EVALUATING COMMUNITY HEALTH WORKERS PERFORMANCE IN THE PREVENTION AND CONTROL OF MALARIA IN LIVINGSTONE DISTRICT, ZAMBIA-A BOTTLENECK ANALYSIS

By

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B.Sc. Nursing

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DECLARATION

I, HELEN CHIPUKUMA, hereby declare that this research work being presented for the Master of Public Health in Health Policy and Management with Implementation Research degree has not been previously submitted either wholly or in part for the same purpose at this or any other University nor is it being currently submitted for any other degree.

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CERTIFICATE OF APPROVAL

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ABSTRACT

Community Health Workers (CHWs) are an important human resource in improving community malaria intervention coverages and success in reducing malaria incidence has been attributed to them. However, despite this attribution, malaria resurgence cases have been reported in various countries including Zambia. This study evaluates fidelity of the CHW strategy through evaluation of performance, quality of service and other moderating strategies in malaria prevention and control in Livingstone district highlighting specific factors that are associated with effective implementation of the CHW strategy in malaria programs.

A mixed method concurrent cross-sectional study based on quantitative and qualitative approaches was used to evaluate performance and service quality for the two catchment areas of Nakatindi and Libuyu in Livingstone district. For the quantitative approach, 34 CHWs were taken as complete enumeration with evaluation based on CHW knowledge on malaria, report submission, health education, testing and treating. Service quality was assessed based on active detection, diagnosis and treatment, prescription of drugs, follow up and dissemination of malaria preventive messages and actions. A community survey of 464 participants was also done to assess community responsiveness. Two focused group discussions from CHWs and three key informant interviews from the CHW supervisors were done for moderating factors to the CHW strategy for malaria.

The study findings indicate that overall implementation fidelity was low with only 5(14.7%) of the CHWs having good performance and least good quality service while 29 (85.3%) performed poorly with substandard service. This however varied with specific indicators being evaluated. For malaria preventive actions by CHWs; 24(70.5%) of the malaria CHWs reported to practice preventive actions and vector control measures. Being married, record for reports, supervision, and work experience were found to be significant factors associated with performance, and no variable was found to be a significant factor for quality service. From the survey, CHWs have poor coverage for malaria index case service response and that a lot more services are rendered by the CHW which are not documented in the CHW records with ITN distribution as the most service received by the community (75%) and 59% for IRS. Lack of supplies, insufficient remuneration and lack of ownership by the supervising district were main moderating factors that were reported to hinder ideal implementation of the CHW strategy.

Fidelity to the malaria CHW strategy was low as performance and quality of service was poor and substandard respectively. Strategies to improve responsiveness by the community and improvement in the organizational system with regards to facilitation of the malaria CHW program in terms of supervision, stock supply and recruiting more CHWs on a more standardized level of recognition and remuneration would render an effective quality implementation of the CHW malaria strategy for this setting.

Key words: Community Health worker, Performance, Evaluation, Malaria, Assessment, Implementation, fidelity, quality, adherence, policy

DEDICATION

To my lovely Son, Lushomo Mwiinga, for bearing my absence during training and my husband Kelvin Mwiinga for understanding me as I struggled through my masters' degree training program. I also dedicate it to the Malaria Community Health Workers in the study communities and their supervisors who shared their work experiences in the community with the researcher.

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LIST OF ABBREVIATIONS

ACT : Artemisinin Based Combination Therapy

CHW : Community Health Workers

CMA: Community Malaria Agents

CSO : Central Statistics Office

FDG : Focused Group Discussion

IRS : Indoor Residual Spraying

IPT : Intermittent Presumptive Treatment

LLITN: Long Lasting Insecticide Treated Net

PHC : Primary Health Care

RDT : Rapid Diagnostic Test

LDHIS: Livingstone District Health Information System

HH : House Holds

H/E : Health Education

OPERATIONAL DEFINITIONS

Performance: This is the accomplishment of CHW tasks in Malaria prevention and control against given roles and targets in a given period.

Quality: Adherence to malaria CHW program roles as it is intended or expected, a fidelity measure.

Fidelity: the extent to which a program or an intervention is implemented as intended by its designers.

Main Stream Health Workers: Health workers and program officers directly involved in the Community Health worker Malaria control program.

Community Health Workers: Trained Community Malaria Agents (CMAs) carrying out community malaria prevention and control interventions. Terms may be used interchangeably.

CHAPTER 1: INTRODUCTION

1.1 Background

Malaria has declined in incidence globally by 37% and Malaria mortality rate by 60% between 2000 and 2015 (WHO, 2015a). Community interventions through Community Health Workers (CHWs) who are a link between the community and the health facility have contributed to this reduction (WHO, 2015b). However, the threat of resurgent Malaria is present in various countries including Zambia, Madagascar and Cameroon due to weakening of the Malaria control programs of which the reasons are lack of funding, complacency with poor execution, purposeful cessation of control activities and no cooperation from the community. Great awareness of this threat and development of systems to minimize it are key to further progress in malaria control (Cohen et al., 2012).

The World Health Organization, in attempting to move towards elimination of Malaria, has come up with a strategy that has three main building blocks. The first pillar is to ensure universal access to malaria prevention, diagnosis and treatment, the second is to accelerate efforts towards elimination of Malaria and attainment of Malaria-free status and the third is to transform malaria surveillance into a core intervention (WHO, 2015b). These pillars can be best achieved through the primary health care strategy that most countries adopted as policy after the 1978 Declaration of Alma-Ata where Primary Health Care (PHC), and CHW are key actors in PHC as links to the community members who are the end users of the services and have proved to be a good strategy in Malaria control activities (Christopher et al., 2011, Pallas et al., 2013).

CHWs are men and women chosen by the community, and trained to deal with individual and community health problems, working in close relationship with the formal health care system (Lehman and Sanders, 2007, Zulu et al., 2013). Over the past decades, studies have shown that CHWs can help reduce morbidity and mortality in settings that have traditionally lacked access to health care (WHO, 2007, Linn et al., 2015, Pallas et al., 2013). Crucial to sustainable success of CHW programs is strengthening health system capacity to support with commodity supply, supervision, and appropriate treatment of referred cases (Kelly et al., 2001). The CHW strategy, as adopted by most countries in relation to helping improve intervention coverages has proved to be a good strategy in Malaria control

activities (Christopher et al., 2011). However, despite the attribution of reduction in incidence of morbidity and mortality, malaria resurgence cases have been reported in various countries including Zambia hence it is crucial to evaluate fidelity of the strategy for a positive implementation outcome (Cohen et al., 2012).

In Zambia, efforts to control malaria are currently being scaled up through coordinated efforts in community interventions such as; Indoor residual spraying in the communities (IRS), distribution of long lasting Insecticide treated nets (LLITN), Larval control, Intermittent presumptive treatment of malaria in pregnancy, Diagnostic testing and Malaria case management (MOH, 2011a). Masaninga reports that the introduction and scale-up of IRS, IPT and ITNs had a significant impact on the reduction of malaria, particularly from 2000 to 2008 (Masaninga, 2013). The national strategic plan currently indicates a vision of Malaria free Zambia by 2030 as a move towards elimination and set a goal of achieving a 75% reduction in malaria incidence and a 20% decrease in under-five mortality within five years through a combination of these interventions (MOH, 2011b).

In 2013, the Zambia government adopted a Community health worker strategy for active detection to achieve malaria elimination in the low transmission zones (zone II). According to the CHW strategy in the training manuals, CHWs are to carry out health education or community sensitization in malaria prevention and control in the community, testing, treating, surveillance and reporting (Kouznetsov et al., 1996) and these are called community Malaria Agents (CMAs) working as volunteers and others are the Community Health Assistants (CHAs) who are formally employed by the government. These activities were implemented through a phased roll-out in selected districts in the Southern Province of Zambia starting with Macha and Livingstone districts, with the goals of improving surveillance and interrupting transmission(Searle et al., 2016). This is because Southern province has made a substantial decline in malaria and is in the low transmission zone (MOH, 2010). Livingstone district of Zambia however, has had a steady rise in the resurgence of malaria from 3.5/100,000 population in 2009 to 10.6/100,000 population in 2014 has been reported (LDHIS, 2014), slowly drifting away from the elimination phase thus affecting the efforts being made negatively. Factors contributing to these observations are not well known. It is not known whether this situation is due to weakening of malaria control programs at community level, or could be partly due to decrease in community acceptance or participation in malaria programs (Cohen et al., 2012). The effectiveness of CHW to adherence to CHW service provision or specifically using active case detection at

reducing malaria transmission has also not been tested nor demonstrated(Larson, 2015) and as such ,there is inadequate evidence on the implementation outcome of fidelity of the CHW strategy in malaria prevention and control in Livingstone district. Periodic performance assessments through surveys and prompt feedback of results on the implementation of interventions to stakeholders in the locality may help to improve malaria control in malaria-endemic countries (Owusu-Agyei et al., 2007). This study aims to evaluate the CHWs fidelity to the CHW strategy in malaria prevention and control programs in Livingstone and to explore the perspectives of CHWs and main stream health workers on the work of the CHW in malaria.

1.2 **Statement of the Problem**

Malaria resurgence cases have been reported in various countries with 75 reports of malaria resurgence occurring in some countries including Zambia indicating weakening of Malaria programs as the most reported cause of resurgence (91%) owing to poor execution of control programs, overall complacency, purposeful cessation of control activities and non-cooperation at community level in malaria programs (Cohen et al., 2012). Livingstone District Health data indicates that there has been a reduction in the incidence rates from 2005 to 2009 where malaria incidence reduced from 318.6/1000 population to 3.5/1000 population respectively. However, from 2010 there has been a steady increase in incidence from the lowest record of 3.5/1000 population in 2009 with no case fatality to 10.6/1000 population with recorded case fatalities in 2014 despite implementation of community malaria interventions (DHIS, 2014). The CHW strategy is a strategy set at primary health care level for implementation of all malaria interventions being a link to the community for malaria interventions. It is not known whether this situation of resurgence is due to weakening of malaria control programs at community level, or could be partly due to decrease in community acceptance or participation in malaria programs (Cohen et al., 2012). The use of CHW is one of the policy strategies adopted in the implementation of malaria community interventions (MOH, 2010) and the Alma Ata review attributes success of preventive and curative interventions to CHWs efforts (Christopher et al., 2011, Pallas et al., 2013). There is however very little evidence on fidelity to the implementation processes of the malaria CHW strategy to evaluate any lapses to the strategy following the resurgent reports despite attribution of success of reduced global morbidity and mortality incidences of malaria to CHW in Livingstone district.

1.3 Significance of the Study

The Ministry of Health (MOH, 2010) has the general CHW roles at national level desk but are not at a standard level of recognition are their roles are not formalized despite having clearly defined roles in the training manuals for Community Malaria Agents (CMAs) who are working on voluntary basis at community level helping to eliminate malaria in the country. It is hoped that the results obtained will guide implementers on coming up with effective strategies that help in the fight against resurgent malaria and also having clearly defined roles that are measurable to rate performance and service quality as measure for implementation fidelity to the malaria CHW strategy. The results of the study will highlight fidelity of the CHW strategy through performance of CHW in malaria prevention and control interventions and quality of service at community level, and contribute to the science body of knowledge of the experiences and challenges faced by the CHWs in the fight to eradicate malaria at community level. An understanding of the fidelity to the program may help to meet any experienced performance gaps in preventing malaria resurgence as they are a link to the community and health care system. It will also promote responsiveness from CHW and end users to improving uptake of existing interventions into routine practice as a positive consequence hence improve the quality and effectiveness of community health services with respect to malaria incidence control through CHWs participation in Livingstone District.

1.4 Study Aim

To evaluate the fidelity of the CHW strategy through assessing performance and quality of service in malaria prevention and control programs in Livingstone.

1.5 Specific Objectives

1. To measure and identify factors associated with CHW performance in malaria prevention and control interventions.
2. To assess the extent to which CHW malaria services have reached the community level from January 2016-June2016.
3. To measure and identify factors associated with quality of CHW services in malaria prevention and control.
4. To explore the perspectives of CHWs and main stream health workers on the work of the CHW in malaria control.

1.6 Framework for Fidelity Assessment

A framework for evaluating implementation fidelity was used and adopted from Christopher et al (Carroll et al., 2007). This is because the framework covers the essential elements that measure the processes of fidelity, a measure to adherence to the CHW strategy. This is shown in figure 1 below

Framework for Fidelity Assessment

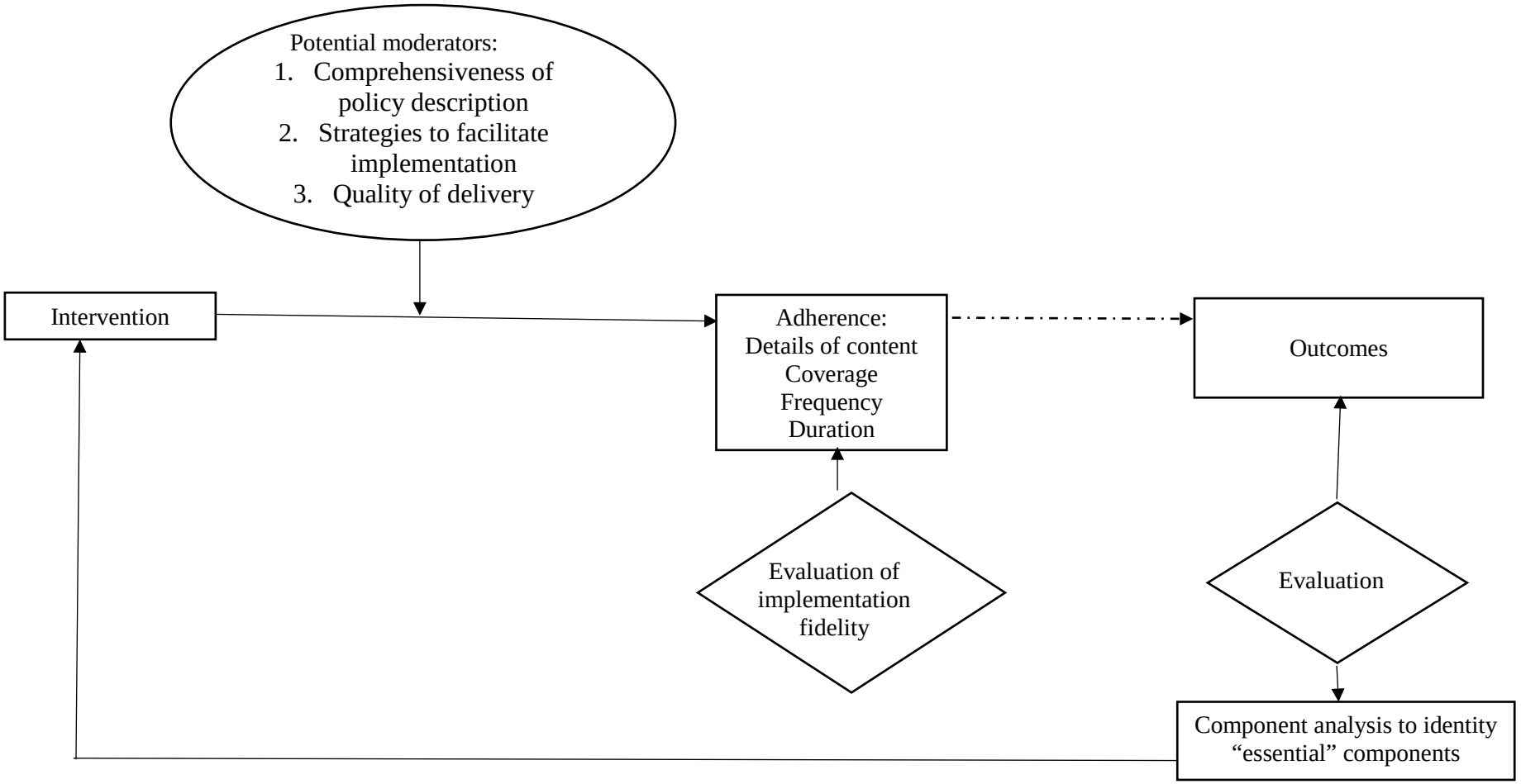

Figure 1: Conceptual framework for implementation fidelity

Potential moderators

Success of the implementation of the intervention, being the CHW strategy as the intervention, is dependent on the potential moderators. ***Comprehensiveness of the policy strategy*** or operational guidelines state that malaria CHWs are to do active case detection, treat, give community health education and report to the system as they continue surveillance hence this was used as a basis for performance and quality evaluation in the study. The ***strategies to facilitate implementation*** related to the six WHO building blocks to enable successful output in terms of provision of Human resource CHW as participants of the strategy, designs to ensure service delivery by CHW, provision of drugs and essentials for their tasks, an effective information or reporting system, financing the CHW strategy and the governance of the strategy. ***Participants' responsiveness*** in this study evaluated how far participants who are the CHWs fully accept the responsibilities required by the strategy done through focused group discussions with the view of getting perspectives towards the CHW strategy.

Adherence

Adherence is essentially the bottom-line measurement of implementation fidelity. If an implemented intervention adheres completely to the content, frequency, duration, and coverage prescribed by its designers, then fidelity can be said to be high. The ***content*** of the intervention may be seen as its 'active ingredients' which are skills or roles evaluated in this study through performance outcomes in this case which is the accomplishment of CHW tasks in Malaria prevention and control against given roles and targets in a given period-six months, July to December 2016. ***Frequency*** was assessed by how often the CHWs carry out the malaria activities in the community. This was covered together with ***Quality of service delivery*** which measured whether an intervention is delivered in a way appropriate to achieving what was intended. In this strategy, CHW are to always carry do active detection, diagnosis and treatment, Prescription of anti-malarial, Follow up, preventive measures(Carroll et al., 2007). ***Coverage*** of community malaria services rendered to the community through the CHW strategy was assessed through a community survey were CHW were placed.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The Alma Ata review attributed large mortality reductions to CHWs involvement in national programmes, when insecticide-treated nets and anti-malarial chemoprophylaxis were delivered, in addition to curative interventions and preventive interventions (Christopher et al., 2011, Pallas et al., 2013). However, a systematic review by Cohen et al reports that malaria resurgence has occurred in some countries like Zambia, Cameroon, Zanzibar etc. due to weakened malaria control programmes, increased potential for malaria transmission, or technical obstacles like resistance (Cohen et al., 2012). Studies that evaluated CHW performance in malaria prevention and control at individual and end user level were considered with guidance from the adopted CHW performance evaluation framework (Kok, 2015). Most studies included in this review were evaluating diagnosis and treatment in community case management of the studies that evaluated performance. This is the most recent community intervention that CHW are implementing as a health service in the fight against Malaria. Only two studies evaluated referral practices (Chinbuah et al., 2013, Chanda et al., 2011) while two of the included studies assessed general performance in relation to the outcome indicators based on general scheduled activities (Yasuoka et al., 2010, Kawakatsu et al., 2015). However, only one study evaluated performance using an integrated approach of community interventions by the CHWs specific to malaria (Yasuoka et al., 2010) . Performance also considers the community as end-user in evaluation of CHWs and only two studies indicated that aspect with regards to the outcome (Druetz et al., 2015, Delacollette et al., 1996).

2.2 Evaluation of CHW performance in malaria management

Diagnosis and treatment- One of the proposed pillars by World Health Organization is to ensure universal access to malaria prevention, diagnosis and treatment (WHO, 2015b). A longitudinal in Zambia study by Counihan et al, which assessed CHW ability to use RDTs safely found that that critical steps were performed correctly even though a few CHWs incorrectly read faint positive or invalid results as negative (Counihan et al., 2012). Another study by Chanda et al investigated the use of Artemisinin based Combination Therapy (ACT) and Rapid Diagnostic Tests by CHW in home management of malaria in two districts in Zambia. It was concluded that CHW were able to manage malaria fevers and that adherence to test results was the best ever reported in Zambia (Chanda et al., 2011). Despite using different

measures of performance approaches, the two studies made similar conclusions, that appropriately trained and supervised CHWs can use RDTs safely and accurately in community practice (Counihan et al., 2012) indicating the importance of continuous practice and occasional performance evaluation in order to maintain the quality of service (Chanda et al., 2011). On the other hand a study by Kelly et al revealed deficiencies in performance though care was not consistently poor because of guideline complexities and inadequate clinical supervision (Kelly et al., 2001). However, two studies done in Zambia show ability of CHW to test and treat correctly using the protocol and guidelines (Chanda et al., 2011). This reveals different performance in different settings.

Referral- Chinibuah et al evaluated adherence of CHW to dosing and referral guidelines and showed that CHWs' adherence to dosing guidelines was high while adherence to referral guidelines was poor (Chinbuah et al., 2013). This is in contrast to the findings by Chanda et al where CHW were able to follow referral guidelines correctly (Chanda et al., 2011). Both studies measured performance of referral using the protocols and guidelines yet with different performance outcomes. The Ministry of Health in Kigali, Rwanda performed a retrospective study to evaluate CHW performance through Observation of the CHWs demonstrating key competencies and review of the records for quality CHWs performance were strongly linked to the level of simplicity of the management tools, the quality of the training they received - which should be a competency based training and the quality of the mentoring they received on site after the training(MOH-Rwanda, 2009).

2.3 General factors influencing CHW performance

One study by Kalyango et al showed that CHW are capable of multitasking and factors perceived to influence CHWs' performance were: community support and confidence, continued training, availability of drugs and other necessary supplies, and cooperation from formal health workers (Kalyango et al., 2012a)and their roles should be recognized and expanded without an effect on quality(Kamal-Yanni et al., 2012, Hawkes et al., 2009, Yasuoka et al., 2012). On the other hand, Bagonza et al evaluated performance of CHW with the objective of assessing factors influencing performance of CHW who had multiple tasks and proved not to perform well. Strategies to improve drug supply, community support and feedback provision from the formal health system are necessary to improve the performance of CHWs even with multiple tasks (Bagonza et al., 2014). However one study by (Smith Paintain et al., 2014) indicates that additional tasks do not reduce the quality of malaria

community case management provided sufficient training and supervision is maintained. Two studies looking at the general performance of CHW (MOH-Rwanda, 2009, Kawakatsu et al., 2015) concluded that the significant factors associated with the CHWs' performance were their marital status, educational level, the size of their household, their work experience, personal sanitation practice, number of supervisions received and the interaction between their supervisors' better health knowledge and the number of supervisions (Kawakatsu et al., 2015, MOH-Rwanda, 2009, Lim et al., 2012).

2.4 Utilization of CHW

One study in Burkina Faso showed that CHWs are rarely utilized to treat malaria in children whereby, in urban areas, less than 1% of sick children consulted a CHW, compared to 1%–9% in rural areas. This study confirms the necessity of evaluating public health interventions under real-world conditions of implementation (Druetz et al., 2015). In contrast in another setting, a study in Zaire, now DR Congo indicates an increase in utilization by 65% and a decrease in morbidity by 50% after engaging CHW (Delacollette et al., 1996). CHWs performance is therefore affected by the environment of operation and good publicity of their existence in the community.

In conclusion, CHW performance differs contextually and different performance evaluations tools were used, implying that performance improvement for the CHW is context specific for successful community interventions. Most evaluation studies are on CHW performance evaluations in malaria and highlights factors enhancing performance. Organizational factors, Community factors and individual CHW characteristics affected performance in different settings. However, performance evaluation considered CHW as individuals in specific interventions and not an integrated approach. Most studies did not evaluate from the end users as success of an intervention need to be gauged from the end user as well (Kok, 2015). Among the studies that evaluated performance, most studies evaluate malaria diagnosis and treatment in community case management. This is the most recent community intervention that CHW are implementing as a health service in the fight against Malaria. There are studies on adherence to referral practices (Chinbuah et al., 2013, Chanda et al., 2011) and studies that assessed general performance in relation to the outcome indicators based on general CHW scheduled activities (Yasuoka et al., 2010, Kawakatsu et al., 2015). Performance also considers the community as end-user in evaluation of CHWs with regards to the outcome (Druetz et al.,

2015, Delacollette et al., 1996) and very few studies evaluate responsiveness from the end user. With resurgence of malaria in Livingstone district, implementation barriers for the CHW strategy are unknown and fidelity to the CHW strategy has not been well explored as even the effectiveness of the CHW strategy has not been tested. There is very little evidence on fidelity to the implementation processes of the malaria CHW strategy to evaluate any lapses to the strategy following the resurgent reports despite attribution of success of reduced global morbidity and mortality incidences of malaria to CHW.

CHAPTER 3: METHODOLOGY

3.1 Research Design

The study employed a mixed methods design using a concurrent approach, where quantitative strand used cross-sectional approach and qualitative component adopted a case study.

3.2 Research Setting

This study was conducted in Livingstone districts of Zambia, the country tourist capital. The district was chosen based on the fact that despite having moved towards elimination of malaria, it is now experiencing resurgent malaria threats (LDHIS 2015). The study was conducted at two clinic catchments areas namely Libuyu urban clinic on the eastern zone with a catchment population of 18,057 (CSO, 2015) which records the highest malaria cases in the district and Nakatindi Clinic with a population of 4,925 (CSO, 2015), on the western zone which also has some cases of Malaria also being reported. Both study sites are the only clinics where there are active CHWs for malaria prevention and control programs.

3.3 Quantitative approach

3.3.1 Study population

The study population consisted of CHWs on one hand, and community households on the other hand. The study population for the quantitative dimension consisted all the malaria CHWs as complete enumeration of 34 in the two catchment clinics participating in malaria community health activities in the district who are chosen by the Neighborhood committee to represent the clinic zones. The Community members as end users through a household survey were included as they are key to measurement of CHW performance in validating or qualifying the performance measure of CHWs through the services rendered by CHWs in the community. Only Household heads whose age was above 18years old, male or female and had lived in the zone for the previous past year were included in the survey.

3.3.2 Sampling and sample size

In the quantitative design, all the 34 malaria CHWs under the two catchment populations were included in the study for the quantitative performance measurement as complete enumeration. For the community survey, the catchment areas were purposively sampled as they are areas were the community malaria agents are found and all the zones were selected (complete

enumeration) as they have representation of a community malaria agent in each zone hence no design effect was considered.

Community survey sample size was calculated using the single proportion formula and the proportion was put at 0.5 since the prevalence of a CHW strategy service is unknown.

$$n = \frac{z^2 p(1-p)}{e^2} = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = 384$$

n = 384 considering + 20% (77) non-response rate: n=463

Assumptions: Probability proportional to size & p= 0.5
Libuyu has 4100 households & Nakatindi has 7287 households giving a total households 11,387. The number of household per clinic catchment was according to CSO and the number of zones was according to the information given by the neighbourhood committee chairpersons.

The study sample size of 463 was apportioned using PPS considered at clinic catchment households only was calculated as follows; 4100/11,387 * 463 which gave Libuyu-167 Households and 7,287/11,387 which gave Nakatindi-296 Households. Household sampling was given an equal weighting where equal number of households were selected per zone as the zones lacked a sampling frame therefore number of household sampled per zone were divided by the number of zones for equal representation. The number of households selected per zone in Libuyu was 17 (167households/10 zones). The number of households selected per zone in Nakatindi was 59 (296 households/5 zones). The actual households were sampled using the cyclic design starting from the Household for the Community Health worker malaria, till the number of households desired for the zone was reached. At household level, a household head above 18 years of age, male or female were purposively sampled.

3.3.3 Data collection

For quantitative data, a checklist was used for administrative data to confirm how many CHWs were fully functional, how many zones existed and how many CHWs were assigned to particular zones. Check list data also included information from the rapid diagnosis test (RDT) registers to confirm the number of malaria cases seen in the period under study indicating the zone were the clients came from for the purpose of scoring the responsible CHW for the area.

Questionnaires administered to the individual CHWs were adopted from studies that used validated questionnaires using Cronbach's alpha reliability test as it was the best measure for the consistency in constructs which were being measured and gave a score of 0.828. These

provided information on the how they are performing and the quality of the services being provided to the community. The questionnaire addressed the CHWs' socio-demographic characteristics, performance measure in actions for malaria prevention and vector control, service quality, and knowledge of malaria epidemiology and vector ecology and the CHW program governance. The questionnaire was administered in simple English since CHW can read and write as a prerequisite for the malaria training or orientation referring to a previous study's questionnaire. Closely supervised research assistants were engaged and trained to administer the questionnaire, and conduct the survey. For the survey, data was collected from sampled households using an administered semi structured interview guide to assess the extent to which CHW services rendered to the community in (Kalyango et al., 2012b)assessing performance in relation to their roles. Household heads above 18years were interviewed with permission upon signing a consent form.

3.3.4 Performance and Quality Measures

Performance- This is the accomplishment of CHW tasks in Malaria prevention and control against given roles and targets in a given period. The dependent variable of this study is the level of each CHW's performance which was developed using five indicators: monthly reporting rate within the previous six months, malaria knowledge, health education or sensitizations done, percentage of households covered in testing, percentage treatment of positive cases by the CHW in their zones. Knowledge of malaria epidemiology and vector ecology, was measured by the respondents' correct answers on items related to service quality and actions. Each indicator was categorized into quintiles (0–4) to standardize the scores making a total of 20 points as highest integrated score as shown in table 1. (Kawakatsu et al., 2015). The scores given were according to studies that used them as performance assessment scores after using principal component analysis and chronbachs alpha reliability test. This tool was also applied in a similar setting i.e. sub-Saharan countries like Kenya (Kawakatsu et al., 2015), Uganda (Kalyango et al., 2012b) and Madagascar(Alam et al., 2012). Reference was made to the reports submitted to the Health center by the CHWs from administrative data.

Table 1: Performance measurement

Score	No. monthly reports in 6 months (0–6)	Malaria knowledge	Health education	% households testing covered (0-100 %)	% malaria positive treated (0-100 %)
0	no monthly reports submitted	lowest (0 score)	None	less than 20,	less than 20
1	1 or 2 submitted	low (1-4)	1 or 2 sessions,	20–39,	20–39
2	3 submitted,	middle (5-8)	3	40–59,	40–59
3	4 submitted,	high (9-12)	4 sensitization	60–79	60–79
4	5 or full reports submitted	Highest (13-16).	5 and above	80–100	80–100

(Kawakatsu et al., 2015)

A framework below was used to explain performance evaluation of CHWs. Thus according to the framework, CHWs performance can be measured at two levels. At the level of the individual CHW and at the level of the end-user (the community), where we can measure CHW-attributable outcomes in communities' behavior, such as increased use of health services and adoption of health- promoting practices (Kok, 2015). This study however is within the sphere of CHW performance evaluation and only measures mediating processes of access, quality, productivity similar to those in the fidelity framework that indicate improved access of malaria CHW services, improved quality of service and improved responsiveness to the CHW strategy (Kok, 2015). We also assess community responsiveness to assess the extent of utilization of community malaria services to evaluate performance, adoption of practices that promote health and health seeking behaviour from the end user level. Factors surrounding performance will help explain the performance of CHW in malaria program.

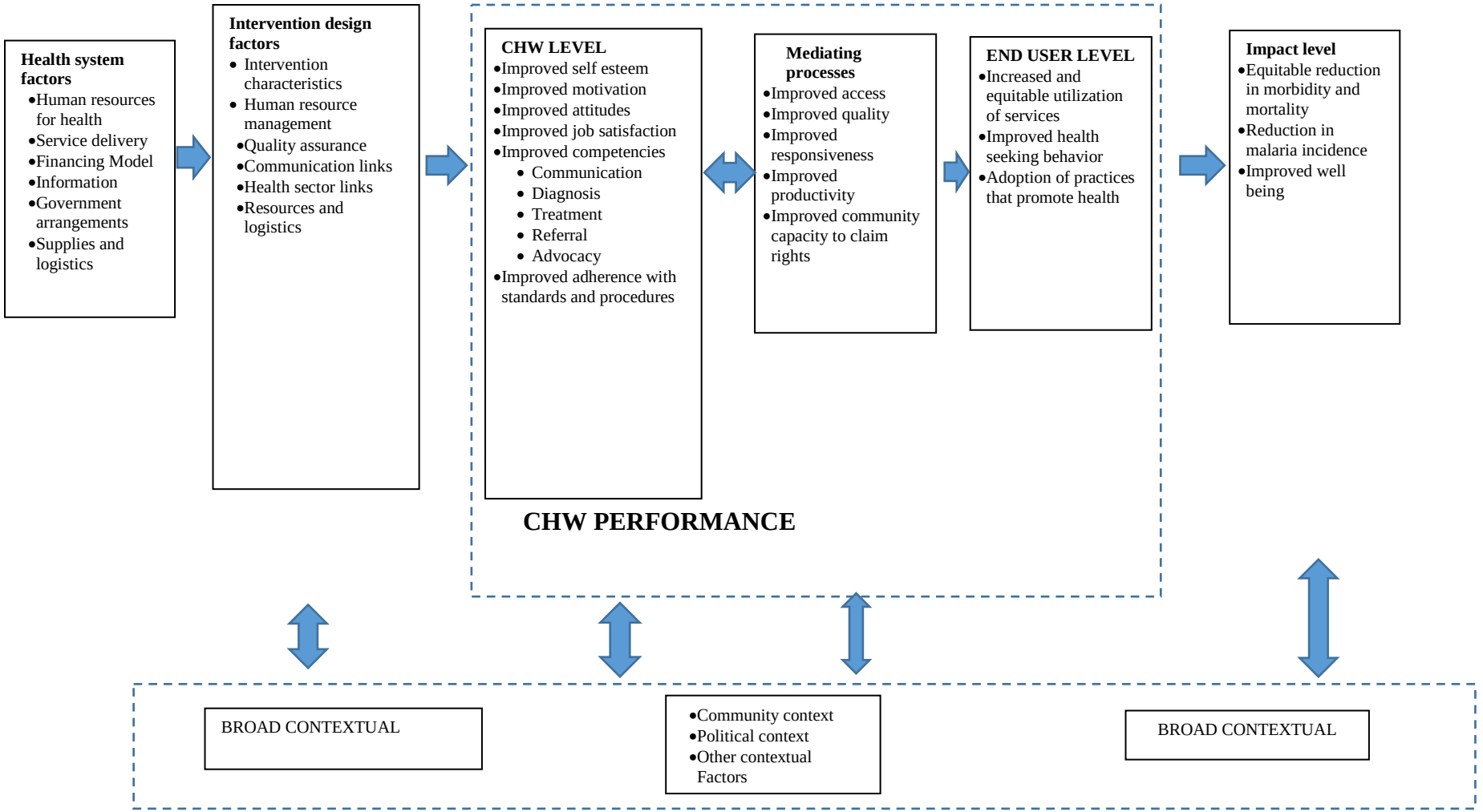

Figure 2: Factors affecting CHW performance

Quality of service delivery measures whether an intervention is delivered in a way appropriate to achieving what was intended. In this strategy, CHW are to always carry do active detection, diagnosis and treatment, Prescription of anti-malarial, Follow up, preventive measures-Quality was assessed using two indices in order to quantify the quality of CHWs' services and the variety of actions taken for malaria prevention and vector control with scores given. Knowledge of malaria was measured by the respondents' correct answers on items related to epidemiology, service and actions on malaria where regularly = 3, sometimes = 2, rarely = 1, never = 0. Active detection and follow-up were given according to the regularity or frequency of respondents 'home visits to find malaria patients and to check if patients had recovered. Diagnosis and treatment included conducting RDTs, observe symptoms, ask symptoms from family, take body temperature, and prescribe anti-malarials to those who had positive RDT results. Regarding prescription of anti-malarials, explanations about dosage and the importance of compliance were required on how the CHWs explained about dosage and compliance were given one point each, if included. Dissemination of effective preventive measures was given a maximum of two points, less effective measures was given one point and of wrong measures, zero points. The score for each of the five items was calculated as total points divided by maximum points so that each item is given a maximum of one point. These scores were added up to create the index (range: 0-5). The alpha was used as it is the appropriate reliability test when different areas are being measured hence the logic of combining these items was confirmed by a high Cronbach's alpha reliability score of 0.828. The action index had a score of 23 and was based on 2 items; the variety of malaria preventive measures and vector control measures that the CHWs undertake themselves (Yasuoka et al., 2010).

Table 2: Quality Measure

Index	No. of items	Highest score	Item
Service quality	5	5	Active detection
			Diagnosis and treatment
			Prescription of anti-malarial
			Follow up
			preventive measures
Actions	2	23	Malaria preventive measures

3.3.5 Data analysis and management

The quantitative data was cleaned, coded, and entered into a computer software Epi info, and transferred to STATA version 13 for analysis. Data was presented and analysed using Frequency tables, measures of central tendency, and proportions for categorical variables and standard deviations for continuous variables that are normally distributed. Because the study population was small (34), bivariate analysis of association between variables was done using a Chi square test for dependent and independent variables considering fisher's exact significance level set at 0.05 as p value. In order to identify factors affecting performance and quality of CHWs' services, selected independent variables were run.

For performance measurement, a chi square fishers exact test was run as performance levels was at two levels (poor<12 and good 12+). The independent variables included age, sex, level of education, marital status, monthly income or incentives, number of household members (those with more than five members tend to have more support at home), number of children under 5 (those with no child under 5 tend to be more active), knowledge in the CHWs understanding of malaria , reason for being CHW, financing , health systems factors like training, supply of commodities, and technical support supervision (Kawakatsu et al., 2015). For quality assessment, a chi square fishers exact was used to measure association between the predictor and dependent variables (<4-less than 80% substandard and ≥4-80%+ good). In order to determine the proportions of CHWs who offered full quality service by always working as the CHW program for malaria is intended, each indicator of the five CHW roles for quality assessment were analysed based on CHW who always carried out the expected activities for that particular indicator and categorized as substandard if scored less than 0.8 for each indicator and at least good quality if scored more than 0.8 for an indicator as good coverage is at least 80% achievement according to WHO guidelines. Independent variables will include; age, sex, education marital status, monthly income training, duration of being CHW, reasons for being CHW, supplies and supervision (Yasuoka et al., 2010). Survey data was managed using descriptive statistics with frequencies, proportions, means and standard deviations to measure performance in terms of CHW strategy reach. Multivariate analysis will be used to analyse utilization as another outcome variable.

3.4 Qualitative Approach

3.4.1 Study Population

On the qualitative dimension, key informants, the program implementers such as the District malaria program Officer and facility malaria Community Focal person were interviewed to obtain opinions on CHW performance and to gain understanding of the malaria CHW program functionality. CHWs were interviewed for their perspectives of over the work they do in the community.

3.4.2 Sampling and Sample Size

Program implementers and CHW supervisors were sampled purposively as people who are involved in implementing malaria control interventions at community level. These included the District Malaria focal point person and the community health workers link or the 2 malaria focal point persons at the two clinics. For the CHWs FGD, purposive sampling was used to select 10 participants each for two FGDs from the 34 CHWs in the eastern zone (Libuyu) and the western zone (Nakatindi). This was with the assistance of the CHW facility supervisors through careful selection of participants who would provide as much information as possible.

3.4.3 Data Collection

On the qualitative dimension, program implementers such as the District malaria program officer and facility malaria Community Focal person were interviewed using an interview guide to explore opinions on CHW performance and to gain understanding of the malaria CHW program functionality. Two Focused group Discussions were done with some CHWs only from the two clinic catchments using a FGD guide.

3.4.4 Data Management and Analysis

Qualitative data was analyzed in n-vivo 10 software after verbatim transcription of all the recordings. Thematic technique was used for the analysis. This approach allows for categorizing of data into themes so as to identify patterns and trends. Preliminary reading of transcripts allowed for development of a code-list that was imported into the software for coding. Code reports from the coding activity allowed for analysis and interpretation of results.

3.5 Ethical and Cultural Considerations

Approval to carry out research was sought from the University of Zambia Biomedical Research Ethics committee (IRB 0001131 of IORG 0000774, reference number 018-06-16) and Livingstone District Community Health office for the study. Prospective participants were informed about the purpose of the study, procedures, risks and benefits, and that they have the right to volunteer whether or not to participate in the study. They had the right to withdraw from the study at any time without adverse consequences. Informed consent was obtained from each participants before administering the questionnaire. The overall benefit was explained that it would be for the community in which they serve in that it is a fight to have a healthy malaria free community. To address fears of exposure as participants were assured that the information would not be shared with anyone outside the research team. Confidentiality and anonymity was achieved by interviewing the CHWs in privacy, keeping the documents safely and serial numbers are used on the questionnaires and not the respondent's names respectively.

3.6 Dissemination

A report will be given to the public health department under the University of Zambia and also to the District health office and Ministry of health. The results will also be published in a credible journal. A systematic review that assesses CHW performance evaluations has been submitted in the biomed central Human resources for health journal for publication.

CHAPTER 4: RESULTS

4.1 Introduction

This section provides quantitative findings from CHWs and the community survey in measuring performance and quality of service of the CHW strategy in malaria as measures of fidelity to the malaria CHW strategy. Qualitative findings explaining facilitation strategies were group into facilitation strategies, Drivers to CHW responsiveness, and community responsiveness.

4.2 Quantitative Findings

4.2.1 CHW Demographic characteristics

A total of 36 CHWs were included as complete enumeration but only 34 CHWs participated in the study. Nakatindi was represented by 56% while Libuyu had 44% representation. Most CHWs were females (71%) while 29% were males. Age range was 22-62 years with a mean age of 23.Age was categorized in two groups >40 and <40 years of which 18% were under 40 and 62%were above 40 years old. About 71 % attained secondary education while 3% had no formal education. Married and not married were 50% each category. About 47%of them only did some piece work for survival and earned less than ZMW K500 only on monthly basis. About 35% had more than six HH members and 50% had no under 5 children in their HH and this same percentage had more than one year of working as a community malaria agent.

Table 3: Demographic characteristic of CHWs

Characteristic	% CHW responses	
	N 34	
	n	(%)
Catchment		
Nakatindi	19	56
Libuyu	15	44
Sex		
Male	10	29
Female	24	71
Age		
<40	6	18
40+	28	82

Table 3 *continued*: Demographic characteristic of CHWs

Characteristic	% CHW responses N 34	
	n	(%)
Education		
no formal	1	3
/primary	8	23
Secondary/	24	71
College/university	1	3
Marital status		
Single	17	50
Married	17	50
Occupation	18	
Business	16	53
Piece works		47
Income		
<K500	16	47
K500-K1500	18	52
Household members		
<6	12	35
>6	22	64
Number of <5yrs children in household		
None	17	50
1+	17	50
Work experience		
6-12 months	17	50
More than 1 year	17	50

4.2.2 Adherence to the CHW strategy

Content of the CHW strategy in assessing roles was evaluated as performance on four indicators over the previous six months according to records of; reporting rate, health education, testing for malaria and treating positive cases(Alam et al., 2012, Kawakatsu et al., 2015). A maximum score of four (4) was allocated to each indicator and an indicators scoring

2 and below exhibited poor performance, and good performance if an indicator scored 3 and above. Results showed that more than 50% of CHW performed poorly in all indicators apart from report submission were 73% had good performance. However, there was a mismatch between knowledge and performance output as 97% of CHWs were knowledgeable about malaria by scoring at least 9 out of 16 questions and yet could not perform as expected. The range was from 8-13 and the mean knowledge score was 10 with a standard error of 0.22 and a confidence interval of 10.2-11.1.Overall, out of 34 CHWs, only 5 (14.7%) had good performance in all the CHW malaria roles and 29 (85.3%) performed poorly. The performance scores ranged from 3-16 out of the maximum score of 20. The mean performance score was 11 with a standard error of 0.67 and a confidence interval of 9.8-12.5 (Table 4).

Table 4: Performance level indicators

Indicator	**Total Score**	**Poor (0-2)**	**Good(3-4)**
Reports	4	<4 reports	4+ reports/6
Scores		27%(9)	73% (25)
H/E	4	<13 sessions	13+sessions/19
Scores		55% (19)	44%(15)
Testing 40 HH/ index case	4	<80%	80%+
Scores		71% (19)	29%(10)
Treatment	4	<80%	80%+
Scores		85%(29)	15%(5)
Knowledge questions 1-16	4	<9	9+/16
Scores		3% (1)	97%(33)
OVERALL	**20**	**85.3%(29)**	**14.7%(5)**

4.2.3 Factors affecting CHWs performance in the malaria prevention and control.

Being married was found to be a significant determinant of performance with a p value of 0.015 of which all good performers 5(29.4%) were among the married. There were 34 CHWs 10 (29%) males and 24 (71%) females. For age category, age range was 22-62 years with a mean of 47yrs. CHWs age was categorized as below 40years and above 40 years a study indicated that those that are more than 40 years tend to perform better than those who are less than 40 years, a finding which was not significant in this study. Likewise, those with more than six household members and those with no under-five children were not significant findings in this study. Concerning service provision, work experience, supervision, reason for becoming CHW for malaria, feedback, refresher course, stock outs and record for reports were variables analyzed. Work experience (p value 0.04) and all who were good performers 5(29%.4) had at least 12 months working experience. The people responsible for supervision (p value 0.002) of which 4(80%) of those supervised by the clinic were good performers and only one (4.2%) from those supervised by the NGO was a good performer. The reporting record found to be significant determinants of performance with a p value of 0.05 although a variety of reporting tools were reported to have been used like register, phone, paper and book (Table 5).

Table 5: Factors affecting CHWs performance in the malaria prevention and control interventions at community

	% of CHWs and performance score category			
	<12 (poor)	12+ (good)		*p*-
Characteristic	**n (%)**	**n (%)**	**value[a]**	
Education				
No formal and primary	8 (88.9)	1 (1.3)		1.0
Secondary/tertiary	21 (21.3)	4 (3.7)		
Clinic catchment				
Libuyu	12 (80.0)	3 (20.0)		0.634
Nakatindi	17(89.5)	2 (10.5)		
Age categories				
<40 years	4 (66.0)	2 (33.0)		0.25
40+ years	25(89.0)	3(10.7)		

Table 5 *Continued*: Factors affecting CHWs performance in the malaria prevention and control interventions at community

Characteristic	% of CHWs and performance score category		*p*-value[a]
	n (%)	n (%)	0.6
Marital status			
Married	12 (70.9)	5 (29.4)	0.015*
Other	17 (100.0)	0 (0.0)	
Income			
<K500	14 (87.5)	2 (12.5)	1.0
K500-K1500	15 (15.4)	3 (16.6)	
Sex			
Male	7 (70.0)	3 (30.0)	0.138
Female	22 (91.7)	2 (8.3)	
No of household members			
<6	11 (91.6)	1 (91.6)	0.635
6+	18(81.8)	4 (18.2)	
No of children U-5			
0	15 (88.2)	2 (11.7)	1.0
1+	14 (82.3)	3 (17.7)	
Work experience in malaria			
6-12months	17 (14.5)	0	0.04*
Above 12months	12 (70.5)	5 (29.4)	
Reason for being CHW			
Recommended by NHC	21 (84.0)	4 (16.0)	0.73
Interest in malaria	8 (88.9)	1 (11.1)	
Incentive/payment received			
Yes	1 (0.9)	0	1.0
No	28 (84.8)	5 (15.2)	

Table 5 *Continued*: Factors affecting CHWs performance in the malaria prevention and control interventions at community

Characteristic	% of CHWs and performance score category		*p*-value[a]
	<12 (poor)	12+ (good)	
Supervision			
Never	0	1 (100)	0.303
Every 6 months	2 (100.0)	0	
Every 3 months	16 (84.2)	3 (15.8)	
Monthly	11 (91.7)	1 (8.3)	
Supervisor			
Clinic	1 (20.0)	4 (80.0)	0.002*
NHC Chairman	5 (100.0)	0	
NGO	23 (95.8)	1 (4.2)	
Feedback			
Yes	28(87.5)	4 (12.5)	0.2
No	1 (50.0)	1 (50.0)	
Trainer of CHW			
GRZ	1 (0.9)	0	1.0
NGO-Anglican	28 (84.9)	5 (15.1)	
Refresher course			
Yes	1 (100.0)	0	1
No	28 (84.9)	5 (15.1)	
Stock outs			
Yes	28 (84.8)	5 (15.2)	1.0
No	1 (100.0)	0	
Record for reports			
Register	0	1 (100.0)	0.05*
Phone	2(66.7)	1 (33.3)	
Paper	3 (75.0)	1(25.0)	
Book	24 (92.3)	2 (7.7)	

[a]Fisher's exact

4.2.4 Coverage of the malaria CHW strategy

Only 34 CHWs were trained for the CHW strategy to cover 11,387 households and coverage of the CHW strategy was assessed through a household survey. A total of 464 households heads participated in the survey represented by 295 (63%) from Nakatindi which had five zones and 169 (36.4%) were from Libuyu which had 10 zones. Females were the most found at households and represented 322 (69%) while 141 (30%) were males. The age range was 18-50 years of which 308 (72%) below 40 and 119(27%) were above 40 years. About 40% (185) had no formal or primary education and 267 (59%) had secondary or tertiary education.

From the survey, 396 (85%) of the population knew the existence of the CHWs and 151 (32%) actually knew them by name. About 336 (72%) indicated having received a malaria intervention and 315 (94.0%) reported having received the service from the CHWs. Malaria cases were reported by 140 (30%) households and only 15(10%) sought for health care from CHWs while 127 (88%) went to the health facility for medical attention. Out of the 140 (30.2%) only 33(23.6%) of households were screen as active detection for malaria. An inquiry of how often the community participants use the CHWs for any health related element, only 8 (2%) used the CHWs always and 165 (41%) use the CHW sometimes. Most malaria cases seem to be local as the participants who reported having had a visitor with malaria were only 18 (3.8%). Overall, a higher proportion of 299 (64%) participants were satisfied with the work of CHWs while 165 (35%) reported not satisfied with the CHWs. Otherwise 351 (75.6%) reported having a good relationship with CHWs 112 (24%) had a fair and poor relationship (table 6).

Table 6: Community responsiveness to the CHW strategy

Characteristic	**% SURVEY responses**	
	N 464	
	n	**(%)**
Catchment		
Nakatindi	295	63.6
Libuyu	169	36.4
Sex		
Male	141	30.45
Female	322	69.55

Age		
<40	308	72.13
40+	119	27.87
Education		
No formal/primary	185	40.93
Secondary/ College/university	267	59.1
Aware of CHWs	396	85
known by name	151	32.5
Community malaria service	336	72
service provider		
Health facility	14	4.1
CHW	315	94.0
Other	6	1.7
Malaria positive test in previous 12	140	30.2
months		
Source of health care		
Health facility	127	88.8
CHW	15	10.4
Other	1	0.7
CHW utilization		
Always	8	2.03
Sometimes	165	41.8
Rarely	112	28.4
Never	109	27.6
Visitor with malaria	18	3.9
CHW HH visit for screening	78	15.7
Pool of persistent stagnant waters	207	44.6
CHW relationship		
Very good	43	9.3
Good	308	66.5
Fair	17	3.7
Poor	95	20.5
satisfaction with the malaria CHW	299	64

4.2.5 CHW strategy assessment at community level

Various roles are carried out by CHW in the community which includes Health Education (H/E), Rapid Diagnosis and Testing (RDT), treatment of malaria positive cases, referring cases to health facility, ITN distribution, ITN use inspection, Indoor residual spraying and burying of trenches. According to figure 2, ITN distribution (75%) and IRS (59%) through community sensitization were malaria interventions mostly carried out by CHWs. These activities were not recorded in the CHW register though and these are one time funded activities.

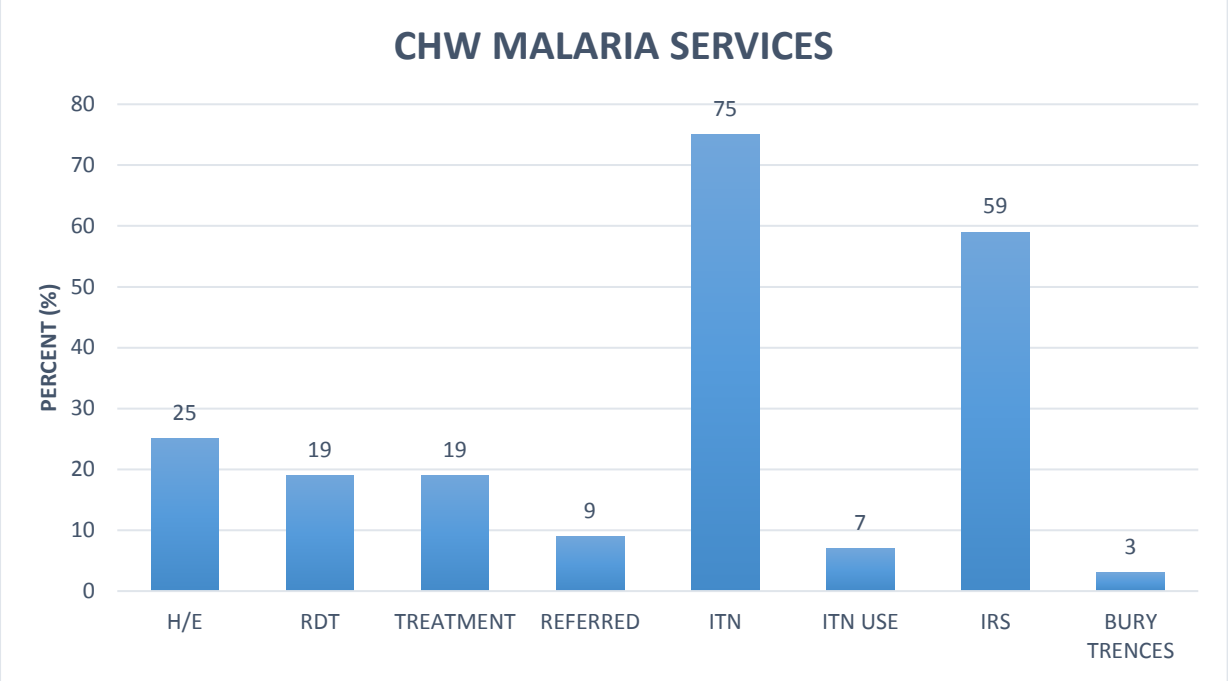

Figure 3: CHW strategy at community level

4.2.6 Community Malaria Management by CHWs

All malaria index cases are to be followed up by CHWs for screening other household members and other households within 140m radius. CHWs are also to give health education and treating positive cases as a CHW role in community malaria surveillance. There was low follow-up community coverage by CHWs in terms of health education, testing and treatment. Results indicate that out of the 140 households that reported having had positive malaria, only 27% were tested by CHW and others from the health facility. Out of the 140 positive cases, only 23% reported having been given health education, 14% were treated by CHW and the others were treated at the facility. From households that did not report malaria, only 15% of them were screened following an index case and 27% received health education messages for CHWs (Table 7).

Table 7: Community Malaria Management by CHWs

	COMMUNITY MALARIA MANAGEMENT N= 464	
Community malaria services by CHWs	**Malaria case n= 140 (30%)**	**Non malaria case n=324 (70%)**
Health education		
Yes	33 (23.6%)	87 (26.9%)
No	107 (76.4%)	237 (73.2%)
RDT		
Yes	39 (26.6%)	49 (15.1%)
No	101 (72.1%)	275 (84.9%)
Treatment		
Yes	20 (14.3%)	0
No	120 (85.7%)	324 (100%)

4.2.7 Quality of CHW service delivery

Overall, the service is substandard as only 5 (14.7%) CHW carried out the CHW program as it was intended carrying out at least 80 % of the required activities specific services in the CHW malaria program and 29 (85.3%) had substandard quality. For the service of active detection, 23 (68%) were able go in the community and find malaria cases and be able to find out if the patient had recovered or not but only nine (26%) of the CHWs was able to always used RDT for diagnosis and treatment though they always referred positive cases to the health facility or collect medication for the clients themselves. For prescription, prescription messages were only given sufficiently by only 3(8.8%) of CHWs risking non adherence to drug dosage guidelines. For follow up role, 16 (47.1%) were able to always follow up patients in the community to monitor progress of treatment. For dissemination of preventive measures, only 11 (32.4%) could always disseminate preventive messages (Table 8).

Table 8: Quality measures indicators

S/N	**Indicator**	**Score**	**Substandard**< 0.80 n (%)	**At least good quality 0.** 80+ n (%)
1	Active detection	1		
	Scores		11(32.4%)	23(67.7%)
2	Diagnosis and treatment	1		
	Scores		25 (73.5%)	9(26.5%)
3	Prescription of anti-malarial	1		
	Scores		31(91.2%)	3(8.8%)
4	Follow up	1		
	Scores		18(52.9%)	16(47.1%)
5	preventive measures	1		
	Scores		23(67.6%)	11(32.4%)
	Overall	**5**	**29 (85.3%)**	**5 (14.7%)**

4.2.8 Factors affecting service quality the CHW malaria strategy

The same nine demographic characteristics were analyzed using a chi square test included catchment of location, age, sex, educational status, occupation, income, number of household members in the CHWs household and number of under-five children in the CHWs household. None of them were significant determinants of quality. From the variables related to service delivery, no variable was a significant factor of at least good quality in this study. This was probably due to small sample size and that a non-parametric test of chi square was used which has less power (Table 9).

Table 9:Factors associated with quality delivery of the CHW malaria strategy

	% of CHWs and quality score category		
	<4 (substandard)	≤4 good)	*p*-
Characteristic	**n (%)**	**n (%)**	**value[a]**
Catchment			
Libuyu	12 (80.0)	3 (20.0)	0.6
Nakatindi	17 (89.5)	2(10.5)	
Education			
No formal education/ Primary	8 (89.0)	1(11.0)	1.0
Secondary/tertiary	21 (84.0)	4 (16.0)	
Age categories			
<40 years	5 (83.3)	1 (16.7)	1.0
40+ years	24 (86.0)	4 (14.3)	
Occupation			
Business	16 (89.0)	2(11.0)	0.6
Piece works	13 (81.3)	3 (19.0)	
Marital status			
Married	14 (82.0)	3 (18.0)	1.0
Other	15 (88.0)	2 (12.0)	
Income			
<K500	15 (94.0)	1 (6.1)	0.3
K500-K1500	14 (78.0)	4 (22.0)	

Table 9 *continued*: Factors associated with quality delivery of the CHW malaria strategy

Characteristic	% of CHWs and quality score category		*p*-value[a]
	<4 (substandard) n (%)	≤4 good) n (%)	
Sex			
Male	8 (80.0)	2 (20.0)	0.6
Female	21(88.0)	3(12.0)	
No of household members			
<6	11 (91.7)	1 (8.3)	0.6
6+	18 (82.0)	4 (18.0)	
No of children U-5			
0	14(82.4)	3(17.7)	1.0
1+	15 (88.2)	2 (11.8)	
Work experience			
6-12months	16 (94.0)	1 (6.0)	0.3
Above 12months	13 (76.5)	4 (23.5)	
Reason for being CHW			
Recommended by NHC	20 (80.0)	5 (20.0)	0.3
Interest in malaria	9 (100.0)	0 (0.0)	
Incentive/payment			
Yes	0	1(100.0)	0.1
No	29 (88.0)	4 (12.0)	
Supervised			
Never	1 (100)	0	0.4
Every 6 months	1 (50.0)	1 (50.0)	
Every 3 months	16 (84.0)	3 (16.0)	
Monthly	11 (92.0)	1(8.3)	
Supervisor			
Clinic	4(80.0)	1(20.0)	0.1
NHC Chairman	3 (60.0)	2 (40.0)	
NGO	22 (92.0)	2 (8.0)	

[a]Fisher's exact

4.3 Qualitative Findings

4.3.1 Facilitation strategies to the malaria CHW program

From the qualitative findings, the factors perceived to influence CHW performance were merged into the following major themes; Moderating factors to facilitation strategies, Drivers to CHW responsivenes and community responsiveness.

Table 10:Qualitative Findings

Major Theme	**Sub Theme**
Moderating factors to facilitation strategies	-Insufficient Remuneration Incentives-financial and non-financial
	-Reduced mobility, no Bicycles, vehicles
	Inadequate Supervision -Frequency -Supervisors -Transport -No evaluation tool -No standard reporting tool
	Inadequate funding -Reduced community malaria activities
	Work overload -Multitasking -Large population to cover -Unwillingness to involve others -CHW roles
	Inconsistent supplies -RDT -Job aides -Storage facilities
	Capacity building -Refresher courses -Increased Training needs -Exchange visits

Drivers to CHW responsivenes	Individual CHW factors -need for recognition-certificates -Lack of CHW confidence -Reduced motivation-self driven, index case dependant, no action plans, world malaria day
Community responsiveness Community concerns	Community participation -Community utilization of CHW -Refusal of some Community interventions-IRS -Narrow focus from community-ITN Increasing malaria cases -Increasing mosquito population -Ineffective IRS -Bordering Tourist capital with kazungula Zimbabwe -Reduced ITN use -Insufficient ITNS -Lack of knowledge on prevention -Inadequate funding for activities -Lack of environmental management -CHWs only in two catchment areas

4.3.2 Factors affecting implementation CHW program

Higher levels of implementation fidelity are achieved when those responsible for delivering an intervention are enthusiastic about it. The organization more broadly may also influence the response of those delivering a new intervention. The Organisational factors were main factors that surrounded responsiveness of CHWs for the strategy.These included insufficient remuneration,inadquate supervision, inadquate funding, work overload for CHWs,incosinstent supplies of stocks and poor cordination with partners.

Insufficient Remuneration

Community health workers indicated that what drives them to continue working is the fact that they were told that they are volunteers from the beginning and so they are self-driven to serve the community in wanting to be part of malaria reduction. Key informants indicated that it is very difficult to achieve the malaria targets without incentives for CHWs and this affects their

performance since the CHWs would rather work where there is an incentive. CHWs even feel the malaria program is lagging behind compared to other programs and this aspect affects their performance. Difficulties in mobility affects their performance as well as they have to travel distant places hence difficulty to cover vast areas.

"*From the beginning, we were told we were volunteers and we understood. We do sacrifice so at some point they should remember us that we have families. We don't work and at the end of the day we need to see to it that the family has food on the table. The world we live in now is different from the way it was before. Times are different from times back. Let them consider us even just a bit for us to be able to continue". P1* FDG

Inadequate Supervision

Supervision is at facility level but is carried out quarterly but usually by the Anglican Church supporting the malaria program. CHWs are not evaluated and there is no standard evaluation tool. Supervision is done by checking books, observing tests and having meetings where discussions of challenges are done. Sometimes Community Malaria Agents (CMAs) are supervised when the facility goes for the outreach activities but the environmental health officer in charge of the CMAs does not manage to constantly supervise them due to transport logistics and that other professional staff do not supervise them leaving the CMAs demotivated for work.

"Let the district also plan for us besides the Anglican. They should claim ownership and have their own program. After all the Anglican found us at a clinic for the district. Like the days of old they should give us refresher course, they should not relax, not waiting for Anglican who get from other donors and us the church"

Inadequate Funding

Funding for malaria programs is inadequate hence action plans are not honoured even when the CHW are eager to work. Sometimes some interventions are not carried out for instance spraying in 2015 wasn't done due to non-financing of the intervention.

"We have no action plans, Even if we make budgets and take to the clinics and goes to the district there is no outcome or response.it is just paper work" p9 fgd2

Increasing Work load

Community malaria agents' roles are to track malaria cases in the community, do the testing and treat positive cases, and if they find any complicated cases like pregnant mothers, under five, they are to refer to the nearest facility for further management. There is a vast area for CHWs to cover within their catchment area, 36 against 11,367 households which is unrealistic to meet targets. Sometimes the same CHWs are taken to other zones that do not have the CHW strategy for malaria activities. Multitasking also increases the workload as they are the same people doing the activities in many other projects where there have heard they are offering an incentive.

‘‘We more CHWs and need refresher courses to have latest updates so that we are not left too much behind’’P1, FGD2

Inconsistent supplies

Insufficient stock for use was found to be a challenge. This included RDTs and storage equipment as storage for RDTs leaves much to be desired. Sometimes when clients with fever are seen, but with a negative result, there is no antipyretic or pain killer but are just referred to the health facility. For ACT, only peri-urban areas are given but those near the centre just get for clients and treat. There program lacks standard registers but improvised books that have no consistent reports. Lack of thermometers, scales and referral forms was also reported. For. ITNs are given but demand is higher than supply. Pregnant women and under five children are prioritized as each bed space may not have an ITN.

“We who work are free but we have challenges with reagents in some cases We need RDT consistency for us to continue working, as people are now saying the CHW has stopped testing. People will neglect us, so give us RDT so that we continue working. A long time ago people came because we had access to RDTs but now people come but can't be tested. Now people come and bounce, we feel bad as we can't do anything for them as we don't want to help meanwhile it is just things we lack to use.p4 fgd2

Non ownership by the district

The CHW program receives support from the Anglican Church which offers support is in terms of training the CHWs and provision of mosquito nets for distribution, ITN use inspection and health education. There were issues of non-ownership of the CHW program by district who only come in if asked especially if there are leakages they help talk to the city council who also

supports by ensuring water leakages are controlled as children play in the stagnated water. P3

"Let the district also plan for us besides the Anglican. They should claim ownership and have their own program. They should also provide refresher courses. After all the Anglican found us at a clinic for the district. Like the days of old they should give us refresher course, they should not relax, not waiting for Anglican who get from other donors and us the church." P3 FGD1

4.3.3 Drivers to CHW responsiveness

Need for capacity building and recognition

The CHWs have been known in the community and therefore need some formal recognition with certificates of training in the work they do including the uniform identification with identity cards and aprons. This enthusiasm for recognition makes them want to work at the centre than going into the community and have to constantly remind them to go work in the community as the health centre is just for them to bring reports. This may be the reason for poor community coverage with regards to their roles.

"We need certificates of training and also identity cards, and refresher courses to have latest updates so that we are not left too much behind. We just have apron and T- Shirts of which others still do not have, especially in rainy season, we need rain gear you can be protected and the books do not get wet."P2 P8.

Improvement of CHW confidence

Some CHWs seem not to have confidence in the work they do especially in treating. Protocols or Coartem course guidelines are at the clinic and this maybe one of the contributing factors to lacking confidence to administer treatment

4.3.4 Community responsiveness

Community Support

The community has recognized the CHWs and appreciate them as seen from the survey that 85% knew the existence of CHWs for malaria. However, the attention from the community is just on mosquito nets and no other CHW roles. Some areas have so many refusals in IRS. Reasons for refusal were that the intervention is implemented late during rainy season when it is inconveniencing to remove things and ran back when rains come, that IRS brings in a lot

more of other bugs, that it is ineffective as mosquitoes do not even die. CHWs find it very hard to sensitize and convenience some difficult community members

"Some areas have so many refusals in IRS and maybe the reason for the sudden increase of malaria population since there are a lot of mosquitoes in the district. IRS works when at least 80-85% are sprayed but the survey indicated 59% households having received IRS which is not good coverage." KI District

Community views on malaria management

Malaria cases are on the increase and the mosquito population has increased and is a concern for the community and program implementers. There is need for a scientific research on mosquito evaluation to detect anopheles mosquito as the population of mosquitoes is alarming. Malaria cases are common in some catchments of Livingstone like areas bordering the city like kazungula and Zimbabwe hence likelihood of sharing same cases is possible and no environmental management is being done hence the cut of the transmission cycle disturbed. With refusals of IRS in some areas, it may lead to difficulties in wiping out malaria in the district.

Areas under the Anglican church are advantaged in terms of ITNs distributed but other areas in the district are affected as well hence need for the CHW intervention in all the catchment areas. The last ITN distribution was in 2012 and the available nets are prioritized to pregnant women and under-five children. Utilization of ITNs is also another area which needs research as some areas are misusing ITNs a garden fences and poultry pens.

"Lack of management of breeding sites even if we do IRS the source not attended to. So we could be spraying structures but what about where the mosquito is coming from is not attended to."DKI

CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This study evaluated fidelity of the CHW strategy for malaria considering the moderating processes and adherance to the strategy as it was intended in terms of content and coverage. Overal, Fidelity to the CHW strategy was found to be low considering that a lot of factors were negatively affecting the implementation of the strategy**.**

5.2 Performance

Overal perfomance of malaria CHWs was poor but varied through the different indicators. However, 97% of CHWs had knowledge on Malaria and this was a mismatch with performance in this setting. This finding is different from the malaria Village Health Workers in cambodia whose knowledge was low and knowledge was a significant determinant of quality(Kalyango et al., 2012a, Yasuoka et al., 2010)**.** This knowledge can however be utilized in strenghtening malaria prevetion dissemination if factors surrounding CHW performance are met.

5.2.1 Quality of service

CHW program fidelity was another aspect that was investigated and results show that only a 21% of CHW were able to work according to the the way the program was intended. This study revealed that most CHW were able to conduct diagnosis with RDTs skills that they had acquired through the training programmes. However, other service items were not performed well. This could have been due to the issues of confidence to treat and that CHW did not have supplies to use hence just stayed in the community demotivated to work. Prescription messages were poor which risks resistance due to non adherance to treatment risking resistance. No variable was found to be a signifcant determinant of quality but other studies indicate need for occasional onsite quality supervision to actually see what they do in order to ensure to quality service especially that some of them are supervised by the fellow malaria chairman and that the facility supervisor is facing challenges in mobility to enable quality supervision. Motivation through standardized level of recognition and remuneration, continious learning through refresher courses and the exchange visits may improve adherance to CHW strategy improving the quality of service.

5.2.2 CHW malaria services in the community

From the outer setting,there were reports of poor community participation and poor utilization of CHWs especially in the test and treat intervention were only 14% sought treament from CHW compared to the 86% who were attended to at the health facility. This is a bit different from a study in burkina faso where less than 1% of the CHW were utilised for treatment of malaria in children in the rural area where CHW strategy for treatment is expected to be widely utilised. This was related to issues of implementation fidelity, a lack of adaptation to the local context and problems of acceptability/feasibility which might have undermined the effectiveness of community case management of malaria. (Druetz et al., 2015). This study however revealed that 85% of the study population was actually aware of the CHW existence, a finding that is different from the burkina faso study where 78% of the community reported not knowing the CHWs as a reason for not utilizing them for treatment. Extending this strategy to other catment areas within Livingstone district may improve surveillance than treatment by CHW in that livingstone is an urban where health facicilities are within reach. In terms of treatment, similar with the Burkina Faso study confirms the necessity of evaluating public health interventions under real-world conditions of implementation(Druetz et al., 2015). However, the 75% of the community had received ITNs distributed by CHWs and 59% had their households sprayed in the previous 6 months though these percentages are not on national target of 80% or better as there are insffifient ITNs and experienced refusals in spraying respectively. Similar with the kalabo study, the communities do recognise community health workers as a policy iniciative, with 95% of respondents confirming their knowledge about the existence of community health workers in their community (Stekelenburg et al., 2003). However, community participation affects performance in that CHWs are only able to attend to those who seek health care from them hence strategies to improve community confidence and utilization of CHW must be put in place (Druetz et al., 2015, Kisia et al., 2012, Kelly et al., 2001, Yeboah-Antwi et al., 2010). It is also very vital to improve health education and sensitization in the community for the community malaria interventions as coverage in different community malaria intervetions were all below expected due to issues of ignorance leading to refusals and not adopting malaria prevention behaviours. However, concerns of not attending to the breeding sites as a source of mosquitoes was a greater concern, including improving the cross border surveillance.

5.3 Facilitation strategies to Fidelity of the CHW program

To develop an effective implementation of the malaria CHW intervention for this setting, being married, longer work experience, supervision in terms of the supervising organization, and reporting system should be given more attention. Qualitatative findings indicate a number of hindrances to implementation fidelity of the malaria CHW program. Organisational factors were main factors that surrounded performance of CHWs.These included insufficient remuneration, reduced mobility, inadquate quality supervision, inadquate funding, work overload for CHWs, inconsinstent supplies of stocks, poor cordination with partners and lack of iniciative for capacity building.

Governance

CHWs are aware that they are volunteers always willing to work and with 97% of them being knowledgeable but the organisation system has not put in place adquate necessesities for this strategy to work as intended. However this knowledge did not yield good performance or good quality service. Qualitatative findings indicate a number of hindrances to implementation fidelity of the malaria CHW program. Organisational factors were main factors that surrounded performance of CHWs.These included insufficient remuneration, reduced mobility, inadquate quality supervision, inadquate funding, work overload for CHWs, incosinstent supplies of stocks, poor cordination with partners and lack of iniciative for capacity building. CHW performance is hard to achieve and to maintain without sufficient consideration for funding and other motivating factors like transport and remuneration (Kalyango et al., 2012a, Perez et al., 2009, Kawakatsu et al., 2015, Druetz et al., 2015). Though the CHWs are interested in working with the health authorities without any remuneration, programmes will have to explore how to transform a completely voluntary service into some incentive-packaged service in order to make such a service sustainable(Owusu-Agyei et al., 2007).

There is poor CHW program cordination and collaboration with regards to the supporting organization and ownership by the supervising district. A standard register and a reporting tool that is common to both supervising organizations is necessary for a common goal. The CHWs also have so much work against a large population and they needed to be remembered in terms of remuneration for them to continue work as per CHW strategy. Improving non-monetary incentives such as providing them with materials that identify them as community-based health workers (badges, t-shirts, and so on), frequent refresher training, supportive supervision is necessary to improve motivation to work (Zulu et al., 2014).

Supervision was a significant factor associated with CHW performance specifically the supervising organization. The CHWs were being supervised by the existing NGO, the clinic and chairman of the program and the CHW workers who had good performance were supervised by the clinic though the facility supervisors faced challenges with mobility for following up CHWs in the field. Suspervision not only needs frequency but quality input as high quality supervision is one of the key factors in improving a CHW's performance (Kawakatsu et al., 2015). Supervision of community health workers in Kalabo however, did not have a positive impact on their performance as quality was reported to be poor and almost half of the community health workers do not experience any benefit from the supervision(Stekelenburg et al., 2003). Evidence from a systematic review on impact and implementation of supervision suggests that improving supervision quality has a greater impact than increasing frequency of supervision alone with supportive supervision packages, community monitoring and quality improvement/problem-solving approaches though evaluation of all strategies is weak(Hill et al., 2014). Supervisors should have adequate health knowledge and conduct routine supervisions to sustain a high performance and responsiveness from the CHWs and they should have standardized method or checklist for the supervision of community health workers(Nsona et al., 2012). This should be done in the community focusing on links with the community.

Reporting system

Reporting record used was found to be a significant determinant of performance. CHW had no standard reporting tools and were expected to submit a report to their zonal chosen CHW supervisor who takes to the chairman of the Malaria CHW program selected among the CHWs. This chairman was the one to aggregate and send the reports to the supporting NGO through the malaria phones they are given which were not able to show or store previous reports sent and hence no record was found at the facility. However, improvised hard cover books registers were used and reports only covered number of testing done which was based on index cases or active case finding, indicating test results. Other CHW activities were not recorded and CHWs concentrated only on diagnosis and treatment, neglecting other CHW roles for malaria prevention and control. This is similar to a study by Yasuoka et al where Village Health workers (VHW) concentrated only on diagnosis and treatment (Yasuoka et al., 2010). Apart from the health education, testing, and treatment from the survey, a lot more services are rendered by CHWs but not reported and these included ITN distribution, ITN utilization

inspection, households sprayed after CHW sensitization, referral, burying of trenches. The qualitative results however indicated doubt in the authenticity of CHW reports as they are rarely supervised and their register records are taken as gospel truth. There is therefore need for a standard reporting tool that will cover all the CHW roles capturing all details required as other details were missing in the improvised registers. This may also aid in supervision by the supervising officers visits(Stekelenburg et al., 2003).

Stocks and supplies

The most mentioned reason for the poor fidelity to the malaria CHW program was the irregular supply of drugs to the community health workers, the same implemetation challenge of the test and treat intervention in another part of zambia where it was concluded that with limited resources, coverage and diagnostic tools, reactive screen-and-treat would not likely be sufficient to achieve malaria elimination but with reactive focal drug administration as an alternative strategy (Searle et al., 2016). The erratic and inconsistent drug supply to community health workers is not only an indicator for poor performance, but could also be a cause of inactivity of some CHWs in terms of active detection and treatment (Stekelenburg et al., 2003).

Human Resource

It is almost impossible for 34 CHWs to cover 11,387 households without inefficiency. Scaling up in terms of capacity building for more manpower would foster good performance in the malaria CHW program. The government endorsed a CHA assistant program to help meet the human resource demands who are to be liaison between community and the health facilities but discussions with CHAs showed that because of the limited number of trained staff at health posts, it was resolved that CHAs should spend more time at the health posts than in the community(Zulu et al., 2014). This process is however a very long term project and sustainability and funds for such a policy lacks feasibility hence local malaria CHWs who are always present in their communities will continue being an effective strategy to in the elimination of malaria for community surveillance improvement as one of the WHO pillars in malaria elimination.

Being married was a significant determinant of performance in this study as all good performers were married. This is similar to study were married CHWs gave a higher performance than others (Kawakatsu et al., 2015). This could be because they have more family members to help with household duties or that they may have an extra source of income from

the other partner. Having fewer household duties encourages CHWs to work more actively and reduces the dropout rate as one of the barriers preventing a good CHW performance was a heavy amount of household duties (Kok et al., 2015) though this was not signifcant in this study. Recruitment of married CHW for malaria interventions may help in sustaining good performance in improving coverages.

Work experience was another significant factor that related to CHW performance.This was indicated from the fact the the CHW who were good performers all had worked for more than one year and were all married. Longer work experience was also a similar finding in this study as confidence is belt more with the longer the period one works (Kawakatsu et al., 2015, Bagonza et al., 2014, Kalyango et al., 2012a, Stekelenburg et al., 2003). The program identified experienced CHW to be receiving zonal reports from the CHWs that had little experience. Longer work experience entails having more opportunity to receive effective training, supervision and any incentives and to build a confidential relationship with community members (Alam et al., 2012, Kalyango et al., 2012a). Familiarity with the work motivates CHWs apply for position like that of a Community Health Assistant (CHA), another strategy being rolled out in Zambia (Zulu et al., 2014).

5.4 Strengths and Limitations

5.4.1 Strenghts

This study is a mixed methods study which explores both quantitative and qualitative and this gives an indepth explaination to barriers to implementation of the malaria CHW program. It also assesses the services received through the community survey and hence is a compremprensive performance and fidelity assessment of CHW intervention in malaria.

5.4.2 Limitations

Lack of a standard performance measurement tool for an integrated approach for CHW community malaria interventions hence performance measurement and quality assessment indicators was adopted from previous studies. To evaluate CHW' service quality, only self-reported data were used, and actual community experiences were not taken into account in terms of utilization of malaria CHW services. The analysis of association did not take into consideration the confouding variables as multivariate analysis ws not done as the sample size for CHW was small. However, ultivariate anaysis will be done with survey data when anlyzing

utilization of CHW for malaria interventions.The validation of self-reported indices regarding service quality and action needs improvement. However, possible attempts were made: for instance, self-reported data were double-checked with CHW' records in their monthly reports; data used to assess performance, which are submitted to the CHW malaria supervisor regularly. Design effect not considered sampled as people in Nakatindi may have different characteristics from those in Libuyu since study sites purposively sampled.

5.5 Conclusion

The study findings indicate that fidelity was low in that performance was poor and quality of service in terms of CHW strategy fidelity was substandard .Findings suggest that CHW strategy can still adequately contribute to the elimination of malaria in this setting with appropriate sustained support from the organization and the community if WHO pillars are to be met. The support should include improvement in the organisational system , consideration for the CHWs characteristics to improve the CHW responsiveness and attending to issues affecting the outer setting; community factors;community responsiveness. These factors affects implementation fidelity and coverage of the CHW strategy in malaria preventive interventions. However, most factors that affected the CHW strategy were facilitation strategies in organizational system that indicated that the CHWs did not have a a condusive working enviroment for them despite them having volunteered to work. Lack of an organised system of program cordination affects implementation fidelity and coverage of the CHW strategy in malaria preventive interventions. Community support would improve the malaria CHW intervention and strategies to improve community responsiveness and confidence for use of CHW are to be implemented. Non participation of the community could be one of reasons why resurgent cases are occuring along with other factors that need further research as malaria needs to be fought using an intergrated approach. CHW performance hinges on contextual factors as they are volunteers.

5.6 Recommendation

i. To maximize fidelity and scale up of the CHW strategy for malaria interventions, efforts to build capacity in other CHWs for the same clinic catchments in order to increase reach or coverage is important as scaling up the CHW startegy to other catchement areas would not be cost effective if available CHWs are are not able to meet the target without quality service delivery. If considered, priority placing of CHWs should be in peri urban bordering areas were malaria cases seem to be coming from.

ii. Strategies to improve community responsiveness and confidence in CHWs in order to increase acceptability of the CHW strategy must be considered as performance is affected by Community support.

iii. There is need to recognise CHWs on a more standard level of recognision and remuneration with clearly defined roles as motivation for the strategy to achive fidelity.

iv. Improvement in the quality of supervision is vital and that needs training of supervisors who will use a stardardized evaluation tool in guiding supervision based on a standardized reporting tool for the maaria CHW strategy.

v. Overall, there is need to strengthen the organizational system of delivery of the CHW strategy for fidelity improvement in the community malaria intereventions.

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APPENDICES

Appendix 1: Information Sheet and Informed Consent document for CHW

UNIVERSITY OF ZAMBIA SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT FOR COMMUNITY HEALTH WORKERS

Study Title: Evaluating Community Health Workers Performance in the Prevention and control of malaria in Livingstone District, Zambia-A Bottleneck Analysis

Principal Investigator: Helen Chipukuma

IRB No.:

INTRODUCTION

Hello! My name is Helen Chipukuma from University of Zambia. I am doing research on Evaluating Community Health Workers Performance in the Prevention and control of malaria in Livingstone District, Zambia-A Bottleneck Analysis.

I would like to invite you to take part in a research study. Before you decide you need to understand why the research is being done, what it would involve for you, what the benefits and risks to you might be, and what would happen after the study ends. Please take time to listen to the following information carefully as I read it to you. Ask questions if anything I say is not clear or would like more information. Take time to decide whether or not to take part.

If you agree to take part in this study, you will be asked to sign the Consent Form on the last page of this document. You will be given a copy of both the Participant Information Sheet and the Consent Form to keep.

Purpose of research project

This study is part of my school requirements for my training in Public Health, which I am doing with the University Of Zambia, School of Medicine. The purpose of the research project is to see how Community health workers are working in malaria activities. From reports, Livingstone district has been doing very well in reducing malaria. At the moment, it shows an increase in malaria again. Most of the malaria activities are done in the community with

Community Health workers helping in the community. To do this, I would like to find out how you are working, if goals are being met, any problems faced and also how the community is using your services.

After the research, I will give a report and also make suggestions to the district and to planners in how work can be made better as we fight to stop malaria as this research will tell how you are working in the community. This will also help to improve of use of on ongoing malaria activities by the community to reduce malaria cases.

Why you are being asked to participate?

Potential participants for the research are all community health workers involved in malaria control. You have therefore been asked to participate because you fit this description.

Procedures

If you agree to participate in this research:

- I will ask you to take part in one interview. This interview will take about 30 minutes. It will be done in a private place. Your name will not be included on the typed documents.

Risks/discomforts

There are no physical risks to participating in the research. However, I see that there may be some fear of being stopped from offering services to the community as I am checking on how you are working. I would like to assure you that this research is just meant to improve the CHW services and to improve community use of good health practices. I am also aware that some information you may tell me or enter in the questionnaires may be personal or may be sensitive to other stakeholders. However, I would like to assure you the information that we get from you will not be shared with anyone outside the research team.

Benefits

If you are participating in this research, you will benefit by receiving help make your work better as this research will identify different kinds of performance related needs. The community health workers will learn from the research and have a platform to express

themselves in matters relating to what hinders their performance and help find solutions to how malaria can be better fought in the community.

Payment

There is no payment for participating in this research. However, refreshments and snacks may be provided during the interview.

Protecting data confidentiality

I have put up steps to protect the information I will get from you. First, I will do my best to make sure that your name is not included with any information that I collect from you. Only my research assistant and my mentors at the University of Zambia will have access to the study information. The collected data will be locked in a safe place. I will keep copies of typed information on CDs in case we have a problem with the computer.

What happens if you do not want to participate in the research?

You are free to decide whether you want to take part in the research and you may stop your participation at any time if you wish. This will not bring any problem to you.

Who do I call if I have questions or problems?

- Call me, <<Helen Chipukuma>>, at <<+260-977-710935>> if you have questions and complaints about the program.

- Call or contact the University of Zambia Biomedical Research Ethics Committee office for any ethical queries. The Ethics Committee contact information is:

Address:	Ridgeway Campus
	P.O. Box 50110
	Lusaka, Zambia
Telephone:	+260-1-256067
Fax:	+ 260-1-250753
E-mail:	unzarec@zamtel.zm

What does your signature (or thumbprint/mark) on this consent form mean?

Your signature (or thumbprint/mark) on this form means:

- You have been informed about the program's purpose, procedures, possible benefits and risks.
- You have been given the chance to ask questions before you sign.
- You have voluntarily agreed to be in this program

_____	_____	_____
Print name of Adult Participant	Signature of Adult Participant	Date

_____	_____	_____
Print name of Person Obtaining	Signature of Person Obtaining Consent	Date

Appendix 2: Information sheet and Informed Consent Document for the Community Members

UNIVERSITY OF ZAMBIA SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT FOR THE COMMUNITY MEMBERS

Study Title: Evaluating Community Health Workers Performance in the Prevention and control of malaria in Livingstone District, Zambia-A Bottleneck Analysis.

Principal Investigator: Helen Chipukuma
IRB No.:

INTRODUTION

Hello! My name is Helen Chipukuma from University of Zambia. I am doing research on Evaluating Community Health Workers Performance in the Prevention and control of malaria in Livingstone District, Zambia-A Bottleneck Analysis.

I would like to invite you to take part in a research study. Before you decide you need to understand why the research is being done, what it would involve for you, what the benefits and risks to you might be, and what would happen after the study ends. Please take time to listen to the following information carefully as I read it to you. Ask questions if anything I say is not clear or would like more information. Take time to decide whether or not to take part.

If you agree to take part in this study, you will be asked to sign the Consent Form on the last page of this document. You will be given a copy of both the Participant Information Sheet and the Consent Form to keep.

Purpose of research project

This study is part of my school requirements for my training in Public Health, which I am doing with the University Of Zambia, School of Medicine. The purpose of the research project is to see how Community health workers are working in malaria activities. From reports,

Livingstone district has been doing very well in reducing malaria. At the moment, it shows an increase in malaria again. Most of the malaria activities are done in the community with Community Health workers helping out. To do this, I would like to find out how they are working, if goals are being met, any problems faced and how the community is using your services.

After the research, I will give a report and also make suggestions to the district and to planners in how work can be made better as we fight to stop malaria as this research will tell how you are working in the community. This will also help to improve of use of on ongoing malaria activities by the community to reduce malaria cases.

Why you are being asked to participate?

Potential participants for the research are community health workers involved in malaria control including the community members receiving the interventions. You have been asked to participate because you fit one of these descriptions.

Procedures

If you agree to participate in this research:

- I will ask you to take part in one interview. This interview will take about 30 minutes or less. It will be done in a private place. If you permit me, I will tape record the interview to help pick all you will say. If not, I will ask you if it will be ok for me to write notes. The information from tape or notes will be typed in full, to help me to fully understand what you will say. Your name will not be included the tape and the typed documents.

Risks/discomforts

There are no physical risks to participating in the research. However, I recognize that there may be some fear of being reported as to who said what against your local CHW as I am checking on how they are working. I would like to assure you that this research is just meant to improve the CHW services and to improve community use of good health practices. I am also aware that some information you may tell me or enter in the questionnaires may be personal or may

be sensitive to other stakeholders. However, I would like to assure you the information that we get from you will not be shared with anyone outside the research team.

Benefits

If you are participating in this research, you will benefit by receiving help to improve the work as this research will identify different kinds of performance related needs of gaps. The overall benefit will also be for the community in which you live and serve as we need to work as a team in order to have a healthy malaria free community. You will be enlightened as the community of what to expect from the community health workers with to community malaria interventions. You will also have knowledge that you need to engage the community health worker in any malaria element in your community.

Payment

There is no payment for participating in this research. However, refreshments and snacks may be provided during the interview.

Protecting data confidentiality

I have put up steps to protect the information I will get from you. First, I will do my best to make sure that your name is not included with any information that I collect from you. Only my research assistant and my mentors at the University of Zambia will have access to the study information. The collected data will be locked in a secure place. I will keep copies of typed information on CDs in case we have a problem with the computer.

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You are free to decide whether you want to take part in the research and you may stop your participation at any time if you wish. This will not bring any problem to you.

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_____ _____ _____

Print name of Adult Participant Signature of Adult Participant Date

_____ _____ _____

Print name of Person Obtaining Consent Signature of Person Obtaining Consent Date

Appendix 3: Information sheet and Informed Consent Document for the Program Implementers

UNIVERSITY OF ZAMBIA SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT FOR THE PROGRAM IMPLEMENTERS

Study Title: Evaluating Community Health Workers Performance in the Prevention and control of malaria in Livingstone District, Zambia-A Bottleneck Analysis

Principal Investigator: Helen Chipukuma

IRB No.:

INTRODUCTION

Hello! My name is Helen Chipukuma from University of Zambia. I am doing research on Evaluating Community Health Workers Performance in the Prevention and control of malaria in Livingstone District, Zambia-A Bottleneck Analysis.

I would like to invite you to take part in a research study. Before you decide you need to understand why the research is being done, what it would involve for you, what the benefits and risks to you might be, and what would happen after the study ends. Please take time to listen to the following information carefully as I read it to you. Ask questions if anything I say is not clear or would like more information. Take time to decide whether or not to take part.

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I would like to invite you to take part in a research study. Before you decide you need to understand why the research is being done, what it would involve for you, what the benefits and risks to you might be, and what would happen after the study ends. Please take time to listen to the following information carefully as I read it to you. Ask questions if anything I say is not clear or would like more information. Take time to decide whether or not to take part.

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Risks/discomforts

There are no physical risks to participating in the research. However, I recognize that there may be some fear of being judged as an under performer risking bad reflection on self. I would like to assure you that it is not an on-job evaluation research but a research for CHW malaria intervention program to improve the system. I am also aware that some information you may tell me or enter in the questionnaires may be personal or may be sensitive to other stakeholders. However, I would like to assure you the information that we get from you will not be shared with anyone outside the research team.

Benefits

If you are participating in this research, you will benefit by having a platform that will put forward your working system with the community health workers to light and will identify different kinds of performance gaps that need attention with regards to malaria prevention and control. This may help identify better ways and approaches to avoid resurgence in the district.

Payment

There is no payment for participating in this research. However, refreshments and snacks may be provided during the interview.

Protecting data confidentiality

I have put up steps to protect the information I will get from you. First, I will do my best to make sure that your name is not included with any information that I collect from you. Only my research assistant and my mentors at the University of Zambia will have access to the study information. The collected data will be locked in a secure place. I will keep copies of typed information on CDs in case we have a problem with the computer.

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_____ _____ _____

Print name of Adult Participant Signature of Adult Participant Date

_____ _____ _____

Print name of Person Obtaining Signature of Person Obtaining Consent Date

Appendix 4: CHW Questionnaire

Section 1: Participant's Background				
Question No.	**Question**	**Response**		
			Please tick where applicable √	**Code**
11	Sex	Male		1
		Female		2
	How old are you?	Less than 40 yrs.		1
12		More than 40 yrs.		2
13	What is your education level?	no formal		1
		primary level		2
		secondary		3
		College/university		4
14	What is your Marital status?	married		1
		Other		0
15	What is your Occupation?	business		1
		Other: specify		2
16	What is monthly income?	Below K500		1
		K500-K1500		2
		K1501-K2500		3
		2501-K3500		4
		Above K3500		5
16	How many household members are in your family?	Less than 6		1
		More than 6		2

17	How many children are under 5?	0		0
		1 or more		1
18	How long have you worked as a malaria CHW?	Less than 6 months		1
		6-12months		2
		more than 1year		3
19	Why did you become a CHW for malaria	Recommended by NHC		1
		Interested in malaria activities		2
10	Do you get any incentive/payment for the work you do?	Yes		1
		No		0
11	How often are you supervised	Never		0
		> 6 months		1
		Every 6 months		2
		Every 3 months		3
		monthly		4
		More frequent		5
12	Who supervises you?	District		3
		Clinic		2
		NHC chairman		1
13	Do you get feedback from your supervisor?	Yes		1
		No		0
14	Who trained you as CHW for malaria	GRZ		1
		NGO-Specify …….		2
15	Any refresher course received?	Yes		1
		No		0

16	Is there a system in place regarding your regular ordering of equipment and supplies	Yes		1
		No		0
17	Have you had stock out of your commodities kits for the last 6 months?	Yes		1
		no		0
18	Where do you record your reports	Register		3
		Paper		2
		Book		1
19	Where do you take your reports	District		4
		Health facility		3
		chairman		2
		NGO		1
20	Do you understand your role clearly and the targets that you are required to meet on monthly basis?	Yes		1
		no		0
21	What major constraints do you face as a CHW?	Lack of supplies		1
		Lack of transport		2
		Lack of community support		3
		Lack of supervision		4

Section 2: PERFORMANCE MEASUREMENT				
Question No.	**A. Quality Index**	**Response**		**Please tick where applicable √**
			Score	
I				
22	How many monthly reports have you submitted in the past 6 months?	No report	0	
		1-2 reports	1	
		3 submitted	2	
		4 submitted	3	
		5 or full reports	4	
23	How many sensitization session or health educations have you given in the past 6 months?	None	0	
		1-2 sessions	1	
		3	2	
		4	3	
		5 and above	4	
24	How many households have you covered for testing(16 households/ index case)	Less than 20%	0	
		20-39%	1	
		40-59%	2	
		60-79%	3	
		80-100%	4	
25	How many positive cases have you treated?	Less than 20%	0	
		20-39%	1	
		40-59%	2	
		60-79%	3	
		80-100%	4	

	KNOWLEDGE				
		0	0		
		1-4	1		
		5-8	2		
		9-12	3		
		13-16	4		
	Grand score=	**20**			
26	Mention the symptoms of malaria	Stomach-ache	**score**		
		Diarrhoea			
		Nausea			
		Fever,			
		Headache			
27	How is malaria transmitted?	cough or sneeze,			
		touching blood,			
		touching utensils,			
		sharing food,			
		coming close to mosquitoes			
		mosquito bites			
28	What transmits malaria?	Fly			
		Being soaked by rains			
		Female mosquito			
		Male mosquito			
		Eating Unripe sugarcane			
29	Which one of four time periods is the mosquito most active	Morning			

		Afternoon			
		dusk to dawn			
		(evening/night)			
30	What is the best time for mosquito development?				
	Mention the vector breeding places	trees (branches/leaves)			
		on the ground			
		water pools around houses			
		water pools in the bush			
31	Mention the natural enemies of the Mosquito?	Dogs			
		Birds			
		Water insects			
		Small fish			
	How is malaria prevented?	IRS			
		ITN			
		Fansida			
		Burying ditches			
	Total score	**16**			

Section 3: Service quality				
Question No.	**A. Quality Index**	**Response**		**Please tick where applicable √**
			Score	
I	**Active detection questions**			
32	How often do you follow up malaria cases in homes	Never	0	
		Rarely	1	
		Sometimes	2	
		Regular	3	
33	Do you go check if patient has recovered or not?	Never	0	
		Sometimes	1	
		Always	2	
	Maximum total score =	5	Total respondent score =	
	Index score = (respondent score÷ maximum total score)			
II	**Diagnosis and treatment questions**			
34	How often do you Visit community to find malaria patients	Never	0	
		Sometimes	1	
		Always	2	
35	Do you use RDTs?	Never	0	
		Sometimes	1	
		Always	2	
36	Do you Observe symptoms	Never	0	
		Sometimes	1	
		Always	2	
37		Never	0	

	Do you ask symptoms from family	Sometimes	1	
		Always	2	
38	Do you take body temperature	Never	0	
		Sometimes	1	
		Always	2	
	Maximum total score =	10	Total respondent score =	
	Index score = (respondent score÷ maximum total score)			
III	**Prescription of Anti malarias questions**			
39	Do you Prescribe drugs to positive RDT	Never	0	
		Sometimes	1	
		Always	2	
40	Do you explain about dosage	Never	0	
		Sometimes	1	
		Always	2	
41	Do you explain the importance of compliance	Never	0	
		Sometimes	1	
		Always	2	
42	What do you tell clients about drug dosage and compliance?	Compliance failure can result in incomplete treatment	0	
			1	
		Inappropriate to save tablets to treat other people's malaria	0	
			1	

		Inappropriate to save tablets for next infection	0	
			1	
		Compliance failure can cause/spread drug resistance	0	
			1	
	Maximum total score =	10	Total respondent score =	
	Index score = (respondent score÷ maximum total score)			
IV	**Questions on Follow-up**			
43	Do you Make home visits or ask patients' family to check if patients recovered?	Never	0	
		Sometimes	1	
		Always	2	
	Maximum total score =	2	Total respondent score =	
	Index score = (respondent score÷ maximum total score)			
V	**Dissemination of preventive measures**			
44	Do you teach of effective preventive measures	Never	0	
		Sometimes	1	

		Always	2	
45	Do you make clients aware about less effective preventive measures	Never	0	
		Sometimes	1	
		Always	2	
46	Do you make clients aware of wrong preventive measures	Never	0	
		Sometimes	1	
		Always	2	
	Maximum total score =	6	Total respondent score =	
	Index score = (respondent score÷ maximum total score)			
	A. ACTION INDEX			
I	**Malaria prevention questions**			
	Effective measures			
47	come back home before dawn	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	
48	wear long-sleeved shirts/pants	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	
49	sleep under bed nets at home	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	

50	refrain from going to malaria endemic places	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	
51	Carry nets when in field/camps	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	
II	**Vector control Questions**			
	burn trash around house	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	
52	seal holes/cracks on walls/ceilings	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	
53	cover water jars/tanks	Never	0	
		Sometimes/Rarely	1	
		Always/Most times	2	
	Less effective measures			
54	kill mosquitoes by hands	Never	0	
		always/most of the time/sometimes	1	
55	use mosquito coils	Never	0	
		always/most of the time/sometimes	1	
56	spray house	Never	0	

		always/most of the time/sometimes	1	
57	clear bush around house	Never	0	
		always/most of the time/sometimes	1	
	Wrong measures			
57	plant flowers/grasses around house	always/most of the time/sometimes	0	
		Never	1	
59	Should not come close to malaria patients	always/most of the time/sometimes	0	
		Never	1	
60	Should not share utensils with malaria patients	always/most of the time/sometimes	0	
		Never	1	

Appendix 5: Community Survey Questionnaire

Participant Identification Number ⌊_⌋⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋⌊_⌋

COMMUNITY SURVEY QUESTIONAIRE

NAME OF CLINIC CATCHMENT……

NAME OF ZONE……..

Section 1: Participant's Background					
Question No.	**Question**	**Response**			
				Please tick where applicable √	**Code**
1	Sex	Male			1
		Female			2
2	Age				
3	Education	no formal			1
		primary level			2
		secondary			3
		College/university			4
4	Do you know of CHWs in malaria control?	Yes			1
		No	**If No, Go to Q.5**		0
5	Do you know them by name?	Yes			1
		No	**If No, Go to Q.7**		0
6	Have you been served by one?	Yes			1
		No			0
7				Yes / No	

	What services have you received for malaria from the CHW in the community?	Health Education/Sensitization	1	0	
		Malaria test	1	0	
		Treatment	1	0	
		Referral	1	0	
		Free Mosquito Net	1	0	
		Spraying	1	0	
		Burring of ditches	1	0	
		ITN utilization inspection	1	0	
		Treating of Nets	1	0	
8	Any malaria experience in the past 12 months in the usual household members?	Yes			1
		No **If No, Go to Q.10**			0
9	Where did you seek health care	Health Facility			1
		CHW			2
		Other (Specify below)			
		If HF or Other, Go to Q.11			
10	How often do you use CHW?	Always			1
		Sometimes			2
		rarely			3
10	Have you had a visitor from outside Livingstone who had malaria in your home in the past 12 months?	Yes			1
		No			0
9	Was your home visited by the Malaria CHW for screening	Yes			1
		No			0
10		Yes			1

	Are you satisfied with the CHW malaria services	No		0
11	If no, why			

Any comment……

Thank you so much for your participation

Appendix 6: CHW Focused Group Discussion Guide

CHW FOCUSED GROUP DISCUSSION GUIDE

FGD Number ⌊__⌋⌊__⌋⌊__⌋ ⌊__⌋⌊__⌋⌊__⌋ ⌊__⌋⌊__⌋⌊__⌋

Location……. Facility …… Interviewer code…….

Date of FGD……

Malaria cases are increasing in our community and so we are conducting a study on the Performance of CHWs in malaria prevention and control in Livingstone district as community links. We will be asking you different issues about your work as CHWs in Malaria control.

1. Describe your roles in malaria prevention and control? Are they clearly defined to you?
2. Explain your experience in your work as CHW agents for malaria?
3. How do you perceive yourselves as being appropriate for the community malaria work, and how effective do you think you are in the fight against malaria.
4. Kindly provide your views on the following issues with regards to malaria prevention and control.
    - support
    - supervision
    - training
    - supplies
    - financing
5. What do you think is the cause of the resurgence of malaria in Livingstone District?
6. What challenges do you meet in your work as community health workers?
7. What motivates you to continue working as CHW in malaria programs?
8. What do you recommend should be done to enable you work well.
9. Any other issues?

We thank you most sincerely for sharing your opinions

Appendix 7: Program Implementers Interview Guide

Participants Number……..Organization…….

Malaria cases are increasing in Livingstone district as indicated by the District HIMS and so we are conducting a study on the Performance of CHWs in malaria prevention and control in Livingstone district as community links. We will be asking you different issues about Community malaria interventions and CHWs in Malaria control.

The interviews will be strictly confidential and will only take 45 minutes. With your consent I request to start the interview.

Questions

1. What do you think are the factors influencing the Performance of CHWs in health services delivery in Livingstone district? (health system and community factors)
2. Describe how the CHW malaria program implemented and coordinated?

- Explain the characteristics CHWs you recruit for malaria interventions?
- Workload-Explain how the CHWs do their work, as delegated or volunteered?
- Do you give them clearly defined of tasks and roles for malaria prevention? Explain their roles?
- How are CHW Selected and recruited? Is the community involved
- What motivates the CHW to continue working?
- How do you supervise supervised the CHW and how do you evaluate the CHWs?
- Training-any refresher courses or trainings you take them to?
- What Protocols and guidelines do they use and any job aids they use?
- Describe the communication process and reporting processes with the CHWs?
- Describe how the supply system is managed to ensure consistently in their work?
- What do you think is the cause of malaria resurgence in Livingstone district?
- How is the performance of CHW? Are they relevant to the system with regards to malaria control programs

Closing Remarks Are there other people you think we should talk to concerning the same? Have we covered everything you think is important?

Debriefing: Thank you very much for your time. Your knowledge and insights will be very helpful and valuable. When the process is complete, I will be happy to share a summary of the findings. Thank you again

Appendix 8: UNZABREC ethical approval

THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: + 260-1-250753
E-mail: unzarec@unza.zm

Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia

Assurance No. FWA00000338
IRB00001131 of IORG0000774

5th August, 2016.

Our Ref: 018-06-16.

Ms. Helen Chipukuma,
University of Zambia,
School of Medicine,
Department of Public Health,
P.O Box 50110,
Lusaka.

Dear Ms. Chipukuma,

RE: RESUBMITTED RESEARCH PROPOSAL: **"EVALUATING COMMUNITY HEALTH PERFORMANCE IN THE PREVENTION AND CONTROL OF MALARIA IN LIVINGSTONE DISTRICT, ZAMBIA –A BOTTLENECK ANALYSIS" (REF. No. 018-06-16)**

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee on 29th July, 2016. The proposal is approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).
- **Ensure that a final copy of the results is submitted to this Committee.**

Yours sincerely,

Dr. S.H Nzala
VICE-CHAIRPERSON

Date of approval: 5th August, 2016. **Date of expiry**: 4th August, 2017.

Appendix 9: Livingstone District authorisation letter

All Communications to be addressed t *In reply please quote*

District Medical Officer and

Not individuals

Tel: 213 -322102

Tel/Fax: 213 – 324016

MINISTRY OF HEALTH
OFFICE OF THE DISTRICT MEDICAL OFFICER

LIVINGSTONE DISTRICT MEDICAL OFFICE

SOUTHERN PROVINCE

P.O. BOX 60796

LIVINGSTONE

22nd July 2016

Ms. Helen Chipukuma,
University of Zambia,
School of Medicine,
Department of Public Health,
P.O. Box 50110.
Lusaka,
Zambia.

Dear Ms. Chipukuma,

RE: LETTER OF AUTHORISATION TO CONDUCT RESEARCH IN HEALTH FACILITIES IN LIVINGTONE DISTRICT

This letter will serve as authorization for Ms. Helen Chipukuma to conduct the research project entitled, 'Evaluating Community Health Workers performance in the prevention and control of Malaria in Livingstone district, Zambia: A bottleneck analysis."

We are glad to offer you an opportunity to conduct the study within our organization. The protocol of the study has been reviewed and approved. Data collection through interviews, focus group discussions and surveys is approved.

If we have any concerns or require additional information we will contact the researcher or the University of Zambia Biomedical Research Ethics Committee.

Yours Sincerely,

Dr C.J Hara
District Medical Office