Transition and Change: Opportunities and Challenges of CHW Policy Reform for Community Health Systems and Vertical Disease Programmes in Liberia

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Abstract

Background: Health workforce shortages remain a critical public health challenge. Particularly in low and middle-income countries (LMICs), the re-invigoration of community health workers (CHW) supplement critical health workforce gaps especially during epidemics and pandemics such as Ebola and Coronavirus.

National CHW policies can influence CHW motivation and performance. Adaptations to national CHW policies therefore have impacts across the whole health system, particularly for vertical disease programming. Using a case study of Community Drug Distributors (CDDs) working under the Neglected Tropical Disease (NTD) Programme, this paper explores how adaptations to a national CHW policy in Liberia influences health systems and intervention hardware and software factors that impact CHW utilisation, management, and performance in the delivery of vertical disease interventions.

Methods: Three qualitative data collection tools were utilized, namely; content analysis of five CHW and NTD program-related policy documents; 25 key informant interviews with facility, county, and national level decision-makers; and 42 life and job histories with CDDs in Liberia. Data were analysed using a thematic framework approach with the coding framework generated in QRS NVivo 11 pro. Transcripts were coded using constant comparison, triangulated, and synthesised with the document review and existing literature for contextual relevance, convergence, and divergence.

Results: The health systems hardware dimension shows opportunities and challenges linked to CHW training, motivation, supervision, and logistics and supplies whilst the software dimensions show challenges regarding community engagement and dialogue in CHW programming. Several contextual factors related to the policy adaption potentially facilitate inequities between the various cadres of CHWs, hinder effective supportive supervision and access to medicines, supplies and equipment which shape CDDs motivation and performance which are essential to equitable NTD programme delivery in Liberia.

Conclusions: This study shows how an adaptation of the CHW policy provides opportunities and challenges for health system hardware and software in varied ways. These have multiple implications for specific intervention hardware and software which provide leveraging opportunities to address gaps and increase CHW motivation and competencies towards better health care delivery and stronger and resilient health systems.

Background

Health workforce deficiencies remain a critical public health challenge particularly in low and middle-income countries (LMICs). A high disease burden and health worker attrition further constrains fragile and under-resourced health systems in LMICs (1, 2). The drive towards universal health coverage (UHC) and the sustainable development goal (SDGs) 3, which focuses on good health and well-being has resulted in community health worker (CHW) programs being revived and re-invigorated (2-5). CHWs are perceived as the answer to health workforce capacity gaps. With an estimated 2.5 health workers per 1000 population recorded in sub-Saharan Africa (SSA), CHWs supplement health worker shortages as paid or unpaid volunteers providing community-based health services in various contexts (6-9). They provide health promotion services for communicable and non-communicable diseases (NCDs) and deliver preventive and first-line curative services in communities (10-12). They receive basic training at the beginning of their recruitment (13), in specific topic areas for which they are recruited. Evidence shows that when adequately supported, CHWs contribute to improving maternal and child health (MCH), sexual and reproductive health (SRH), and other health outcomes (14, 15). Yet, CHW programmes are hindered by multiple

contextual challenges including minimal training; inadequate logistics and supplies; poor or limited remuneration; and inadequate supportive supervision (8). Ensuring motivated and supported CHWs is essential to equitable access to health services given the critical linkage they provide between communities and health systems particularly in SSA, where access to quality healthcare is often limited (16-18).

In Liberia, the health system is recovering from prolonged conflict and humanitarian crisis with access to health care hindered by insufficient infrastructure, lack of appropriately qualified health personnel, and limited oversight capacity particularly in rural areas (19, 20). With a national health workforce density of less than 3.7 per 10,000 population (21), CHWs are a key bridge to supplementing critical health worker gaps. In addition, more than 29% of Liberians live more than an hour's walking distance from the nearest health facility (22, 23), prompting a reliance on CHWs as the first point of contact with the health system. CHWs play a critical role in responding to current and future pandemics (24, 25). During the Ebola epidemic in 2014/2015, CHWs were fundamental in engaging and supporting communities to respond and control the epidemic (26).

Contextual factors such as having a national CHW policy can influence CHW performance (27) as it recognises and provides guidelines for the critical role that CHWs play in health service delivery. Following the Ebola outbreak, the Liberian government (in collaboration with partners) prioritised the development, finalisation and rollout of an integrated CHW system which is guided by the national community health services policy and strategic plan (28). Started in 2012 and fully operational post the Ebola outbreak, the Revised National Community Health Services Policy (NCHSP) 2016-2021, and its associated strategic plan was launched in 2016 by the Liberian Ministry of Health (LMoH). The plan specifically prioritises the introduction of a structured community health workforce (Community Health Assistants (CHAs)) with a central focus to provide guidance and instruction regarding how all programmes should manage and support CHWs (28). The plan aims to strengthen the health system and promote trust and ownership of health interventions to ensure adequate health and social protection for all (3, 28). A summary of the core operating structure within the revised CHW programme is presented in Fig.1 (22, 28).

However, since the plan's inception, there is scant evidence of how such policy changes have influenced training, motivation[1] and supervision of various CHW cadres in Liberia which is essential to supporting CHW performance and attaining the SDGs. By late 2019, there were about 3,761 CHAs and CHSSs deployed to serve communities five kilometres from the nearest health facility (22).

The roll-out of national health policies, such as the National Community Health Services Policy (NCHSP) 2016-2021, has impacts across the whole health system particularly for vertical disease programmes. For example, where vertical programmes rely on CHWs for programme delivery, national policies frequently present new operating structures. Consequently, the revised NCHSP in Liberia has crucial implications on the vertical disease programmes such as mass drug administration (MDA) for Neglected Tropical Disease (NTDs). MDA campaigns rely on the use of community drug distributors (CDDs) who are non-salaried CHWs to distribute medicines to eligible community members through a house-to-house distribution strategy (29) for the control and elimination of preventative chemotherapy NTDs[2]. Given that the success of MDA depends on having well-motivated and supported CDDs, the rollout of the CHA policy impacts the management and support of CHWs working in vertical disease interventions such as MDA in Liberia.

Guided by key elements of a conceptual framework on CHW performance (30), this paper aims to explore how adaptations to the national CHW policy enable or constrain the utilisation, management and performance of community health cadres in the delivery of vertical disease interventions using a case study of CDDs working under the NTD Programme. The framework (Fig 2) suggests that CHW performance is a transactional social process while

recognizing the importance of relationships and power between different actors within their environment (30). Drawing from existing models, it recognises CHW performance as a dynamic central element that is influenced by context, health systems and intervention (NTD programme) hard and software (27, 30). It thus presents an apt framework for assessing and exploring how the CHA policy in Liberia influences transactional processes within Liberia's health system, shaping CHW performance generally and specifically for NTD programme delivery.

Footnote:

[1] financial and non-financial

[2] onchocerciasis, lymphatic filariasis, schistosomiasis and soil transmitted helminths

Methods

Study Locations and Sampling

The study was conducted at the national level and in three counties in Liberia. Maryland, Bong and Grand Bassa Counties were purposively selected as the study sites as they had districts where there is partner support for the implementation of the CHA policy and districts where there is no partner support. Geographic diversity and ongoing links with health management teams in each county resulting from previous collaborations were also considered. Site selection enabled a comparison of programmatic realities in the early stages of the CHA policy rollout and how this varied between districts and counties.

Data Collection

This qualitative study was conducted between March 2017 and August 2018 in Liberia. It utilised a multi-method approach to collect data through policy document reviews; key informant interviews (KIIs) with decision-makers and managers at the national, county and facility levels; and life and job histories from CDDs. All qualitative data were collected as a total of 67 digitally recorded audio files by five Research Assistants (RAs) with at least three (3) years of contextual research experience following the consolidated criteria for reporting qualitative research (COREQ) (31) (Supplementary File 1). Topic guides were piloted and modified before the main data collection. All interviews were conducted face to face in English and Kpelle, Bassa or Grebo (local dialects) to allow for in-depth exploration in private locations usually identified by the participant(s) on a scheduled date after verbal and/or written/thumb printed informed consent was sought from each participant. Interviews lasted between 30-65minutes. The first author held daily debriefing sessions with RAs to discuss key findings and refine lines of inquiry towards achieving data saturation (32). No identified participant declined participation and no interviews were repeated. All audio files were transcribed verbatim in English by five (5) RAs and reviewed by the first author for quality assurance and accuracy of translations. Transcripts were not returned.

Document review: A content analysis of policy documents to understand the context of the CHW within a vertical health programme was completed. Table 1 presents the five policy documents reviewed that govern CHWs and the NTD programme which were accessed from the LMoH. The analysis explored the key policy issues governing the current community health service context, the actors and processes driving the community health service policies; cadres of CHWs and their selection criteria; how CHWs are managed, supported, and integrated within the health system and barriers and facilitators to the utilization of CHWs in vertical programming. Findings from the review informed the framing of the research findings presented in the results section.

Key Informant Interviews: Results from the analysis of the policy documents informed the development of topic guides to collect primary data from key informants purposively selected based on their knowledge and experience of the community health programmes at the national, county and district levels. The KIIs further explored participants' perceptions and experiences of how CHW policies are implemented; their management and support systems specifically selection, recruitment, supervision and motivation; barriers, enablers and challenges; and the impact of community health policy and programme reform on vertical disease interventions. In total, 25 KIIs were conducted with representatives of the LMoH (4), NTD programme (5), the community health programme (1), non-governmental development organisation (NGDO) programme implementing partners (5), officers in charge (OIC) of health facilities (6) and CHSS working within the NTD programme and the community health programme (4).

Life and Job histories: To gain phenomenological insights regarding the experience of CDDs, 42 life and job histories were conducted with purposively selected CDDs in Maryland and Bong counties. Life and job history data was not collected in Grand Bassa county as data saturation had been reached. CDDs were recruited based on the length of time engaged with the NTD programme, age, and selection as a CHA. The life histories explored CDDs' life and career history, motivation to work, training received, and support systems to understand their satisfaction with their jobs and engagement with the NTD programme.

Data Analysis

A thematic framework approach was used in data analysis (33) with the initial coding framework generated in QRS NVivo 11 pro by LD, GZ, JR, ST, GN using pre-identified themes derived from the initial topic guide, research objectives and emerging themes (34). Using both deductive and open-ended inductive approaches, transcripts were coded in constant comparison and patterns and linkages between quotes, codes, themes, and existing literature were explored in-depth for contextual relevance, convergence, and divergence.

Data from the document review and interviews are triangulated and synthesised in the results section with the document review providing a situational context for the qualitative findings in the face of the policy reform in 2015.

Ethics

Ethical approval was obtained from the University of Liberia Pacific Institute for Research and Evaluation UL-PIRE IRB (16-09 009) and Liverpool School of Tropical Medicine (LSTM) (17-044) while administrative consent was obtained from the Liberian MoH before data collection.

Results

Table 2 shows the characteristics of the interviewed participants while Table 3 presents key illustrative quotes to demonstrate the authenticity of the findings. The results are presented within the context of the CHA policy and its influence on NTD programme delivery, and the hard and software-related factors elaborated on in Kok et al's conceptual framework on CHW performance.

The context of the CHA policy and its influence on NTD programme delivery

The document review shows that the CHA policy is centred around the CHSS and CHAs who are formally recognised and 'paid' community health cadres while informal or volunteer CHWs are categorised as community health volunteers (CHVs). Table 4 presents the types of CHWs operating in Liberia, their key roles and responsibilities and the training required under the revised NCHSP. The NCHSP categorises CDDs as CHVs. The KIs show that high-level political will and mobilisation influenced by CHW policy reforms in other African countries such as Ethiopia and the drive to achieve UHC were key factors shaping the reform and implementation of the CHA policy.

Hardware

Under health systems hardware dimension, opportunities and challenges associated to CHW training, supervision, remuneration and logistics and supplies are influenced by several contextual policy related factors. These enable inequities between cadres of CHWs, thwarts supportive supervision and hinder access to medicines, supplies and equipment which adversely influence CDDs motivation and performance and equitable NTD programme delivery in Liberia.

Training

The NCHSP stipulated pre-service and in-service training with requirements for CHAs, CHSSs, and CHVs from the document review further detailed in Table 4. The policy emphasises the need for coordination with the Ministry of Education (MoE) to embed community health content into existing pre-service health training programmes with the potential for accreditation of the CHA programme. Although the document review shows an expectation for biannual in-service training through focused supportive supervision and/or linked to periodic interventions, this is less detailed. For CHAs, the review shows that training provided by non-governmental organisations (NGOs), national and county level health training staff should be built around four key modules covering different health topics and delivered over four months as a hybrid of classroom and practical community-oriented activities. Most key informants positively described CHA training as didactic training with supervised role-plays that CHAs are expected to complete. However, KIs conducted in unsupported implementation areas showed that CHA training in such areas is still ad hoc and linked to specific programmes with CHVs reportedly feeling excluded when not selected for CHA training. Some KIs added that some recruited CHVs had not completed the CHA training because funding partners had ceased their support [funding] for program implementation in those communities.

For NTD programming, training for MDA is cascaded using a train the trainer model. Key informants reported that training for Officers in Charge (OIC) is delivered by county health teams (CHTs) and is scheduled for about three days. This is however frequently shortened to a day and a half to minimise subsistence costs; accommodate high health staff workloads; delays in drug delivery to health facilities, requiring rapid MDA intervention rollout^[3] to avoid expiration of medicines; and tight reporting deadlines. Same systems barriers experienced by OICs also account for rapid training times for CDDs. Consequently, most CDDs were dissatisfied with the training they received which they reported was usually rushed, lasting for at most, half a day with training content focused on reviewing eligibility criteria and giving medicines. CDDs requested more information about side effects and provision of training manuals and Information, Education, and Communication (IEC) materials.

In life and job histories, CDDs who had been recently engaged within the CHA program reported an in-depth NTD focus within the CHA training which provided them with critical skills to conduct and complete MDA activities, suggesting that some vertical programme barriers to training as identified amongst other CDDs have been alleviated.

Supervision

A description of the cascade of supervision as outlined in the NCHSP (Fig.1) shows that supportive supervision relies on integrated and standardised supervisory checklists and tools which are monitored by the community health services division (CHSD). In unsupported implementation areas, inadequate supervision was cited by Key informants as a reason for the poor retention of CHVs. They explained that OICs of health facilities are charged with the supervision of CHV activities and reviewing monthly referrals to the health facility. OICs reported providing additional supervision to CHVs such as CDDs during health campaigns such as MDA when additional resources such as fuel for motorbikes, or scratch cards to call CDDs are provided. CDDs reported that the number of times they received supervision varied particularly during MDA with some CDDs indicating that they received supervision at least twice during the MDA campaigns. Other CDDs reported that although they might receive some supervision during campaigns, the timing and frequency are not pre-determined. Several CDDs stated that supervision ceased when campaigns ended which they felt reduced their engagement in other health activities.

In supported districts, CDDs who had undergone CHA training and recruitment as CHAs reported feeling satisfied and supported in their duties because they received more supervision, usually from the CHSS. However, the heavy workload of OICs and CHSS and large catchment areas assigned to each CHSS for supervision activities were cited by key informants and CHSS respectively as key reasons for the ineffective supervision processes in some areas. Several OICs and CHSS reported incurring personal out of pocket costs during supervision.

CDDs frequently reported that the lack of supportive supervision was demotivating. Key informants elucidated that inadequate availability of health resources including the provision and fuelling of motorbikes to transport supervisors to the various communities and shortage of health workers resulting in high workloads for supervisors as critical barriers to the provision of supportive supervision at all levels of the health system, regardless of implementing partner support, or campaign activity. In communities where there were no health facilities, there were no CHSS to supervise CHAs or such communities were merged with communities where CHSS are stationed.

While CHAs and CDDs requested regular and structured supervision structures, they also proposed that phone-based supervision and regular health facility-based meetings could alleviate some supervision challenges. Some key informants suggested the establishment of a new cadre of CHWs to play an intermediary supervisory role between OICs and CHSS[4]; They added that more in-depth CHA training in districts with implementation support motivated CHAs to provide peer supervision for each other. They further reported that although there are sustainability challenges, the utilisation of existing community structures, such as community health development committees (CHDC) and health facility development committees (HFDC) for supervision had proven valuable in monitoring and supervision and providing feedback to CHSS and health facilities.

Remuneration

The review shows the NCHSP providing a clear distinction between incentives, motivation, performance-based incentives, career development and retention for CHWs. This policy provides a standardised incentive of 70USD per month for CHAs providing at least four hours of routine community health care packages at the household level per day. Key informants reported that the monthly incentive for CHAs had been introduced in partner supported districts as the only financial remuneration provided for CHAs, but the incentive was being poorly implemented because it was not linked to CHA performance. National level KII added that bureaucracy between donors and the LMoH led to delays in fund payments and resulted in at least quarterly CHAs payments instead of monthly payments.

Moreover, the NCHSP details that all community health cadres are entitled to receive other forms of motivation [5] from the programme or community. Described as opportunities for receiving rewards for working on project-specific initiatives, the NCHSP stipulates the following criteria for standardising such rewards:

- Daily disbursement fees of 5USD per day, not exceeding 10 days per month.
- For programmes requiring ongoing engagement of community cadres, a flat rate of up to 50USD per month (commensurate to work) should be provided or compensation at rates established before 2015 but not exceeding rates received by CHAs.

Yet, the irregular or ad-hoc disbursement of financial remuneration was described by KIs as demotivating and resulting in attrition of CHAs and CHVs. In unsupported districts, KIs reported the lack of regular financial remuneration for CHVs within programme specific initiatives as stipulated by the NCHSP which was influenced by the availability of government funding and donor stipulations. CHV dissatisfaction with accessing such financial rewards is reportedly aggravated by the fact that some donors who had previously paid their monthly allowances had stopped because their projects ended in the district. CDDs expressed dissatisfaction with irregular financial remuneration and explained that communities that had previously provided remuneration to CDDs had stopped because they perceived CDDs as adequately compensated by the NTD programme. Harsh economic circumstances experienced by households also contributed to communities' inability to sustain motivating CDDs with gifts. CDD dissatisfaction was compounded by some CDDs having the opportunity to be selected for training and recruitment as CHAs while other CDDs did not have the opportunity to be selected into the CHA program.

Some facility-level key informants explained that they had made efforts to communicate with CHVs to keep them motivated and rotate CHVs to engage in 'one off' vertical disease campaigns that could bring the promise of financial reward for CHVs. A KI reported the importance of supporting CHVs as *'they were leaving things they normally do'* to voluntarily support health service provision. Particularly for male CDDs who volunteered on the NTD programme while working additional jobs to financially provide for their families, they faced criticism from family members who felt that they received financial remuneration from the NTD programme but were not bringing the money home.

Finally, the NCHSP proposes the development of performance-based financing practices and career development and retention opportunities in collaboration with other ministries for cadres of CHWs, but key informants reported this was not operational partly due to the infancy of the policy.

Supplies and Equipment

Box 1 shows the key steps outlined by the NCHSP, that the CHSD and the MoH are expected to undertake to ensure adequate and quality-assured medicines, supplies and logistics. In practice, participants indicate that implementation challenges in managing and coordinating the logistics and supply chain has had adverse implications on CHWs motivation. For the NTD programme, in districts where the CHA policy implementation is not supported by funding partners, inadequate logistics and protective clothing were reported as factors affecting CHAs and CDDs performance and completion of job roles. CDDs suggested that they should be provided with identification badges to further authenticate them in the communities and mobile phone calling cards to facilitate communication with supervisors. Some CDDs added that since they work in places that *'they just could not reach by foot'*, they should be provided with bikes to facilitate their travel. Some county and district level key informants mentioned that inadequate supply of fuel meant that even when supplies and logistics are available for distribution, they incurred personal pocket costs to transport them to CHWs. Both KIs and CDDs recommended improving

logistics, supply, and equipment to enable CDDs to improve their coverage areas to include far to reach places and reduce travel distance and size of CDD catchment communities.

The inadequate supply of logistics and equipment was also reported in partner supported districts. KIs reported that in districts receiving funding support to implement the CHA policy, although CHAs and CHVs have been supplied with logistics such as rainboots, they still lacked supplies such as hand sanitisers, books, and pens. They added that the provision of such supplies and logistics including the issuing of certificates for CHAs and or CHVs would be crucial to motivating and improving CHA performance in the communities. For instance, while several CDDs requested supplies and logistics to support NTD program delivery, some CDDs mentioned intrinsic motivational factors including knowledge gained from the NTD training programme, personal experiences of losing relatives leading to taking up the CDD role and the potential of progressing to becoming a health worker.

Box 1: Logistical and Supply Chain Management Stipulations in NCHSP	
MoH CHSD shall:	<ul style="list-style-type: none">• Ensure that national supply chain and commodity documents are reflective of the latest international guidelines and protocols for community health programs and similarly that curriculum and SOPs for CHAs are aligned national protocols;• Ensure that all key pharmaceutical policy documents incorporate CHA supply chain requirements;• Ensure that all materials intended to facilitate CHA activities are delivered to CHAs through a clearly defined framework within the health facility;• Work closely with the Supply Chain Management Unit (SCMU) to ensure medicines, medical supplies and other logistic needs of CHAs are adequately quantified at the national level, based on county needs and are supplied to health facilities in a timely manner to prevent stock-outs at community level• Ensure that oversight responsibilities for rational utilization are clearly delineated to the responsible pharmaceutical arm of the MoH and in coordination with county level administration.

Software

The health systems software dimensions shows policy related contextual challenges involving selection and recruitment and community engagement and dialogue in CHW programming which facilitate inequities between the various cadres of CHWs which hinder CDDs motivation and performance for efficient health care delivery.

Selection and Recruitment

CHSS are selected through a formal application and interview process as they are trained in formal health care roles such as nurses or midwives. The NCHSP highlights the importance of Community Health Focal Points[6] in supporting the selection and replacement of CHAs. The NCHSP emphasises the need for communities to be highly engaged in the work of CHAs and so, communities are guided by CHTs to select members of the community health committees (CHCs) before the selection of CHAs. CHA selection is based on core criteria outlined in Box 2.

Box 2: CHA Selection Criteria (Exert from NCHSP pg9)

- Must be a permanent resident in the community in which s/he serves;
- Must be between 18 and 50 years of age;
- Should be trustworthy and respected;
- Should be interested in health and development matters;
- Should be a good mobilizer and communicator;
- Should be available to perform CHA tasks;
- Should be physically, medically, mentally and socially fit to provide the required services, including walking long distances up to one hour or more to provide health services to people in their designated catchment area;
- Should have been involved in community project/s in the past;
- Should be able to demonstrate the ability to read, write, add, subtract and multiply in English to successfully complete a test of literacy as part of their recruitment process;
- Fluency in the dialect that is spoken in the village or town where s/he is serving;
- Must be a Liberian; and
- Females should be given preference.

Communities commonly propose previous CHVs for CHA roles. Key informants described their role as facilitative with OICs playing a more direct role in the CHA selection process. KIIs reported the availability of community members willing to volunteer as CHAs but their inability to meet the selection criteria such as literacy and gender often hindered their recruitment. For example, CHVs have to complete a literacy test before embarking on the CHA training programme. Thus, poor literacy levels in communities were a significant barrier to the selection of CHVs as CHAs irrespective of gender, although exacerbated for women due to education preferences favouring males. Most CHAs are therefore often selected from outside the community. Key informants added that literacy-based challenges had been experienced for many years in the selection of CDDs and other CHVs.

Historically, there has been no prioritisation of specific population groups within CDD selection processes, with community selection of CDDs often being influenced by underlying community power dynamics. KIIs reported that the prioritisation of females for selection within the CHA policy could therefore support establishing a balanced health workforce as there have been challenges to recruiting female CDDs. Over time, attrition of CDDs had led to a decline in participatory approaches to community selection, with CDD replacements often being selected by OICs or community leaders, with minimal community dialogue. While the NCHSP shows an awareness of gender-based challenges in the recruitment of females as CHWs, it proposes engagement with the Ministry of Education to narrow gender gaps in terms of literacy access and retention. To address these challenges, KIIs described working with women (and some youth) to improve their literacy levels through community-based adult education programs to enable them to participate in the CHA program. They proposed that embedding literacy programmes within CHA training or creating educational scholarship programmes would better support the participation of women and other CHVs with literacy challenges.

Community relationships and responses

Both the review and the interviews across all levels emphasised the importance of embedding CHWs within their communities which allows them to *'add respect and rapport'* between the health system and communities while *'educating community dwellers to make decisions about their own health'*. Embeddedness within communities allowed CHWs to support health surveillance activities which KIIs reported as a critical role *'in case there are outbreaks and there needs to be a focus in a specific area'*. Within the NTD programme, delays within the drug supply chain result in a reduction of time to complete awareness and drug distribution activities which hinder

community connectedness and CDDs interaction with community members. Some CDDs described community members refusing to accept medicines or negative interactions because of the limited time they have to connect with community members as demotivating factors to their role. They requested support from the CHA programme in completing awareness activities and using strategies such as group sensitisation meetings and involving community leaders to enhance their work.

Footnote:

[3] (including CDD training)

[4] a suggestion stemming from the actions of an implementing partner which had in a previous program created 'Quality Assurance Officers' who supervised CHSS to reduce the supervisory workload of OICs.

[5] both monetary or in-kind for transportation and gifts

[6] at county level

Discussion

The drive towards attaining SDG 3 and the emergence of epidemics and pandemics such as Ebola and the ongoing coronavirus (COVID-19) have emphasised the need to strengthen health systems. CHW cadres are a suitable pathway to strengthening community health systems, attracting increasing interest, investment and policy reforms from governments, regional and international donors. While the renewed resurgence and re-invigoration of CHW cadres (3, 5, 10) provides an effective strategy for providing comprehensive and people-centred primary healthcare, several policy and implementation challenges exist. Utilizing an adapted Kok's conceptual framework on CHW performance (Fig 2) which distinguishes health systems and intervention hardware and software, we explored how such policy and operational alterations impact vertical programmes. This allowed us to explore how strengths and weaknesses in specific interventions and the broader health system can facilitate or hinder each other. The development and implementation of the CHA policy provide opportunities and challenges for health system hardware and software strengthening in different ways which have multiple implications for specific intervention hardware and software. For health systems strengthening, it provides opportunities for CHAs to be formally recognised and paid; improved and formalised training including the use of practical exercises and sufficient time to explore specific issues in detail; a more formal supervision structure where the CHSS directly supervise the CHAs; and monthly incentives of 70 USD for CHAs which serve as strong motivational factors for CHAs and potentially other CHW cadres. Yet, the roll-out of the CHA policy could create inequities between CHAs and other CHW cadres, unless key hardware elements can be extended to include support for other CHW cadres.

Evidence from Africa shows that adequate training, regular and routine salary or financial remuneration, materials, and tools to perform their duties are key motivational factors for CHWs (17, 35, 36). Training as a comprehensive and dynamic hardware component should be perceived as ongoing and iterative as the absence of such motivational factors potentially compromises CHW performance and quality of service delivery. For example, multiple strengths were identified concerning the CHA training due to the training delivery approach (use of combined didactic, role play and practical activity) and duration which is key for strengthening systems hardware in Liberia. Yet, weaknesses in the training concerning intervention hardware remain, particularly for campaign-based activities in districts and counties where the CHA policy implementation is not supported mainly due to lack of logistical support and condensed training delivery periods. The intense additional training provided within the CHA programme as a system hardware strength, therefore, has the potential to fulfil intervention gaps such as the inadequate training reported within NTD programme delivery towards improving CHW competencies and

performance. This presents opportunities for stronger systems hardware to support campaign delivery using the intense additional training provided within the CHA programme which has benefits for intervention programming due to the comprehensive coverage of issues frequently absent from vertical intervention training such as in the NTD programmes. Conversely, it could facilitate the perception of inequity and demotivate CDDs not selected for training and engagement in the CHA programme.

Donor restrictions further shape training delivery and who receives what - further facilitating inequities. CHA training is mainly funded by international donors which poses a challenge to CHA training in areas where donors are absent. In areas where the CHA policy implementation was not supported by donors, only a few CDDs are selected and trained as CHAs with CDDs not selected left feeling demotivated. In other instances, the implementation of the CHA policy is interrupted when donors depart, leaving the CHA training of selected CHVs disrupted. Consequently, where the CHA programme is rolled out effectively and has adequate partner support, it has the potential to address CDD training gaps. Conversely, in areas lacking partner support, training challenges may be exacerbated, with negative impacts on CHV performance when they are not selected for training and engagement in the CHA programme.

Furthermore, as an essential element to the success of any intervention/program, (16), supportive supervision remains the weakest area of the CHA policy and intervention delivery due to limited health staff, staff workloads, and inadequate resources allocated to supervision. Yet, for resource challenges, intervention hardware strengths can potentially address some of these shortcomings by providing top-up resources to supervisors to reach communities. Nevertheless, this area needs improvement as program effectiveness is further enhanced when adequate supervision of CHW is integrated into the health system (37). For the CHA policy, although the CHAs supervision structure provides opportunities for vertical programming as CHSS will provide some level of supervision for other CHW cadres, the limited numbers of CHSS remains a critical barrier to supervision resulting in ineffectiveness, irregularity, and poor quality supervision. For instance, CDDs who are not CHAs were infrequently supervised with little, or no supervision received once MDA campaigns are concluded. This is consistent with other study findings where the frequency ranges from no visit, to once a year and to three times a month (38, 39). The situation is worsened by inadequate resource support for supervision requiring supervisors to spend out of pocket to undertake supervision reported in this study and other studies (16, 36, 39-41). Peer and electronic supervision accompanied with adequate communication routes and resources have been recommended in this and other studies in Africa (42-45) as alternative ways to reduce supervision challenges related to costs, gender issues and professional development. High performing peer supervisors could potentially progress into the CHA program as career advancement opportunities. Also, the role of accountability and communication structures on CHWs' competencies and adherence to guidelines and procedures including their motivation and satisfaction cannot be underestimated. Other studies have suggested expanding the role of community actors to include supporting supervision (46, 47), as suggested by our findings on the potential role of Village Health Committees (VHCs) and CHDCs.

Moreover, inequities are created by the establishment of a remuneration structure that does not include everyone and is further complicated by poor donor coordination and inconsistencies. Even where policies recommended by WHO and other studies (48), are in place, these are not adhered to, further worsening inequities. As such, while the CHA policy provides opportunities for CHAs to receive monthly remuneration of 70 USD, there are delays in payments arising from irregular disbursement of funds and bureaucracies which demotivate CHAs. Other CHV cadres like CDDs remain unincentivized formally and received little attention which potentially influences their performance. Differences in remuneration packages between MoH programmes and NGO sponsored programmes also entrench inequities as reported in African settings (49). Compounding CHW dissatisfaction is the limited numbers of CHWs creating heavy workloads on limited numbers of CDDs during MDA which reduces population

coverage, requiring CDDs to cover long distances with inadequate supplies. Indeed, only 2.5% of total official development assistance for health has targeted CHW programmes with about two-thirds of this being allocated for specific disease control programmes over the last decade (50). Donor and government commitment and regular disbursement of financial remuneration programs for all CHWs cadres are urgently needed.

Irregular supplies of logistics and materials as hardware challenges further hinder the activities of CHW cadres which could adversely affect their performance. These findings reflect elements of Kok et al's hardware component which suggests that the six health system building blocks influence intervention design factors including training, supervision, logistics and supplies and accountability and communication structures which in turn shape CHWs' competencies and adherence to guidelines and procedures (30). The CHA policy brings opportunities for enhanced coordination and collaboration with vertical programmes for effective implementation and a stronger health system built around the efficient use of shared resources. Challenges surrounding the integration of vertical programs into routine health services and partners' interests and funding influencing resource allocation however exist. Vertical programme funding as an intervention strength has the potential to address hardware challenges through collaborating with and leveraging on other sectors to reduce funding challenges for CHW training and supervision. Such systemic changes impact individual CHA motivation, competencies, and performance.

For system's software, the CHA policy provides an avenue to enhance community delivery and acceptance of CHWs through an increase in the numbers of CHAs and an emphasis on recruiting female CHAs. The literature shows female CHAs could improve coverage for health interventions in communities (51). Yet, similar to another study's findings (36), literacy challenges hinder female recruitment as CHAs in this study. Community-based adult education programs could support the inclusion of women as CHVs. Specifically, for NTD programming, encouraging girl child educational programs could improve numbers of female CDDs, reduce CHA literacy gaps and promote wider literacy of CHWs. Adaptions that promote gender transformation are favourable although in the long-term change, it relies on significant structural adaptations including addressing power dynamics at community level.

Lastly, for systems software, the decline in community dialogue and engagement for the selection or replacement of CDDs and other CHVs creates challenges in ensuring community ownership and support of community health cadres which impacts the sustainability of community-led approaches when not managed effectively. The need for community involvement and transparency in the selecting and replacement of CHVs cannot be underestimated as evidenced by findings from this and other studies in LMICs (52).

Strengths and weaknesses

Box 3. Strengths and weakness of the study

1. The study findings show how transition and changes through time play out at multiple levels in job and life histories and bring a temporal analysis of CDDs and CHAs experience through the collation of their life histories.
2. Although the use of life histories allowed us to capture changes in CDD experience over time there might be some recall bias among CDDs.
3. Also, there were limited numbers of female CHAs recruited into the study which was due to the low numbers of women who meet the selection criteria and are trained as CHAs.
4. Moreover, we did not complete life and job histories in Grand Bassa because we had reached data saturation with no new themes emerging from life and job histories conducted in Maryland and Bong
5. Lastly, in some counties, we were unable to interview some CHSS as they had not yet assumed their posting.
6. Despite these limitations, the study collected data from a broad range of perspectives from multiple health stakeholders, show how individual experiences are shaped by policy and reflect broader policy changes and shocks to the system.

Conclusions

This study analysed the CHA policy and how policy and context changes impact vertical programming and health systems through the utilisation, management, and performance of community health cadres. It uses a context-specific lens to examine the hardware and software systems factors that shape CHW motivation and support. The hardware dimension shows opportunities and challenges linked to training, motivation, supervision, and logistics and supplies whilst the software dimensions highlight the importance of community engagement and dialogue in CHW programming. This study shows how system and intervention hardware, and software dimensions provide leveraging opportunities to address gaps and increase CHW motivation and competencies towards better health care delivery and stronger and resilient health systems. It also provides key insights into how the implementation of the CHA policy influences and shapes CHWs training, motivation and supervision which is essential to equitable NTD programme delivery in Liberia.

List Of Abbreviations

Community-Based Health Worker - CHW

Community Drug Distributors - CDDs

Community Health Assistants - CHA

Community Health Development Committees – CHDC

Community Health Services – CHS

Community Health Services Division – CHSD

County Health Teams - CHTs

Community Health Volunteers - CHVS

Health Facility Development Committees - HFDC

Information, Education, And Communication - IEC

Liberian Ministry of Health - LMoH

Low And Middle-Income Countries - LMICS

Maternal And Child Health - MCH

Ministry Of Health - MoH

Mass Drug Administration -MDA

National Community Health Services Policy - NCHSP

Neglected Tropical Disease Programmes - NTD

Non-Communicable Diseases - NCDs

Non-governmental development organisation - NGDO

Sexual And Reproductive Health - SRH

Sub-Saharan Africa - SSA

Sustainable Development Goal - SDG

Universal Health Coverage - UHC

Declarations

Ethical approval and consent to participate: Ethical approval was obtained from the University of Liberia Pacific Institute for Research and Evaluation UL-PIRE IRB (16-09 009) and Liverpool School of Tropical Medicine (LSTM) (16-042) while administrative consent was obtained from the Liberian MoH before data collection. Verbal and/or written/thumb printed informed consent was sought from each participant before the interview.

Consent for publication: Consent for publication was sort from each participant prior to the interview.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests

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Authors' contributions: LD, ST, GZ, RT and JR conceived the study idea and designed the study proposal. GZ and GN collected the data and reviewed transcripts. LD, GZ, GN and GNN, coded, analysed, interpreted the results. GZ and GNN developed and revised the manuscript. GN, KK, RT and JR contributed to interpreting and revising the manuscript. ST and RT contributed to revising and shaping the manuscript. All authors read and approved the final manuscript and are accountable for all aspects of the manuscript.

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Tables

Table 1: Policies accessed and reviewed

Author	Policy document	Date
Ministry of Health, Monrovia, Liberia	National Community Health Services Policy (NCHSP)	2016-2021
	National Community Health Services Strategic Plan	
	Investment Plan for Building a Resilient Health System in Liberia	2015-2021
	National Health and Social Welfare Policy and Plan	2011-2021
	Master plan for Neglected Tropical Diseases	2016-2020

Table 2: Characteristics of interviewed participants

Label	Label Description		Gender Male (M), Female (F)	Educational level	Number of persons interviewed
A. Key informant Interviews (KIIs)					Total (25)
MKII 001-006	Health Ministry Montserrat co		M (4), F (2)	Further Education	6
HKII-001 - 004	Officer In Charge (OIC)		M (2), F (3)	Further Education	4
SVKII-001	Sightsavers		M (1)	Further Education	1
PIHKII-001	Partner in health		M (1)	Further Education	1
LMHKII-001	Last mile health		M (1)	Further Education	1
NTDKII-001	NTD Program		M (1)	Further Education	1
BKII-001-002	Health facility		M (2)	Further Education	2
DKII- 001	Community health director		M (1)	Further Education	1
CHOKII -001	County health officer		M (1)	Further Education	1
CHSSKIIs-001-004	Community health service supervisor		M (4)	Further Education	4
DHOKII -001-02	District health officer		M (2)	Further Education	2
B. CDD life and job histories					Total (42)
HLJH-001 -019	CDD interviews	County (Maryland)	M (10), F (9)	Attended secondary school - further education	19
BLJH-001 -023		County (Bong)	M (20), F (3)	Attended primary school - further education	23

Table 3: Participant Quotes from transcripts

Theme	Quotes
<i>The context of the CHA policy and its influence on NTD programme delivery</i>	'[the] president saw value in the policy and was a driving force' (County MoH Staff, Male)
	'[it is] influenced by the policy in other countries such as Ethiopia' (County MoH Staff, Male),
	'Focus on UHC and ensuring equitable access to health services for all Liberian's was important for pushing this agenda forward' (National MoH Staff, Male).
Hardware	
<i>Training</i>	'There is no training besides the monthly meeting we don't have any extra training that have been provided. I remember we had the NTD where they were train how to distribute the Mectizan, but since that time we have had no additional training' (OIC, Male, Unsupported District)
	'I want them to give us some materials like training book or something that we will be reading through' (CDD, Male, Bong)
	'It can be short...because those drugs you are carrying in the community... The mistake you make maybe the life you were saving, you will be damaging...the time frame of training is too short. At least they could make it two day, three days...the third day where they can test you whether you understand it or you don't understand it, they ask few questions that you will not [be] able to make a mistake in the field if you do go.' (CDD, Female, Maryland)
<i>Supervision</i>	'In the policy it says that CHSS will visit the CHA twice a month. The reality is that some of them have not been able to reach to the CHA to supervise them even once a month. This is because the CHSS must work 20% of their time in the clinic, but the clinic work takes up most of their time. So, we would like them to be assigned to the facility as the community health team, but not have to work in the facility' (NGO National Level, Male).
	'I have to walk seven hours distance to go for supervision, and then I have to supervise the CHAs on two hours. Before I come back, darkness will catch me, and I will sleep there' (CHSS, Supported District, Female).
	'The county health team supposed to check on us...Nothing for me nobody can check me check on me. So, myself too I say...It is better for me to pick up cutlass and go on my farm' (CDD, Male, Maryland).
	'the government [needs] to think about how the structures can be sustained...those that are working need some form of motivation either cash or kind' (DHO, Unsupported District, Male).
	'[Quality Assurance Officer] provides a layer of supervision between the OIC and the CHSS' (NGO National Level, Male)
<i>Remuneration</i>	'They should be given some cash at the end of every month...They will also be feeling good because that's a form of employment too. Imagine you are in the village and every month you get seventy dollars, which amount to almost ten thousand dollars you know in Liberian Dollars...but for the past three months you know their incentives have not been delivered. There's bureaucracy you know, the money have to go from X to the Ministry Of Health and the office of financial management rather they have their own procedure or processes before that is completed several months have elapsed and people had not gotten their pay. They still pay the people every month, but it appears like they are paying them every quarter' (NGO Staff, National Level, Male).
	'When I took over, the CHVs weren't really working or all together, so when I took over, I brought them all together more. I didn't give them any reward, but the means...when a programme came, I didn't just let one keep working and working I started to rotate them when different programmes came and that allowed them to reengage. The problem is that X was giving incentives but when X left you know right now is not available. So that is one thing that holds them back' (OIC, Male, Unsupported District).
<i>Supplies and Equipment</i>	'We have challenges with movement and logistical support. We need something like rain gears {raincoats and other rain protective materials}, we don't have it, rain boot, we don't have even

	<p>the gasoline that we need to ride to get be-hind them sometimes it is not there. Sometimes we sacrifice and use our own money to support them' (DHO, Male, Unsupported District).</p> <p>'You people were not able to provide us with anything that will protect us. Such as raincoat, rain boots, because we walk in the darkness. when we go into the community, they believe that you people can bring big, big car so when you go in the community when you tell the people I am coming they can say I come give medicine so your feed me, the people cannot agree. They can say they give us money, whereby we sacrifice our lives, to serve the community because we want to prevent sickness from our community, and that is sacrifice' (CDD, Male, Bong).</p>
Software	
<i>Selection and Recruitment</i>	<p>"CHAs will be selected by their own people. Criteria is set, they select them...The only thing is we guide the process, we go to the community, and we talk to the opinion leader, and they select based on our criteria. If these people are interview and tested, that's how it is. We don't select but we only guide the process." (County MoH Staff, Male)</p>
	<p>'Most people in the community are not lettered. So hard to find women who are lettered (CHSS, Supported District, female).'</p>
	<p>'in the interior...boys' education is prioritised over girls, with girls remaining in the kitchen' (CHSS, Supported District)</p>
	<p>'Where women and youth have been unable to read and write they have been encouraged to join the elders educational programme so that they can be incorporated into the programme' (MoH, Supported District, male).</p>
	<p>'some women who as a result [of literacy support linked to the CHA programme] have completed school and are in midwifery school right now' (CHSS, Supported District, female).</p>

Table 4: Types of CHWs operating in Liberia, their key roles and responsibilities and training required or provided

Type of Community Provider	Role	Household Coverage	Pre-Service Training requirement in the NCHSP	Training package
a) Community Health Assistant (CHA)	<ul style="list-style-type: none"> Supervised to deliver an integrated and standardised service delivery package that includes preventive, curative, promotive, rehabilitative, and palliative services, and epidemic surveillance to households located more than one-hour walk (>5km) from the nearest health facility Coordinate CHVs who do not meet CHA criteria or who are not selected as CHAs. 	<ul style="list-style-type: none"> One CHA 40-60 households (up to 350 population) <p>NB: in areas that are sparsely populated (more than one hour between communities) or have a population of less than 350, one CHA will be aimed for per community.</p>	<ul style="list-style-type: none"> Must be nominated by their communities through the CHCs using established criteria All selected CHAs must undergo the standardised training package and pass proficiency tests and supervision to progress to the next training module and function as a CHA. 	<ul style="list-style-type: none"> Integrated and standardised training package including promotive, preventive, and curative services as well as modules on logistics, monitoring and surveillance. In-service refresher training to be provided twice per year.
b) Community Health Services Supervisor (CHSS)	<ul style="list-style-type: none"> Provide field-based supervision to CHAs working in remote catchment communities of the health facility. 	<ul style="list-style-type: none"> One CHSS to supervise 10 CHAs. 	<ul style="list-style-type: none"> Must be a professional health worker (Registered Nurse, Physician's Assistant, Environmental Health Technician). 	<ul style="list-style-type: none"> Specialised training package on supply, operations, monitoring and supervisory functions. Also, sessions on facilitation skills and relevant technical content for CHA level service provision as CHSS will serve as a trainer for CHAs.

c) Community Health Volunteer	<ul style="list-style-type: none"> Primarily engaged in health promotion activities 	<ul style="list-style-type: none"> One CHV 40-60 households (up to 350 population) 	<ul style="list-style-type: none"> Training on principles of community engagement and mobilisation, health promotion and education, referral.
d) General Community Health Volunteer <ul style="list-style-type: none"> <i>Trained Traditional Midwives (TTM)</i> <i>Traditional Midwives (TMs)</i> - <i>Community/Household Health Promoters (HHPs)</i> <i>Community Drug Distributor (CDD)</i> <i>Mass Drug Distributor (MDD)</i> <i>Community-Directed Care Provider</i> <i>Community-Based Distributors</i> <i>Community Accompaniers (One accompanier 6-10 patients (not population-based))</i> <i>Natural Leaders for CLTS</i> <i>Youth Peer Educators</i> 	<ul style="list-style-type: none"> Provide limited promotive, preventive, and curative services 		<ul style="list-style-type: none"> Specialised programmes will use standardised training modules in the area of focus with coordination with relevant MoH divisions.

*All data in this table is taken from the National Community Health Services Policy and Strategic plan unless otherwise stipulated

Figures

Fig 1: Summary of core operating structure of revised CHW Program

Figure 1

See image above for figure legend

Fig 2: Kok MC, et al's (2017). Conceptual framework on CHW performance as a transactional social

Figure 2

See image above for figure legend

Figure 3

(Adapted) Kok MC, et al's. Conceptual framework on CHW performance as a transactional social process.

Supplementary Files

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- [SupplementaryFile1COREQ.docx](#)