

Implementation Research for Malaria Prevention and Control: Barriers and Lessons Learnt in Capacity Building of Community Health Volunteers in Malindi, Kenya

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Abstract

A two-year implementation study was undertaken in Malimo and Kakuyuni of Malindi, Kenya. The study combined data collection and intervention in three phases from November 2015-September 2017. These phases were: 1) CHVs recruitment and need assessment; 2) Curriculum and development of training guide; 3) CHVs implementation activities. Implementation activities were carried out for six months where selected CHVs conducted home visits, created awareness on malaria prevention and control activities, and collected monthly data using prescribed forms. Workshops, field visits, and formal and informal meetings were used to collect information on challenges faced by the CHVs and the lessons learned in the intervention phase. Seventy-seven (77) CHVs were identified. Twenty (20) were randomly selected, trained, and assigned to 20 households each to implement malaria prevention and control activities. The challenges identified included low literacy levels of CHVs leading to the introduction of peer-to-peer; weak referral system and poor linkages of CHVs to health facilities; insufficient supervision and missing coverage and also a multiplicity of CHVs' roles. Identification and use of need-based capacity strengthening and follow-up are crucial in addressing challenges facing CHVs and enhancing their capacity for successful implementation of CHVs activities in malaria prevention and control.

Keywords

Qualitative Research, Peer to Peer, Literacy Levels, Referral Forms, Supervision and Community Structures

1. Background

Mortality among children under 5 years old has fallen by more than 50% in the last decade (WHO, 2021). However, the global burden of diseases and years of life lost are still high in low and middle-income countries owing to infectious diseases, including malaria. Malaria burden remains high despite knowledge of effective interventions and substantial increases in donor funding, improved control, and increased enthusiasm for malaria elimination (Bhutta et al., 2013). Such interventions include community-based approaches for prevention and treatment of common illnesses responsible for high mortality and morbidity, such as malaria (Lassi et al., 2015).

Improving the availability of effective health services has been an essential strategy for malaria elimination in all of the endemic regions (WHO, 2014). Malaria continues to affect the populations living in remote and rural regions where the most vulnerable are least able to receive essential preventive measures and access health services due to insufficient human resources (World Bank, 2003). CHVs in most contexts operate with inadequate training, insufficient logistical support, poorly sustained motivational schemes, and a lack of community support (Matsumoto-Takahashi and Kano, 2016). In sub-Saharan Africa, several preventive and curative malaria control activities are conducted at the community level. Community case management of malaria, a strategy that was originally based on presumptive treatment of all cases of suspected malaria, is widely practiced. There is evidence showing that CHVs can contribute to the efforts of improving the health of the population, particularly in those settings with the highest shortage of motivated and capable health professionals (Global Health Workforce Alliance and Organization, 2010). CHVs conduct a wide range of services offered to the community including promoting preventive malaria control measure (Global Health Workforce Alliance and Organization, 2010). The basic characteristics of community health workers are: members of the community where they work; selected by the communities, answerable to the communities for their activities; supported by but not necessarily part of the health system and are trained for shorter durations than other professional health workers (Lehmann and Sanders, 2007). The roles of CHVs are diverse within and across countries and programs. In some cases, they may perform a wide range of tasks that could be preventive, promotive, curative or developmental while in other cases they are appointed for very specific tasks (Lehmann and Sanders, 2007). The training of the CHVs may also vary from a few days to several months (Chipukuma et al., 2018) and may be offered by different organizations that also assign them responsibilities to perform in their communities.

Health service provision in Kenya is centered around four tiers of service provision community, primary care, primary (county) referral and tertiary (national) referral services (MOH-Kenya, 2014). Kenya has a Community Health Strategy (MOH-Kenya, 2005) which is a national policy aimed at enhancing delivery of primary health care at the community level. The strategy is based on the use

of volunteers known as Community Health Volunteers (CHVs) also known as community Health Workers, linked to primary health facilities through the Community Health Extension Workers (CHEWs). A representative Community Health Committee (CHC) provides governance, oversight, and leadership within their respective community unit (MOH-Kenya, 2005). Although the community strategy is evidence based, the Kenyan government has faced challenges in introducing and these include insufficient resources, competing priorities within governments and limited community ownership (UNICEF and GOK, 2010).

Even with the ensuing challenges, there is need for functional and innovative mechanisms for maintaining sustainability of CHV programmes. This calls for robust methodologies like the implementation research (IR) which allows for consultation and interactive engagement and processes that identify contextual factors important to policy-makers. The broad objective of this study was to use IR in exploring the challenges and experiences of CHVs in the implementation of malaria control and prevention activities with an aim of strengthening and building their capacity, within a context of declining malaria prevalence in Malindi.

The Intervention

The implementation phase (see **Figure 1**) included an assessment of the roles of CHVs in malaria control and prevention. This entailed identifying the training gaps among the CHVs. These was addressed through targeted training in relation to community level malaria control and prevention. The CHVs were then released back to their communities and were asked to initiate and/or continue (where previously done) with community level malaria control and prevention activities. The research team alongside the CHEWs monitored and assessed the success of implementing the community level malaria and control activities using CHVs. Any further training needs and capacity gaps were addressed through additional training.

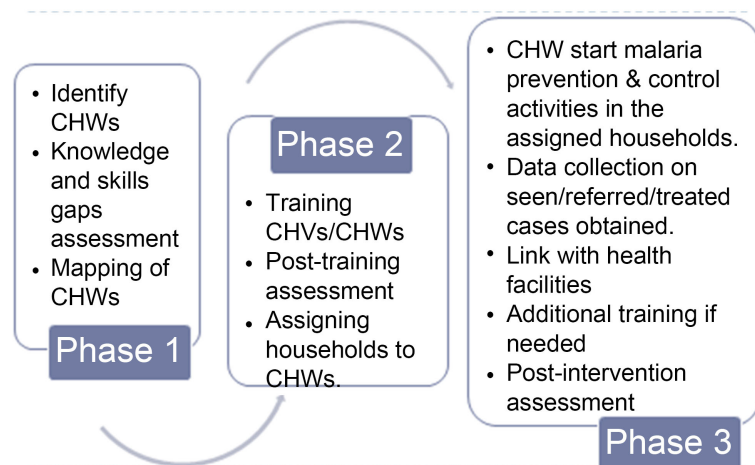


Figure 1. Research implementation process.

2. Methods

2.1. Study Setting and Selection of Participants

The study was carried out in Malimo and Kakuyuni sub-locations, Goshi Location, Malindi Sub-County of Kilifi County. In 2006, the Ministry of Health established community units and trained 77 (seventy-seven) community health workers—33 men and 44 females in each sub-location. The two sub-locations had malaria research activities by Kenya Medical Research Institute (KEMRI) in collaboration with International Center for Insect Physiology and Ecology (ICIPE) in the Integrated Vector Management project. The study selected 20 out of the 77 CHVs (11 from Malimo and 9 from Kakuyuni). They were selected on the basis on their past participation and involvement (very active/active) in CHVs activities following initial assessment that we conducted to all CHVs. According to research activities carried out by KEMRI-ICIPE malaria programme, despite a decline in malaria cases in the area, the areas selected served as malaria hot-spots sustaining malaria transmission.

2.2. Data Collection Methods

The study utilized a mixed-methods implementation research approach. These methods included initial identification of CHVs to participate in the study and obtaining baseline data on the malaria situation in the study sites; interactive monthly meetings, post assessment survey with CHVs, workshops with stakeholders and CHVs and field visits. CHVs were followed up for six months in the field within their respective catchment of 20 households. They were expected to interact with the households on monthly basis; Collect data using a CHV monthly household data capturing tool, and provided information about malaria symptoms, prevention and control methods within the households they covered, including encouraging use of long lasting mosquito nets and removal of mosquito breeding habitats. During the household visits, persons confirmed to have fever were referred to a health facility near them for treatment. The CHVs used a referral forms adapted from the Ministry of Health (MOH) forms.

2.3. Interactive Monthly Meetings

Monthly meetings were held between the field project team and the CHVs usually at a central place (dispensary). Each CHV was attached to either a field team (project field officer or a CHEWs where they had a one-on-one meeting. During the meetings, a CHV submitted the filled monthly household reporting form and together with the officer, they checked it for correctness and completeness. CHVs also shared their experiences during the household visits and data collection in the field, as well as the challenges they faced and issues that they needed to be addressed by the research team. The performance status of their equipment such as the thermometer was assessed and where necessary replacement done. The reports from CHVs were compiled by the project officer and shared with the research team for further inputs and direction.

2.4. Supervisory Field Visits

The field team carried out random supervisory field visits to monitor the work of the CHVs. During the visits the team observed the CHV engagement with the household heads or other representatives, the interview process and recording in the data collection forms, and other relevant interaction with the household owners. The supervisor visited a CHV was visited at least once during the implementation phase.

2.5. Workshops with CHVs

Two workshops were held to assess the training needs of CHVs. The workshop objectives were two-fold. First, to sensitize the stakeholders about the project and their role; and second to work with the stakeholders in training CHVs on training needs that were identified during the monthly and quarterly assessment project meetings with the CHVs. In the initial workshop, a joint curriculum was developed with stakeholders covering topics such as malaria, mosquitoes, mosquito control measures, communication strategies at the household level and community engagement. The 2nd workshop was a refresher training which aimed at dealing with challenges identified during the implementation process such as recording on the data forms, agreeing on the terms that presented incorrect meaning e.g. fever.

2.6. CHVs Post Assessment Survey

A post-implementation assessment survey was conducted with CHVs who participated in the study. The assessment was conducted by researchers who were members of the study team, and they used a structured questionnaire to collect information from the CHVs regarding their experiences and lessons learned during project implementation.

2.7. Data Analysis

The data for the study were collected and analyzed concurrently at different stages of the study, with each level of analysis informing activities in the next stage. As a standard procedure, the summary notes from monthly interactive meetings, field notes during supervisory visits, workshop proceedings and structured interviews reports were typed and saved in MS word. All notes were reviewed and imported to NVIVO 12 Plus software (Jackson and Bazeley, 2019) for further processing and analysis. Deductive analysis was used to categorize codes based on the study objectives. Data coding was done simultaneously with data collection to ensure that thematic saturation was monitored. Also, to ensure a fair interpretation of the data, the transcripts were initially coded by three researchers independently. The coding process involved a critical review of transcripts and notes to identify emerging themes from the data. The three researchers coded the transcripts and notes, then they met to compare the codes independently. They resolved any divergence by re-reading the relevant sections of the transcripts together and

agreeing on the best fit interpretation of the data. The major and sub-themes are discussed below, supported by relevant quotes from the transcripts. Preliminary findings of the study were presented to the stakeholders at the county level to help improve the CHVs activities.

3. Results

Analysis of the data obtained from the field using the different methods identified several barriers that affected CHVs performance. **Table 1** shows barriers identified, how the barriers affected CHVs performance and the actions taken by the research team.

Table 1. Summary of the barriers identified, effect to CHVs performance and actions taken by the research team.

<i>Barriers identified</i>	<i>Effect on CHVs performance</i>	<i>Action taken by research team</i>
Low literacy level of CHVs	- Incomplete forms	
	- inability to comprehend the questions in the data collection tools	
	- rephrasing the questions and misinterpretations of terms	
Weak referral system	- Inability to read the questions and inability to write responses correctly on the forms	
	- Health facility staffs' refusal to accept complete the referral forms	- Introduced the peer to peer strategy
	- weak community health structures	- Capacity building bridging workshop to reflect and revisit terms that were identified from the monthly data collection forms as not having been well understood misconceived, or misinterpreted by the CHVs
	- insufficient supervision of CHVs	- Conducted discussions with the facility staffs and discussed the results of the study especially highlighting the challenges that CHVs were experiencing and importance of the referral system
Weak community structures	- CHVs felt demotivated and demoralized	
	- Low morale of CHVs	
	- low morale of CHVs	
Insufficient supervision	- insufficient supervision	
	- poor implementation of CHVs activities in their respective villages	
	- negative attitude by the facility staffs	
Multiplicity of roles	- Low morale	
	- High CHVs turnover	
	- Demotivated CHVs	
Multiplicity of roles	- Work overload	
	- Delayed reports	
	- Absenteeism during monthly meeting	
	- Credibility of reports	

Each of the barriers and the action taken to address them is discussed below.

3.1. Low Literacy Levels of CHVs

Low literacy levels among CHVs can affect their ability to comprehend, correctly interpret and internalize the various information and processes required of an IR process. As shown in **Table 2**, a total of 77 CHVs that were identified and participated in the initial baseline assessment of which 37 were from Malimo and 40 from Kakuyuni community units. Most of them were female (66%) while the males constituted 34%. The CHVs had generally low levels of formal education with most of them (82%) having some primary level of education whereas only 36.4% had completed primary level of education. Only 10.4% of CHVs had completed secondary level of education. This was despite most of them being young, being aged between 22 and 66 years with an average age of 40 years. Most CHVs (83%) were married while 17% (13) were single. This indicates that in addition to being volunteers in their communities, most CHVs have additional family responsibilities.

Apparently, CHVs are among the educated elites residing in their villages. However, with their level of educational attainment, this had implications on their capacity to acquire and process new information. During the implementation of the study, literacy levels played a key role in the performance of the CHVs especially in filling data forms. During the monthly meetings and household visits, inconsistencies were noted in how data were captured on the

Table 2. Demographic characteristics of community health workers.

Category	Sub-Category	Number (n = 77)	Percentage (%)
Sex	Male	33	34
	Female	44	66
Age	19 - 35	37	41
	36 - 76	40	59
Marital status	Married	64	83
	Single	13	17
	None	1	1
Educational status	Lower Primary	6	9
	Upper Primary	48	73
	Secondary incomplete	6	9
	Secondary complete	5	7
	College education	1	1
Main Occupations	Farmers	39	58
	Small traders	24	36
	Formal employment	4	6

monthly reporting tool. These inconsistencies included incomplete forms, inability to comprehend the questions in the data collection tools, rephrasing the questions and misinterpretations of terms, inability to read the questions, and inability to write responses correctly on the forms. In one instance, and without prior knowledge of the research team, a CHV who could not write had requested her daughter aged 17 years to accompany to the field so as to assist with filling the data forms. Another CHV had filled the forms before visiting the households, while a few others had incomplete forms after a day's visit to the assigned households. These issues were identified during the first and second month of the implementation period and during the quarterly follow-up meeting. In such cases, the actions taken by CHVs though well intended bordered along the breach of confidentiality lines and were therefore discouraged.

To continue supporting the CHVs and build their capacity, the research team devised an innovative *peer to peer strategy* to enable those who could not read or write to work with their peers. The five CHVs affected were attached to peers and they worked harmoniously and effectively alongside each other. This ensured continued inclusion and participation of all enlisted CHVs irrespective of their literacy ability and without compromising the integrity of the research process. To motivate these peers to support their counterparts, they were given some additional cash on top of their monthly allowance. Additionally, a capacity building bridging workshop was held with the CHVs to reflect and revisit terms that were identified from the monthly data collection forms as not having been well understood misconceived, or misinterpreted by the CHVs. Such terms included *fever* which means *hotness of the body but could have a different meaning or connotation*, as *homa*, when translated into Kiswahili fever. In such a case, the responses in monthly reporting tools showed varying responses that related to all kinds of pain, aches or signs of ill-health. The correct position was pointed out to CHVs to avoid further ambiguity.

3.2. Weak Referral System

A key role of CHVs is to refer community members observed to have signs of fever or ill-health to a health facility using the provided referral form. During the monthly meetings and CHV post assessment interviews, it emerged that the CHVs referral procedures were affected by health facility staffs' refusal to accept and complete the referral forms, or for some to acknowledge them. This resulted due to weak community health structures and insufficient supervision of CHVs. As a result, CHVs felt demotivated as the referral forms were important to them in five ways; the referral forms was one way in which the community members would be obligated to seek prompt treatment; served as a proof that the individual had sought treatment; the forms were a proof that a CHV had visited the homes, made observations, and where necessary referred suspected cases for further diagnosis and treatment, received feedback on the kind of treatment given and finally it served as a platform for monitoring and following up to the

patient progress. The CHVs also noted that they felt recognized and appreciated by the community when they accepted to go to a health facility for treatment, and by the health providers when they received the persons they referred to the facilities. A CHV reported; *Sometimes you find a health facility in charge who does not want anything to do with CHVs work. They treat us badly. They even show it in their face. I feel like I want to quit as a CHV. But because I work for my people, I get the energy to continue* (K04).

Hence, recognition by the health care providers could have gone a long way in enhancing the work and capacity of the CHVs in the communities they served as demonstrated in the extracts obtained through interviews with CHVs on their referral work (see **Table 3**).

3.3. Weak Community Structures

A strong community structure can enhance the work of CHVs especially with regard to their recognition and acceptance in the communities. Ideally, Community Health Committees (CHCs) comprised of village health committee

Table 3. Main themes and sub-themes with selected quotes on referral forms.

Category	Sub-themes	Selected quotes from CHVs on referral system
Referral forms	Enhanced the work of the CHVs	<ul style="list-style-type: none"> - Referrals made my work easier (K02) - By filling the referral form it meant that as a CHV, was doing his/her work in the community (M08) - A CHVs feel appreciated, recognized and respected by the community (M005) - We could get feedback on the treatment (M08) - When patients visited the health facility, they brought to me feedback which previously was not the case (M01)
	Enhance patients treatments at the health facility	<ul style="list-style-type: none"> - Some patients were reluctant to go to the dispensary, but with the referral form, they felt they had an obligation to go to seek medical attention (M06) - Patients were well received and quickly (M03) - I referred a child with fever to the clinic. Malaria was tested but he tested negative. The clinic staff were able to establish the cause of the fever and the child was treated free of charge (K04) - The patients sought treatment at the clinic unlike before they visited traditional healer (M11) - The referral system motivated the patients. The patients felt recognized and services were improved (M09) - The patients went to the hospital in good time and received prompt treatment (K08) - Initially, it was a problem but now communities are easily willing to go to the clinic. Now in the facilities, the referral forms are easily accepted (K09)

representatives with the area CHEWs being the secretary. A CHC is expected to meet monthly to discuss performance and health related issues affecting their villages including the CHV activities. In cases where CHCs were weak or non-existent, the CHVs lacked a forum for discussing issues that affected them including referral forms, support, health issues affecting the community and supervision in the field. For example, in Malimo, the Community Health Committees (CHCs) worked better than the one for Kakuyuni. In Malimo, the unit was well established with functional grassroots structures such as CHCs. Community dialogue days and feedback meetings with CHCs were conducted in their respective villages. CHVs also said they had a good working relationship with the catchment facility staff. On the contrary, Kakuyuni, did not have a functional CHC.

3.4. Insufficient Supervision

Effective implementation of CHVs work and activities requires continuous follow-up and monitoring, as well as moral and where possible financial support. During the implementation of the study, a project officer was charged with the responsibility of supervising the CHVs who are engaged in the project activities. Nonetheless, the bigger mandate was within the MOH working with the CHEWs. To this end, the study observed that CHVs supervision was insufficient. There was little support offered to CHVs during their assigned role by the Ministry of Health even though they were expected to give monthly reports at the dispensary. This was common in the area that had weak community structures and negative attitude to CHVs from facility staffs. A CHW stated “*we are not recognised by the facility staffs, he despises us and we feel neglected and unwanted*” Structured interviews CHW Kakuyuni.

3.5. Multiplicity of CHVs' Roles

During our interactions with the CHVs, we noted that the CHVs had numerous roles. In addition to their occupational roles, CHVs were involved in health-related programmes and in community development activities. The mostly mentioned programmes by the CHVs that required their input or participation included road construction works; nutritional, and orphans and vulnerable groups programmes; as well as HIV-AIDs TB and malaria programmes. The CHVs participated in more than one donor programme implemented in their area in addition to their MOH assigned duties. There were no guidelines for sharing CHVs in the area thus, the programmes worked in isolation of each other. Each programme provided CHVs with their roles and timelines without knowledge of other existing programmes working with the same CHV. In addition, CHVs had their own domestic and economic duties. This affected the performance of CHVs as about 50% were not able to follow their routine household schedule or and either attended the monthly feedback meetings late, so as to fit in the activities of the other programmes. Furthermore, these programmes expected the CHVs to produce reports using the prescribed reporting tools. Given the CHVs

low literacy level, their competencies in producing credible information were complicated by this multiplicity of roles. In some cases, the CHVs sought work outside their area to earn a livelihood, and this affected their involvement in the CHV work. These challenges could not be effectively dealt with given the short time of the study. However, the team made recommendations to the Ministry of Health on the need for clear guidelines and procedures for enhancing CHVs co-ordination.

4. Discussion

This paper seeks to highlight factors that are likely to influence the performance of CHVs within an IR project. Understanding this is important as it is related to the success or failure of CHVs programmes. Evidence on factors influencing CHV performance can help to improve CHV programme design and management. The study identified five though inter-related challenges that affected CHVs performance in Malindi, Kenya. These were low literacy levels, weak referral system, weak community structures, insufficient supervision, and multiplicity of roles.

Low levels of literacy affected the performance of some CHVs. Our selection of CHVs was based on their activeness and commitment to previous CHV activities (Muia et al., 2019) and not based on literacy ability. Nonetheless, though not initiative envisioned, CHVs low levels of education impacted on their work. The CHVs performance indicators that included timeliness and completeness in filling data reporting tools proved to be not the best measurement indicators when literacy levels were not taken into account. Hence, in this study, CHVs who experienced literacy related challenges devised ways of coping with the challenge such as working with a helper or their children to help them in filling the form; pre-filling the forms prior to the visits; or having forms that were incomplete. These actions, while well intended, caused delays in completing assigned tasks, and raised questions on confidentiality, while consistency and correctness concerns also emerged. A systematic review on intervention design factors that influence performance of community health workers in low- and middle-income countries found out that regular supervision was important (Kok et al., 2014). With the implementation research design, researchers were able to identify these issues immediately after the CHVs embarked on field work and necessary measures and interventions were taken to address identified issues. Effective on-site supervision and supports requires adequate time and resources where each CHV would be visited at least within one month and necessary support provided. This was not feasible and not all the CHVs could be visited in the same month given the additional roles which the team had to perform, even though the team was available via telephone, and had scheduled monthly face-to-face feedback meetings with all the CHVs. However, offering CHVs supportive supervision within the structures and functions of the health team demonstrated better outcomes (Hill et al., 2014) although this also had challenges of time and resources as have been found in studies elsewhere (Tavrow et al., 2002).

Another challenge was multiplicity of roles of CHVs. The CHVs were engaged with several organizations and in multiple projects and activities. There were no guidelines from the Ministry of Health for CHVs engagements by partners. They were therefore “free for all” and for them, they had no restrictions in terms of how much they could offer their time given their other family and livelihood demands. In an area of limited opportunities like Malindi, CHVs work is voluntary and donor’s or sponsor organizations working with CHVs provide a stipend ranging between Ksh500.00 (approximately \$5) and Ksh1000.00 (USD 10) per day for a day worked. In most cases, the CHV are engaged between 2 - 3 hours per day and for 3 - 5 days per month with an organization. The motivation of the CHV’s to work with multiple organizations and on non-health programmes was mainly to sustain their family and community needs, and largely due to monetary incentives which have equally been identified by other studies in Kenya (Aseyo et al., 2018). Other motivations include getting new skills and recognition by the community (Winn et al., 2018), formal linkage to the health system, and in some cases, getting recognition certification. These are some of the factors that maintain CHV morale (Ebenso et al., 2020) even when the financial compensation is low.

In light of foregoing, there is need for greater and more formalized recognition and coordination of CHVs, guided by the County Governments through the Ministry of Health. Such guidelines should be developed jointly with the CHVs, and by both health and non-health actors so as to improve the performance and quality of CHV activities. Multiplicity of roles including household duties (Mwangi and Nzengya, 2022), child care and small scale businesses (Lusambili et al., 2021) as well as working with development partners as identified in our study contributes to work overload for the CHVs. This should be factored in while developing the CHVs coordination and engagement guidelines to minimize the risk of CHVs work overload. The Ministry of Health at the County level should also streamline CHVs activities within the County and address concerns relating to low literacy levels and the multiplicity of roles that affect the quality of CHVs output and accomplishment of tasks within set timelines. Similarly, our study observed that, CHVs concentrated more on roles that paid them better. WHO recommends that development partners involved in funding CHVs programme implementation should ensure that the support provided to CHV programmes is harmonized across development partners and aligned with the national policy frameworks and mechanisms (WHO, 2020). Additionally, supportive supervision could be embraced to minimize the tendency of CHVs, who often have limited chances for paid opportunities and with few hours of work, to get engaged by multiple donors or projects to cater for their financial needs.

The current study observed weak linkages between CHVs and the health facilities. Community that did not have functional community units lacked forums that could be used by the CHVs and the communities to give feedback and seek interventions and solutions for the challenges experienced. Such CHVs expe-

rienced more challenges than those from communities that had functional structures. This is what other studies call “the hardware” and includes supervision systems, training, accountability and communication structures, incentives, supplies and logistics (Kok et al., 2017; Oliver et al., 2015).

Again, one key lesson that we learned is the need to engage the health facilities on a continuous basis and to review the referral documents for acceptability and ownership by the health workers especially in cases where there is staff turn-over. In this study, weak referral system left CHVs demotivated, feeling disrespected, unappreciated and not recognized. Consistent across our findings and the literature is the need for greater investments in referral systems that link CHVs with local health facilities, and include supervisory support, recognition and open communication with facility staffs. Such investments in health systems functions and capacities are considered critical to increasing CHV effectiveness and maximizing their contribution especially in the context of universal health care (Give et al., 2019).

The current study involved working with existing CHVs. Their selection was based on activeness and commitment to the previous CHVs activities. Activeness was determined by provision of timely reports and ability to perform activities in assigned households. But, during our engagement with the CHVs, some questions emerged. Does commitment to CHVs work mean quality data? In what ways is activeness measured—is it on the basis of reporting which would lead to one being considered as active? Although the “active” and “committed” CHVs gave their reports on time, the field officers noted gaps and inconsistencies in data capturing, and this was partly attributed to the team’s inability to provide prompt on-site support when needed. Since IR provides for a continuous analysis of the data, those perceived as active CHVs “worked smart”. We observed two of the CHV who perceived as active CHVs provided duplicated and sometimes “non-existent” data. This data could not be subsequently included in the final analysis, which retaliates the importance of vigilance during the continuous analysis of the data. Whereas CHVs are supposed to produce and submit monthly reports to MOH, efforts should be made to ensure simple summaries are carried out on individual reports to understand the trends and identify and correct any inconsistencies in the data. This is possible if regular supervision is provided to the CHVs.

An important lesson concerning IR in this study is the ability to identify barriers and seeking immediate solutions to address those barriers. Importantly, these barriers if not timely and effectively addressed are likely to affect implementation outcomes of a study. IR was instrumental in shaping the implementation design of the study and eventually in improving the quality of data collected by CHVs. In this study, the introduction of peer-to-peer strategy assured CHVs of continuity regardless of the notable weaknesses or challenges; and they felt appreciated and treated with dignity. These gave the CHVs with challenges the motivation and drive to learn from their peers to improve on their skills. For the

implementer including the research team and the Ministry of Health staffs, IR was a learning process which helped the team to shape their thinking and understanding of what goes on with CHVs engagement. The team recommends that Implementation Research studies should be advanced in studies of this nature, including the Operation Research studies since barriers and challenges can be identified in the early implementation stages, and corrective or modifiable measures taken to address the challenges.

5. Conclusion

CHVs require constant follow-up and supportive supervision. IR was important in understanding the capacity and skills gaps of individual CHVs and their needs. The capacity building of CHVs is not a one-of event but a continuous learning and capacity building process. This could take different approaches, both formal and informal, including field visits and workshops, and the use of peers who might communicate better their understanding of the goals and workings of the project. Functional structures that are supported by the community and relevant health departments are important for smooth co-ordination of CHVs. We recommend the peer to peer strategy be evaluated further to establish its effectiveness in improving performance and capacity building of CHVs in malaria prevention and control, and other community health and development work.

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Authors' Contributions

AK conceived the study. AK, LK and DM analysed, and interpreted the data from the study. LK drafted the manuscript and AK, DM and CMM revised the manuscript for intellectual and scientific content. All authors read and agreed on the final manuscript.

Ethics and Consent

Ethical clearance was obtained from the Kenyatta University, Nairobi ethical review committee (SSC No. 2631); while a Research Permit was obtained from the

National Council for Science, Technology and Innovation (NACOSTI). The researchers completed an online ethics refresher course on the principles and procedures of conducting ethical human research (Eckstein, 2010). Field assistants were trained on ethical procedures. In the field, necessary protocol both at the County department of health and respective local government units was carried out and advanced informed consent was obtained from all respondents. Further permissions to undertake the study in Malindi were obtained from relevant county and sub-county levels. In addition, informed written consent to participate in the study was obtained from the CHVs.

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Paper Context

Malaria continues to affect the most vulnerable populations living in remote and rural regions. There is evidence showing that CHVs can contribute to the efforts of improving the health of the population, particularly in those settings. We used IR to identify barriers to CHVs performance and sought innovative ways overcoming the barriers. Literacy levels were a major barrier whereby we applied a “peer to peer strategy” to improve CHVs performance. The strategy needs to be evaluated further to establish its effectiveness in improving performance and capacity building of CHVs.

Conflicts of Interest

The authors declare that they have no competing interest.

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