with the community since they are the people they know already. So it was easy for them to accept them [the CHAs]. (District focal person, Western Province)

In Northern Province a supervisor noted that the health post was previously unstaffed, which meant patients had to travel 35 km to the nearest RHC. A volunteer CHW summarized improvements observed in his community after the CHA began working:

> We have observed some strength in this CHA program as compared to the days before it. There is a reduction in illnesses in the community due to the treatment they offer. Deaths have reduced because we now [have] access to medicines to give to the sick, and the CHA go into the community to treat and teach, which never used to happen before the program. This program has brought happiness to our community as deaths and illnesses are reducing. (Volunteer CHW, Luapula Province)

Table 4 Summary of respondents interviewed during the first and second round of data collection

Interview type	1st round interviews	Participants (gender)	2nd round interviews	Participants (gender)	Comments
Individual interviews	#	# (M; F)	#	# (M; F)	
District focal persons	4	4 (3 M; 1F)	4	4 (3 M; 1 F)	1 interview per district
CHA supervisors	6	6 (6 M; 0 F)	8	8 (8 M; 0 F)	1 interview per post
CHAs[a]	9	16 (7 M; 9 F)	12	19 (6 M; 13 F)	1–2 interviews per post
Sub-total	19	26 (16 M; 10 F)	24	31 (17 M; 14 F)	43 interviews
Small group interviews					
Volunteer CHWs	8	24 (13 M; 11 F)	8	23 (18 M; 5 F)	1 group per community
Community members	8	23 (17 M; 5 F)	8	26 (8 M; 18 F)	1 group per community
Sub-total	16	47 (30 M; 16 F)	16	49 (26 M; 23 F)	32 small group interviews
Totals	35	73 (46 M; 26 F)	40	80 (43 M; 35 F)	

[a] Pairs of CHA were interviewed together at the health post, with a few exceptions: (1) CHAs at HP10 were interviewed individually due to scheduling issues; (2) only one CHA was staffed at HP4 in Northern Province and HP6 in Luapula Province, both were interviewed individually; and (3) during the second round, only one of two CHAs were interviewed at RHC1

Few community members directly mentioned challenges to acceptance of CHAs. However, CHAs, supervisors, and district focal persons discussed challenges regarding community understanding and expectations of the CHA scope of work and CHA time spent at the health post versus in the community. Since much of the CHA scope of work is focused on disease prevention and health promotion, rather than diagnosis and treatment, their inability to provide certain health services was a concern to community members. A CHA explained the situation as follows:

> The villagers they were welcomed me, they were welcomed us in a good manner but somehow somewhere they were asking about, 'What about if I want to deliver [a baby] these people they cannot help me to deliver? Or maybe are they not going to inject the injection?' They were just worried about those because when the time comes and they [pregnant mothers] need to deliver… a lot of them, they don't have transport to reach to [the] RHC. (CHA, Luapula Province)

Where CHAs spent their time was another factor that influenced community acceptance. The program was designed for CHAs to spend 80 % time in the community and 20 % at the health post. However, in practice, most CHAs spent more than 20 % of their time at the health post due to high demand for services, particularly if the health post lacked a trained HCW. One CHA explained:

> We are supposed to spend more hours in the field but it is still a challenge because sometimes you find that there so many patients here, to leave them it's not good. (CHA, Western Province)

Similarly, a CHA supervisor mentioned:

> Their training requires them, 80 % to be in the community and 20 % to be here [at the health post]. But because of the shortage of the human staff in these health facilities…they tend to be now 50 % at the health facility, 50 % in the community. (CHA supervisor, Western Province)

These passages illustrate the challenge of introducing a community-based health workforce within a health system with critical shortages of facility-based HCWs. CHAs are pressured to remain at the health post focused on curative care, rather than delivering prevention messages in the community.

Supervision Support Systems

Effective and reliable supervision is considered a cornerstone of successful CHW programs [9]. Supervision refers to the "process of guiding, monitoring, and coaching workers to promote compliance with standards of practice and assure the delivery of quality care service" [9]. Supervision is often regarded as the main linkage point between CHWs and the PHC system [9], with the strength of this link a key factor in successful program integration [4]. Zambia set out to design an effective supervision support system for the CHA program. At the district-level, a CHA program district focal person (appointed by the District Medical Officer) manages recruitment, deployment, and supervision issues for all CHAs in the district. At health posts where CHAs are staffed alone, they are supervised at least once a month by the In-Charge at the nearest RHC. Where trained HCWs work alongside CHAs at the health post, they serve as supervisors through on-the-job support at the health post and in the community. Prior to CHA deployment, the supervisors from areas where the CHAs would be posted attended a 5-day training program to better understand the expected role of CHAs and strengthen their supportive supervision and mentorship skills. Supervisors were equipped with a supervision manual and briefed on using tools to facilitate monthly supervision visits.

The CHA supervisors that were interviewed included enrolled nurses, midwifes, clinical officers, and environmental health technicians. Ten supervisors, all male, were interviewed in two rounds of data collection (Table 2). Four supervisors, all with enrolled nurse qualifications, were stationed at the health post alongside CHAs. The process evaluation revealed that monthly supervision visits were not consistently conducted during the first 6 months of implementation, neither by supervisors based at the health post of nearby RHC. At 2 months post-deployment, four of six supervisors reported conducting a health post visit, while only two of six reported community-level supervision visits. One supervisor stationed alongside CHAs mentioned difficulty in leaving the health post unattended as a reason for lack of community-level supervision:

> It's a matter of pressure, because I'm alone. You find when you leave this place [health post] there is no one to tend to patients here. (Supervisor, Eastern Province)

At 6 months post-deployment, all eight supervisors reported conducting at least two supervision visits in the prior 3 months. However, only two had supervised at the community-level. Lack of transport, work overload, and travel distance were mentioned as barriers to community-level supervision. A supervisor explained:

> I have been the only qualified person, meaning that I was involved in a lot of activities. Just to supervise each one of them became very difficult because of the work being done at the center. Unless when we go with them for outreaches like immunizations, that's

> when I do conduct a supervision… but to go in the home visits it is very difficult for me. (Supervisor, Luapula Province)

The few supervisors who conducted supervision in both health posts and community locations usually integrated their supervisory activities with another community-level health program to enhance efficiency and transportation, as well as minimize time away from their health posts.

Regular feedback from supervisees about supervision style is an important mechanism for establishment of effective supervision. CHAs mentioned that the major strength of the supervision was its encouragement to work more and motivation to resolve challenges. While many CHAs recognized the busy schedules of their supervisors, they pleaded for more supervision time. One CHA explained:

> I will say though you are busy with your job at least you can make an effort to be with us so that you can see how we are working. Maybe we are wrong and you are the supervisor; where we are wrong or not sure we are supposed to come to you as our boss so that you make some, you control some mistakes that we made. (CHA, Western Province)

Coordination of Community Cadres Within the Health System

Zambia's vast network of volunteer CHWs was recognized in the 2010 NCHW strategy for health promotion and prevention efforts at the village level. Policy makers recognized that introduction of a formalized and salaried community cadre in the health system could adversely affect volunteers, but expected that CHAs and volunteers could work together with CHAs serving as coordinators of health-related activities by the volunteers in their community. There was keen interest in volunteers' perceptions of the CHAs and the scope of their work, and how the two cadres collaborated.

Prior to CHA deployment districts were asked to officially introduce the CHAs and their role at community-level meetings. Many volunteers first learned about the CHA role through these meetings and reported understanding the skills included within the scope of CHAs. Volunteers identified specific opportunities for collaboration with CHAs: mobilize community for events, organize community meetings, infant growth monitoring, escort CHAs to household visits, teach cleanliness, map community and number households, perform malaria and HIV rapid diagnostic tests, assist record keeping, educate community about hygiene and water sanitation, collect medicine stocks from RHC, teach family planning and prevention of mother-to-child transmission of HIV.

Many volunteers spoke of a positive, learning relationship with the CHAs:

> There are times when we are faced by problems in this community, we come here and discuss with the CHA on how we can work together to solve the problem. With such interactions it has made our work in this community easier. Again these CHAs are very helpful to us. All the questions we have, they explain to us and this has made us work well with the CHAs in order to save our community. (Volunteer CHW, Luapula Province)

Despite orientation meetings some volunteers remained skeptical about working with CHAS, lacking clarity about CHA work, resenting CHA salaries, and perceiving offloading of responsibilities onto volunteer CHWs. A volunteer stated:

> We really need someone to come and teach us as volunteers so that we know the role and purpose of the CHA so that we can know how to work together… We have discussed but we are really not sure on how we should be working together…They are now workers who get paid per month and we don't get paid so we think they want to offload some of their duties to volunteers. (Volunteer CHW, Luapula Province)

CHAs also shared similar perspectives:

> Some [volunteers] they are like saying that 'Ah those [CHAs] at least they are getting something but us we are wasting our time for nothing here and we are gaining nothing.' (CHA, Western Province)

Many volunteers expressed a wish for more training on health topics and increased logistical support and supplies, such as bicycles, job aids, and t-shirts/uniforms, which would help volunteers work with CHA in door-to-door visits and mobilization activities.

Health Systems Challenges

The process evaluation pointed to deeper operational health system weaknesses that affected the new health cadre. CHAs, supervisors, and district focal leaders consistently mentioned two underlying problems at program launch: a lengthy delay in CHA receiving monthly salaries and the inability of CHAs to access drugs and commodities through the national supply chain. These are consistent with a recent qualitative study of CHAs' work experiences [30], and suggest that the government health system was unable to react quickly enough to incorporate the new cadre. For example, even after the 1-week CHA training course for

CHA supervisors, additional memos from the MOH to the provincial and district-levels were necessary to ensure that CHAs could access commodities from the RHC. This highlights both the communication challenges and the importance of sensitization on key processes for successful integration of a new cadre. Zulu et al. [31] have shed further light on health systems factors related to integration of CHAs into the national health system, with specific issues related to acceptance and adoption at the district-level.

Discussion

This process evaluation utilized interviews with a variety of stakeholders to explore perspectives and lessons from the first 6 months of CHA deployment. Critical information for programmatic and policy decisions about the CHA program was obtained in four key areas: community acceptance of CHAs, supervision support mechanisms, coordination with volunteer CHWs, and health system adaptation to integration of a new cadre. Many findings pointed to underlying health systems weaknesses in Zambia, a theme which may be relevant to other countries interested in formalizing, integrating, and scaling community-based health cadres into their national health system.

The process evaluation supported the way the program was already being implemented to enhance community acceptance of CHAs by selecting them from their home communities. Cultural understanding and shared experience were critical for community acceptance, especially important in a country with considerable cultural and linguistic diversity. Such acceptance should also be considered in deployment of other types of health workers. Concern about limitation in CHA scope of work expressed by some community members were partially addressed in August 2012, with revision of the CHA curriculum. The scope of work was revised to include new maternal and reproductive health services, including emergency uncomplicated deliveries and administration of injectable contraceptives. The concerns raised by community members validated these changes to the scope of work.

While several small-scale CHW programs have demonstrated effective support mechanisms, many national CHW programs have failed to establish consistent supervisory systems [3]. Process evaluation findings led the research team to recommend improvement of the supervision system by careful review of who is selected to be the supervisor. The resulting government discussions on the best fit for the supervisor role, whether at the district or health center level, ultimately confirmed the decision that the supervisor should continue to be the "In-Charge" at the health post where the CHA is stationed, if possible, or else at the nearest RHC. Currently, the Ministry of Community Development, Mother and Child Health is developing the National Integrated Strategy for Community Based Services and Volunteers, which will likely include partial supervision of volunteer CHWs by CHAs. Additional coordination between CHAs and volunteer CHWs will be encouraged in the strategy, with concrete suggestions about their relationship, opportunities for collaboration, and frequency of meetings in which volunteers report to the CHAs on their activities.

This process evaluation also led to recommendations for strengthening Zambia's health systems and incorporating new programs or cadres into an existing system. After each round of data collection the research team met with the district focal person to debrief on preliminary findings and discuss challenges and next steps. These meetings offered opportunities for district focal leads to engage on solutions. Identification of operational challenges 2 months post-deployment was critical to spur action from MOH and implementing partners to address the bottlenecks preventing payroll processing and CHA access to drugs and commodities. Memos from the central MOH to the provincial- and district-levels were used to communicate essential messages and next steps.

Study Limitations

There are several limitations of this study. Only 10 health posts out of 161 were visited. However, the facilities were geographically diverse and a variety of stakeholders was interviewed. The process evaluation was conducted at only 2 and 6 months after deployment of the first cohort of CHAs in order to provide rapid feedback to the government for continuous program improvement. This meant that some issues were premature as CHAs were just settling into their new role. Mock interview training that emphasized rapport building was used by the interview team to limit social desirability bias. Respondents were assured that data would be presented in aggregate to ensure confidentiality.

Conclusions

Few large-scale CHW programs in Sub-Saharan African countries have published the lessons learned from early stage implementation. The present process evaluation was undertaken to provide the Zambian government with data about their CHA program, but many of the findings are applicable to CHW programs in general. The diversity of stakeholders interviewed provided an array of useful perspectives on the rollout of the pilot CHA class. Preliminary

results and recommendations were available within 6 months of data collection, allowing the government to make informed programmatic adjustments prior to the second deployment of CHAs in 2015. A subsequent CHA process evaluation was undertaken in 2015. Development of the National Integrated Strategy for Community Based Services and Volunteers is in-progress, highlighting government commitment to refining community-based services based on evidence to guide policy implementation.

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Author Contributions KBV, YWB, and MM conceived of the process evaluation assessment. YWB and KDS drafted the process evaluation protocol and designed the data collection tools with input from KBV and MM. KDS, YWB, and the field interviewers collected and transcribed all interview data; KDS and YWB analyzed the data and jointly drafted a programmatic report documenting all evaluation results and recommendations. KBV and YWB worked with ministry counterparts (MM, ECK, EMM and CPC) to share process evaluation results and discuss recommended actions. KDS wrote the first draft of the manuscript; YWB, KBV, JWvdB and SP provided substantial revisions. All co-authors reviewed and approved the final manuscript.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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References

1. Murphy, G. T., Goma, F., MacKenzie, A., Bradish, S., Price, S., Nzala, S., et al. (2014). A scoping review of training and deployment policies for human resources for health for maternal, newborn, and child health in rural Africa. *Human Resources for Health, 12*(1), 72.
2. WHO. (2006). *Working together for health: World health report 2006*. Geneva, Switzerland: WHO.
3. Lehmann, U., & Sanders, D. (2007). *Community health workers: What do we know about them?*. Geneva, Switzerland: WHO.
4. Tulenko, K., Møgedal, S., Afzal, M. M., Frymus, D., Oshin, A., Pate, M., et al. (2013). Community health workers for universal health-care coverage: From fragmentation to synergy. *Bulletin of the World Health Organization, 91*(11), 847–852.
5. WHO. (2013). *The world health report 2013: Research for universal health coverage*. Geneva, Switzerland: WHO.
6. Campbell, J., Admasu, K., & Tlou, S. (2015). Maximizing the impact of community-based practitioners in the quest for universal health coverage. *Bulletin of the World Health Organization, 93*, 590.
7. Perry, H. B., Zulliger, R., & Rogers, M. M. (2014). Community health workers in low-, middle-, and high-income countries: An overview of their history, recent evolution, and current effectiveness. *Annual Review of Public Health, 35*, 399–421.
8. WHO. (1989). *Strengthening the performance of community health workers in primary health care*. Technical report series 780. Geneva, Switzerland.
9. Perry, H., & Crigler, L. (2014). *Developing and strengthening community health worker programs at scale: Guidance for program managers and policy makers*. Washington, DC: USAID, MCHIP.
10. CIA. (2014). *Zambia. The World Factbook*. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/za.html
11. Institute for Health Metrics and Evaluation. (2013). *Global burden of disease country profile: Zambia*. Seattle, Washington. Retrieved from www.healthdata.org/zambia
12. UNAIDS. (2015). *How AIDS changed everything—MDG 6: 15 years, 15 lessons of hope from the AIDS response*. Retrieved from http://www.unaids.org/sites/default/files/media_asset/MDG6Report_en.pdf
13. WHO. (2014). *World malaria report 2014*. Retrieved from http://www.who.int/malaria/publications/world_malaria_report_2014/en/
14. Zambia Central Statistical Office. (2013). *Zambia demographic and health survey 2013–2014: Preliminary report*. Retrieved from http://dhsprogram.com/pubs/pdf/PR53/PR53.pdf
15. Kamwanga, J., Koyi, G., Mwila, J., Musonda, M., & Bwalya, R. (2013). *Understanding the labour market of human resources for health in Zambia*.
16. Ferrinho, P., Siziya, S., Goma, F., & Dussault, G. (2011). The human resource for health situation in Zambia: Deficit and maldistribution. *Human Resources for Health, 9*(1), 30.
17. Gow, J., George, G., Mutinta, G., Mwamba, S., & Ingombe, L. (2011). Health worker shortages in Zambia: An assessment of government responses. *Journal of Public Health Policy, 32*(4), 476–488.
18. MOH Zambia. (2009). *Concept note for the development of a community health worker national strategy*. Lusaka, Zambia: MOH Zambia.
19. MOH Zambia. (2010). *National community health worker strategy in Zambia*. Lusaka, Zambia: MOH Zambia.
20. Zulu, J. M., Kinsman, J., Michelo, C., & Hurtig, A.-K. (2013). Developing the national community health assistant strategy in Zambia: A policy analysis. *Health Research Policy and Systems/BioMed Central, 11*(1), 24.
21. Rossi, P. H., Lipsey, M. W., & Freeman, H. E. (2004). Tailoring evaluations. *Evaluation: A systematic approach* (7th ed., pp. 31–65). Thousand Oaks, CA: SAGE Publications.
22. Hulscher, M., Laurant, M., & Grol, R. (2003). Process evaluation on quality improvement interventions. *Quality and Safety in Health Care, 12*(1), 40–46.

23. Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity. *Implementation Science, 2*, 40.
24. MOH Zambia. (2011). *Republic of Zambia: National human resources for health strategic plan 2011–2015*. Lusaka, Zambia: MOH Zambia.
25. MOH Zambia. (2013). *The 2012 List of Health Facilities in Zambia: Preliminary Report, v15*. Lusaka: Zambia.
26. NCH Software, version 5.63. (2013). *Express scribe*. Canberra, Australia: NHC Software. Retrieved from http://www.nch.com.au/scribe/index.html
27. VERBI Software – Consult – Sozialforschung GmbH. (2013). *MAXQDA, software for qualitative data analysis, 1998–2014*. Berlin, Germany.
28. Zhang, Y., & Wildermuth, B. M. (2005). Qualitative analysis of content. *Analysis, 1*(2), 1–12.
29. Zulu, J. M., Kinsman, J., Michelo, C., & Hurtig, A.-K. (2014). Integrating national community-based health worker programmes into health systems: A systematic review identifying lessons learned from low-and middle-income countries. *BMC Public Health, 14*(1), 987.
30. Zulu, J. M., Kinsman, J., Michelo, C., & Hurtig, A.-K. (2014). Hope and despair: Community health assistants' experiences of working in a rural district in Zambia. *Human Resources for Health, 12*(1), 30.
31. Zulu, J. M., Hurtig, A.-K., Kinsman, J., & Michelo, C. (2015). Innovation in health service delivery: Integrating community health assistants into the health system at district level in Zambia. *BMC Health Services Research, 15*(1), 1–12.