Determinants of Implementing a Community-Based Diagnosis and Monitoring System for Hypertension at Community Level in Malawi

Elvis Safary[1*], Micrina Mwandeti[2], Caroline Mtaita[1], Veronica Shiroya[1], Andreas Deckert[1], Volker Winkler[1] and Florian Neuhann[1,3]

1. *Institute of Global Health, Heidelberg University, Germany.*
2. *Lighthouse Trust, Lilongwe, Malawi.*
3. *School of Medicine and Clinical Sciences Levy Mwanawasa Medical University, Lusaka, Zambia.*

***Corresponding author:** Elvis Safary, Heidelberg Institute of Global Health, Germany, Bergheimer Str. 20, 69115, Heidelberg. **ORCID ID:** 0000-0002-2341-7760.
Email: elvis.safary@uni-heidelberg.de

Summary

INTRODUCTION

Hypertension control and management remains a major public health challenge in low-and-middle-income countries including Malawi. In addition, health facility-based diagnosis and monitoring of hypertension in Malawi is hampered by lack of access to care, shortage of health professionals, fragmented services and extra cost especially for the poor. The purpose of this study was to explore the determinants of implementing a community-based system for hypertension at community level.

MATERIALS AND METHOD

Semi-structured interviews were conducted among 28 purposively selected community volunteers across 35 community sites in Lilongwe, Malawi. The tool was used to collect information about determinants of implementing community-based diagnosis at individual, health system and patient level. Data was analysed using thematic approach through pre-identified evolving themes. Ethical approval was granted by both Malawi and Ethics committee of the Medical Faculty of Heidelberg University.

RESULTS

A total of 28 community volunteers participated in the study, of which 24 (85.7%) were females and 4 (14.7%) were males. The determinants that affect diagnosis and monitoring at community level were categorized into three socio-ecological units of analysis: individual level (limited training on hypertension and other non-communicable diseases, lack of incentives, poor collaboration and communication difficulties); health systems level (drug shortage, inadequate infrastructure and equipment, lack of well-functioning referral system, and limited number of community volunteers) and patient-related determinants (adherence to medication, lack of appreciation and use of alternative remedies for hypertension).

CONCLUSION

A socio-ecological perspective provided a useful framework to explore the interplay among multilevel and interactive factors that impact diagnosis and monitoring of hypertension at individual, health system and patient level.

Planners and resource allocators could consider these factors during planning, implementation, and evaluation of community programs. Additionally, a holistic public health approach which builds upon community volunteer's capacities and harnesses the community's needs is paramount to improve hypertension control and monitoring at community level.

Keywords: *Non-Communicable Diseases, Community Volunteers, Hypertension*

***[Afr. J.** Health Sci. 2021 34 (2): 179-193]*

Introduction

Low-and-middle-income (LMICs) countries face a large burden of cardiovascular diseases (CVD) and have fewer resources to address it (1). Apart from CVD, cancer, chronic respiratory diseases and diabetes are a major contributor (80%) of most NCDs (2). Additionally, they share harmful risk factors like tobacco use, physical inactivity, unhealthy diet, harmful use of alcohol and HIV (3). Hypertension is an important modifiable risk factor for CVD accounting for an estimated 9 million deaths annually (4, 5). Hypertension in Malawi is one of the commonest causes of outpatient morbidity nationally in addition to the already high HIV/AIDS burden (6). In 2009, Malawi Nation-wide survey estimated that 8.9% of the population had cardiovascular disease and 30% of adults had hypertension (3).

Hypertension diagnosis and monitoring requires frequent measurement and potential adjustment to treatment options as well as frequent health facility visits. These options are not practical and feasible particularly for the poor. Further, this would be costly and time consuming consequently causing more burden to the already overloaded health facility (7). With the rising burden of hypertension, several studies have shown that access to and availability of physicians can be difficult hence the merit of moving certain tasks to communities and families (8).

Utilization of available community volunteers may be a logical step for managing CVDs. Community volunteers have been effective in managing communicable diseases such as HIV/AIDS in LMICs (9). Primary and secondary prevention of hypertension often involves diagnosis, monitoring and provision of lifestyle counselling which can be instituted by community volunteers (10).

Due to the continued shortage of skilled human resource, health systems are turning to strengthen the community health workers programme such as Lady health worker programme in Pakistan and Health extension programmes for community volunteers in Ethiopia (11, 12). This interest has also been prompted by other factors such as increased simplification of diagnostic procedures such as screening of hypertension, growing HIV epidemic, the resurgence of other infectious diseases and failure of health system to provide adequate care for people with chronic diseases (13). Various countries have begun to again invest in Community Health Worker (CHW) programmes.

Research in NCDs has recently been conducted in Malawi with estimated prevalence ranging from 15.8% to 32.9% (14, 15). The population prevalence reported a crude prevalence of 14.7% in urban areas and 13.6% in rural areas with a weighted age-standardised national prevalence of 15.8% (15). Most cases of hypertension remain undiagnosed, untreated or inadequately controlled. Discrepancies exist in the distribution of prevalence between urban and rural settings (15). These discrepancies were explained by issues related to methodology, variation in the diagnostic criterion, use of different cut-off measures, study setting,

smaller sample size, and larger proportion of missing outcome data.

A systematic review of hypertension and diabetes burden, risk factors and interventions for prevention and control in Malawi indicated disparities in the understanding of hypertension and its treatment (16) and strong belief in other remedies to cure hypertension (16). The report further indicated social, economic, and cultural context that could influence patient's health behaviour and practices for chronic conditions. Such contextual factors where social, economic and cultural factors influence patients' adherence to medication and recommended behaviour modification (17), are areas where community volunteers play a vital role in patient education and health care delivery. Given the important role played by community volunteers in prevention, control and monitoring of hypertension (18, 19), contextual evidence is needed to inform health service delivery practices towards achieving population level impact. This study therefore explores the determinants of implementing a community-based system for hypertension at community level in Malawi.

Materials and Methods

Setting and Study Framework

This study was part of a larger project between Lighthouse Trust, Malawi, and University of Heidelberg Germany, which was supporting local efforts to integrate NCD services and provide capacity strengthening measures through continuous medical education to healthcare staff. The project also had an element of implementation research which established an on-going innovative blood pressure control and monitoring model through use of community volunteers to screen, monitor and document blood pressure (BP) readings.

Lighthouse Trust serves a large cohort of people living with HIV and provides comprehensive routine HIV treatment and care (20). Urban and peri-urban areas of greater Lilongwe in Malawi were chosen because they were part of Lighthouse Trust supported areas. Lighthouse Trust had a network of trained CHVs who lived and worked in these areas. CHVs were supported by Lighthouse Trust community nurses who oversaw their daily activities including administrative duties. CHVs were already active with Lighthouse Trust in HIV prevention programs creating an appropriate opportunity to introduce hypertension screening and monitoring at community level.

Study Design

A qualitative study based on phenomenological approach was carried out. The approach focused on how people experience a phenomenon (21). For our study, we explored the determinants in diagnosis and monitoring system for hypertension. We employed a qualitative study design utilizing semi-structured interviews to explore the determinants of implementing a community-based system for hypertension at community level in Malawi.

As part of the ongoing project, between May and July 2019, we conducted 28 semi-structured interviews among purposively sampled community volunteers directly involved in diagnosis and monitoring of persons suspected with hypertension at community level. This facilitated a clear understanding of the realities CHVs undergo while working in resource-limited settings at community level.

Study Participants and Sampling Strategy

Prior to initiation of the community service, key collaborators and project staff met to identify community needs, citing NCD prevention and treatment services. The project

collaborated with Community Based Organizations (CBOs) in Lilongwe to support the community-based model of care. The CBO sites address critical health system inputs and processes that have contributed to the implementation and expansion of community-based service delivery in Malawi. Greater Lilongwe has a high number of well-developed CBOs that enable CHVs to actively participate in community health outreach programs. For example, CHVs provide basic nursing, nutritional support, pain relief, and home visits which has contributed to a foundation of palliative care in Malawi (22). CHVs have already been active with Lighthouse Trust in the areas of HIV prevention programs and hence this created an appropriate opportunity for continuity of community service.

In our project framework, Lighthouse Trust (LT) supports two health centres and one community hospital (Area 18, Kawale, and Mitundu hospital) in capacity building, medical and technological support, human resource, and clinical services and its surrounding CBOs. Purposive sampling was used in selecting CHVs from the three study sites (Kawale, Mitundu, Area 18) supported by Lighthouse Trust. They worked in close collaboration with the Malawi Ministry of Health and the CBO sites.

CBOs have access to venues that served to support programs within the community which were utilised by the LT for implementation of our project. Each CBO dedicated a specific day only for hypertension care (i.e. BP screening, lifestyle counselling and advice). During the remainder of the week, the CHVs cared for personal business and other programs as well as sensitizing the community about the blood pressure (BP) screening activity at the CBO site.

Participant selection criteria included community volunteers who were actively providing health care at community level, those who understood English and willing to be interviewed.

Interviews

The interview took place in three different community areas (Area 18, Mitundu, and Kawale) in Central Lilongwe. As part of the bigger project, a total of 35 CHVs were recruited and trained. However, only 28 CHVs were present at the CBO site during interview for this study. Each interview lasted 30-40 minutes and were conducted in English and sometimes in Chichewa (local language) by the community nurse in case something was not clear.

Data Collection Tool and Data Collection

An assessment tool adopted from the standard operating procedures, project monitoring and evaluation framework and community document registers were used to develop interview guides. The tool was developed by the investigators and was scrutinized by experts (a panel of PhD students in public health and professors). In total, 28 community health volunteers who were present at the CBO site were interviewed during the three-month data collection period from May-July 2019. The guiding questions focused on experience about diagnosis and monitoring of hypertension at individual level, health system and patient level, and the challenges at each level.

Semi-structured in-depth interview (IDIs) (n=28) were conducted by the Principal Investigator with assistance from Lighthouse Trust community nurses to stimulate the discussion and rephrase the questions in the native language (Chichewa) where it was easily understood. All interviews were conducted at the CBO sites. Due to privacy and confidentiality of the activities conducted at the CBO, all interviews were conducted through note taking. All notes were reviewed after the interview for correctness and where

anything was not clear, it was clarified before leaving the CBO site. All interviews were note taken after obtaining both verbal and written permission from the participants.

Data Analysis

Data from field notes obtained from observation and unstructured interviews were analysed through thematic content analysis. We used word repetition technique during analysis. The investigator noted words and synonyms that were frequently used. The notes were transferred and entered into an EXCEL sheet. A deductive and inductive approach was used, the initial codes guided by the conceptual framework of the overall project (23).

Reading the transcripts was the first step of the analysis, which helped to identify the evolving themes. The codes were developed based on a priori coding (deductive) and additional themes added based on the materials collected (inductive). The final step of the analysis was connecting and inter-relating themes while constructing a narration. Data analysis was performed manually using a word document.

Ethical Considerations

This study respected the principles in the Declaration of Helsinki. All methods performed in this study were in accordance with the ethical standards of the institutions and/or national research committee. The study was granted ethical approval by the National health Science Research Committee, Malawi protocol number #19/03/2272 and the Ethics Committee of the Medical Faculty of Heidelberg University S-113/2019. Voluntary informed consent was obtained from the CHVs in order to participate in the study. The participants where told (orally) that the findings would be published in scientific journals and that the findings would be presented in the form of examples/quotes provided by the participants.

Results

Majority of the participants were female community volunteers and had Junior Certificate of Education (JCE) level of education as shown in Table 1. Secondary education in Malawi takes four years from Form 1 – 4. Students sit two exams after every two years, JCE at Form two and Malawi School Certificate Examination (MSCE) at Form 4.

The study findings are organised under the three themes of the Social Ecological model to understand the determinants faced by community volunteers in diagnosis and monitoring of hypertension at community level. Table 2 summarizes the study themes and codes.

Individual Factors

Limited training and continuous education

Lighthouse Trust conducted a one-day intensive training on blood pressure for community volunteers. One community volunteer was identified and trained from each of the community-based organization (CBO) study sites. Upon training, each community volunteer in their respective CBO sites was expected to transfer the knowledge learnt from the training to other volunteers who did not receive the training. However, several participants reported not having adequate training on hypertension despite the training.

"I received a one-day training…I do not remember everything. I thought we would get refresher training and continuous mentoring but we did not…giving advice and referring is not easy if you do not clearly understand the readings" #IDI | Female | 38 years

"I have forgotten everything we were taught on that day. I think it was too much given to us at one sitting. May be one week with continuous field mentoring would be helpful" #IDI | Female | 43 years

"The reality is that, the training was one day. I think it was too much for us. You measure BP and get values that you cannot properly interpret…since we cannot interpret well, it becomes difficult to refer the right clients to the health facility" #IDI | Male | 51 years

Poor Communication with Health Facilities

A considerable part of a good collaboration is good communication between community volunteers and health facilities. However, most respondents felt there was little communication and if it took place it was often performed poorly.

"I feel like we do not work together yet we are supposed to be a team. Sometimes patients visit the health facility and return back to the CBO and report being sent back without any proper explanation. Sometimes they return and inform use that the nurse said she was ok, no need for medication. This makes people to stop trusting the volunteers and even not go to the health facility. We need to have proper feedback to help us improve" #IDI | Female | 32 years

Lack of Financial Incentives

CHVs were motivated to undertake their roles in screening, monitoring and referring clients to the health facility. However, many cited lack of remuneration as a demotivating factor to their work in the community. They reported to be incurring additional costs as a result of implementing the intervention at community level.

"We love what we do in the community but at the same time it is also a lot of work to implement these activities, yet we do not receive any remuneration." #IDI | Female | 49 years

"I knew when I came here as a volunteer that there was not going to be much in terms of payment but I think when you see the scope of work that we do you will appreciate that we need to be financially compensated" #IDI | Male | 57 years

Health System Factors

Lack of well-functioning referral systems

There was no clear follow-up system for referring patients to the health facility and back to the CBO site. CHVs either physically followed patients to their homes or waited for the patients to return back to the CBO site to give feedback. When patients were followed up through home visits, CHVs relied on patient's recall of their clinic attendance and by inspecting the health passport to confirm that they actually visited the health facility following referral. This is an informal way of implementing follow-up services, hence there is need for a follow up protocol to be put in place.

"We refer patients to the health centre but sometimes they do not go or if they go, they complain that there were to many people at the facility so they left without seeing the doctor. As a CHV, when I refer clients, and they do not return to the CBO to inform me, it becomes hard to follow up and as we continue screening it means we will identify more clients and it will even be harder to follow up without a proper system" #IDI | Male | 46 years

Limited number of community volunteers

Participants indicated that the shortage of community volunteers in the community results in extra workload and was detrimental to effective health delivery in the community. Additionally, some community volunteers were used at the health facilities to assist in measuring blood pressure. This was because of

the limited number of trained health care personnel at the health facilities.

"We have many health programs in the community that we participate in but we are very few and we need more volunteers to assist. Because of the inadequate number of community volunteers, we find it difficult to conduct community sensitization and without this we feel like we are missing a lot of people" #IDI | Female | 59 years

This complaint (below) from community members about waiting time at the CBO site for ordinary monitoring of blood pressure is an example of a problem because of limited capacity.

"One major challenge I have experienced is that sometimes people come just to get their BP re-check but you will get we have a lot of other clients. I was the only one trained so others are not yet very confident to do the work. Many complain that they come early but leave so late yet they have other things to do. I think if we have more volunteers trained in BP measurement and interpretation it would solve this problem" #IDI | Female | 37 years

Shortage of Drugs

A health system challenge identified by many volunteers was the unavailability of essential antihypertensive drugs at lower service delivery facilities despite these drugs being free of charge at public health facilities. Community health volunteers reported that some patients only took one round of medications and did not refill their prescriptions due to shortage at the health facilities. Many reported that they were advised to purchase them individually at the private pharmacy outlets. However, patients reported inability to purchase the drugs due to lack of funds.

"We work had to refer clients to the health facility to get proper diagnosis and treatment but unfortunately many visit the facilities and get prescription but the health facility is out of stock. What is the point to diagnose and I cannot give medication? Patients are frustrated and because of this we get a lot of blame. Majority cannot purchase these drugs because they do not have the money" #IDI | Male | 34 years

Patient-Related Factors

Non-adherence to community volunteer recommendations

Patients with hypertension reportedly found it difficult to understand and accept their illness as a chronic disease requiring lifelong treatment causing them to poorly adhere to hypertension lifestyle counselling advice. Moreover, patients lamented that they did not have any symptoms yet they were diagnosed with hypertension and given antihypertensive drugs to take. Additionally, some patients reported to experience nausea as a side effect of medication. However, some patients are aware of the necessity of the continuous taking of medications but do not do so.

"You advice patients to avoid smoking and reduce alcohol intake and they ignore your advice. Many stop when they develop side effects. They asked, 'why should I continue taking the drugs if I feel okay? Sometimes the drug makes me want to vomit, so why should I continue taking them" #IDI | Male | 48 years

Other reasons given for non-adherence of medication included lifelong management of hypertension. For example, adherence was impeded as many patients did not realise the medications were meant to be continued even after blood pressure was lowered.

"One patient reported that he stopped taking his medication when he felt ok but when he came for a re-check, his systolic BP was as high as 200" #IDI | Female | 44 years

Financial constraint

One of the biggest determinants to effective hypertension control mentioned by most participants was financial constraint. With exception of a few, many volunteers cited poverty across all communities as a commonly reported barriers to accessing healthcare for hypertension. Many patients reported that they could not afford transport cost to the health facility. Additionally, patients were often required to pay out of pocket for medication at private pharmacies when there was shortage at the health facilities.

"Sometimes you refer patients to health facilities…but when you do a follow up, you realize that they did not go because they do not have fare to go. Some patients even ask to be escorted so that you can help pay for their transportation cost" #IDI | Male | 39 years

"Why would I go to the health facility just to be told to buy my own drugs? I would rather use that money to buy food for my family? …that was a response I was given while doing follow-up of a patients I referred to the health facility" #IDI | Female | 52 years

Use of alternative remedies for treatment of hypertension

There are many traditional or herbal medications in Malawi that are perceived to cure hypertension. While antihypertensive drugs are taken for life to manage the condition, traditional/herbal medicines purport to be curative. This perception often discourages people from accessing modern care and if they do, continuation of the treatment for a long duration is a challenge. Additionally, some cited use of traditional medicine to cure diseases as a cultural practice.

"The quality of drugs given to patients to take discourages them from adhering for a long-time. Additionally, these drugs are more expensive if purchased by patients. This makes it easy for patients to seek traditional remedies since they will be taken either once or for a shorter duration. Some mentioned that they had the traditional medicines given to them down generation and they have always worked" #IDI | Male | 54 years

The illustration below is a response that shows the popularity of traditional medicine, which are sometimes taken alongside with antihypertensives or may be used as a substitute for medication.

"Some patients tell you that they take antihypertensives in combination with local ones. Some of them told me that they stick to herbal medicine because when they checked and realised the BP was okay, they stopped the hospital one. So, they believe the herbal medicine works better than hospital medicines." #IDI | Female | 40 years

Discussion

This paper presents and discusses in-depth insights on community health volunteers working at community level in rural and semi-urban communities. The findings of this study indicate that community health volunteers are the first point of contact for community members at community level. They have previously been used in other programs such as HIV, maternal and child health in preventive and curative tasks.

CHVs discussed several determinants in community-based diagnosis and monitoring of hypertension. These determinants can be summarised into three broad themes: individual, health systems and patient-related factors.

Although our data shows that the Community-based hypertension initiative is acceptable to community volunteers and

patients (40) role of community health volunteers in diagnosis and monitoring of hypertension at community level in Malawi, the determinant identified by community volunteers are worth discussing.

Individual Factors

Majority of the CHVs were females and were unpaid, however, Lighthouse Trust motivated them through non-monetary means such as capacity building initiatives, exchange visits and T-shirts. Additionally, the volunteers were also formally and informally recognized for their contribution and responsibility to primary health through their position in the community, contact with health personnel and monthly provision of health education at a health facility.

CHVs in our study were lay individuals who volunteered, and had varied views and experiences, based in the communities they served, and majority had limited education, having received brief training on hypertension screening, monitoring and documentation. The nature and definition of community health volunteers varies widely in other studies, for example, CHVs may be referred to as local community members who have no formal education in health care (24), members of the communities where they work, are selected by the community, and answerable to the community for their activities (25), and are lay people trained to promote health among their peers in the community (26).

Willingness to become a community volunteer could be influenced by the hope of being compensated eventually especially in situations where there is high unemployment or fewer opportunities. A lack of financial or material compensation has been broadly reported in other studies as having an influence on the performance of community volunteers (27). The Government of Malawi in collaboration with donors could offer more incentives to draw more volunteers to cater for the shortage of health workers which could avoid health facilities being overstretched and facilitate better care for patients. Task shifting care for hypertension to lower level health providers such as community volunteers has been suggested to increase access to health services (10).

Implementation of the community programmes involves thorough training of CHVs to build their confidence and capacity for CVD prevention and control. Limited training and continuous education were mentioned as an impediment to provision of proper diagnosis and monitoring of hypertension by community volunteers. This was also similar in other studies in Africa (28-30). Low level of knowledge and lack of training among CHVs were reported to pose a challenge in their work in Kenya (31). The government could invest more in community volunteers and offer comprehensive training. A systematic review in China noted that high quality training and supervision of CHVs were key facilitators of their NCD prevention and control roles (32).

Health System Factors

Malawi's health system delivery is struggling with workforce challenges in all domains of health. Malawi currently has a one doctor to 33,000 patient's ratio. This falls below the one doctor to 1320 patients WHO recommendation. In addition, the distribution of more qualified professional workers is concentrated in a few major towns. The problem is more serious for NCD service provision which are generally not accessible, equitable nor responsive to the need of the vulnerable (14). Results from our study indicate that at community level, community volunteers also reported the critical shortage of volunteers. In the midst of these challenges, lie opportunities to improve NCD prevention strategies, treatment and control in Malawi.

For example, the deployment of technology, effective exploitation of Community-based health systems and task sharing provide important frameworks to improve NCD care.

Shortage of drugs came out prominently in the study and the potential ways in which it affected the work of CHVs was featured. Other studies have also reported how shortage of drugs influence hypertension control (33). However, a leaf can be borrowed from South Africa where evidence indicate improved access to chronic disease medication resulting from drug forecasting and the supply chain at the lower levels (34).

Our study reported lack of clear formal referral and follow-up procedures in place to keep track of patients who have been referred to the health facility and back to the community. Improved strategies for referral and follow-up could assist in improving the outcome of patients on treatment. According to other studies, one of the major roles of CHVs is referral of patients to health facilities which is coupled with challenges such as poor feedback from the patients (35). In our study, CHVs referred clients identified with elevated blood pressure to either the community nurse or nearest health facility. In other studies, hypertension has been described as a symptomless but dangerous disease (36) and in such communities where health-seeking behaviour is poor and people only visit health facilities when they have serious symptoms, it has been suggested that CHVs can be trained on how to administer medication which can play a critical role in identifying problems early enough for timely intervention (36).

Patient-Related Factors

Evidence shows that poor communities are more affected by NCDs, which further ensconce poverty due to high cost of health care for NCD (37, 38). Our study findings indicate that community members face financial constrains such as lack of transport cost and lack of money to purchase medication in addition to the already lack of basic needs. This massive financial burden on patients obstructs early detection and treatment of hypertension. Patients incur additional financial and opportunity costs to access limited hypertension services and antihypertensive drugs due to the widely dispersed nature of their settlements. This further steps on an already vulnerable group into poverty and contributing to the poor control of hypertension.

Cultural practices and cost issues prompted patients to seek alternative remedies such as traditional herbal medicine hence hindering hypertension control and monitoring. Cultural practices such as preference for herbal treatment were reported in other studies (39). Community volunteers in collaboration with professional workers need to improve health education on hypertension to deliver accurate hypertension information on importance of medical interventions.

The study shows the complexity of the work done by community volunteers and the different determinants in diagnosis and monitoring of hypertension at community level. It is evident that CHVs have a potential to supplement the formal health system in the struggle to achieve sustainable development goals in Malawi and other low-and-middle-income countries.

In summary, as a priority, it is important to clearly identify and discuss determinants that community health volunteers are facing in implementing the community-based hypertension program. CHVs can make good contributions to the improvement of hypertension diagnosis, identifying cardiovascular risk, and referring patients to health facilities. However, it is essential to recognise their limitations. They are not trained health workers and so cannot be expected to be as competent as professional health workers. On the other hand, their proximity to the community setting coupled

with their ability to act as a bridge to existing primary health systems does offer potential to support the health system.

Limitations

This was a qualitative study, and we acknowledge that our findings may not be generalisable to the wider Malawian population. However, we believe that our observations can further inform the development of such interventions aimed at integrating NCDs into primary health care without the support of major programmes such as HIV or TB programmes.

The work of CHVs in this study focused on people with suspected high blood pressure, thus possibly excluding patients with conditions which could have potentially benefitted from CHV services. Additionally, although the study involved three study sites, there was a relatively small sample size of CHVs specifically female CHVs. This is because of the acute shortage of community volunteer's especial males. However, we do not anticipate that the sex of the respondent had a large influence because both male and female volunteers had similar views. Despite these limitations, this study is an important step in initiating the discussion on the redesigning of research to be better aligned with the communities in which the research is conducted.

Conclusion

Taken together, this paper reveals the three layers of determinants as individual factors, health system and patient-related factors, associated with hypertension diagnosis and monitoring at community level in Malawi within the unique context of a lower social economic community. These is key contextual evidence needed to enhance the successful implementation of the national NCD Policy at community level in Malawi. We find sufficient evidence at different levels that the Government of Malawi can improve to support CHVs in delivery of preventive, promotive and curative services to the community they belong. These include recruitment and provision of comprehensive training for CHVs, financial incentives for CHVs, improving health systems functions as well as drug supply in public health facilities and dissemination of health messages to the community. It is evident that CHVs have the capacity to supplement the formal health system to cater for the limited shortage of professional health care workers. However, there is need for more studies that examine determinants of other NCDs and CHVs capacity to support decision making.

Acknowledgement

The author gratefully acknowledges the support of Lighthouse Trust, Malawi, Health facility staff and the participation of Community Health Volunteers for their time and valuable contribution during this study.

References

1. **Roth GA, Johnson C, Abajobir A, Abd-Allah F, Abera SF, Abyu G, *et al.*** Global, regional, and national burden of cardiovascular diseases for 10 causes, 1990 to 2015. *J Journal of the American College of Cardiology*. 2017;70(1):1-25.
2. **Chan KY, Davies Adeloye LG, Kolčić I, Marušić A.** How big is the 'next big thing'? Estimating the burden of non–communicable diseases in low–and middle–income countries. *J Journal of Global Health*. 2012;2(2).
3. **Althoff KN, Gebo KA, Moore RD, Boyd CM, Justice AC, Wong C, *et al.*** Contributions of traditional and HIV-related risk factors on non-AIDS-defining cancer, myocardial infarction, and end-stage liver and renal diseases in adults with HIV in the USA and Canada: a collaboration of cohort studies. *J The lancet HIV*. 2019;6(2):e93-e104.
4. **Addo J, Smeeth L, Leon DA**. Hypertension in sub-saharan Africa: a

systematic review. *J Hypertension.* 2007;50(6):1012-8.
5. **Tunstall-Pedoe H. Preventing Chronic Diseases**. A Vital Investment: WHO Global Report. Geneva: World Health Organization, 2005. pp 200. CHF 30.00. ISBN 92 4 1563001. Also published on http://www. who. int/chp/chronic_disease_report/en. *Oxford University Press;* 2006.
6. **Li P-J, Jin T, Luo D-H, Shen T, Mai D-M, Hu W-H, *et al*.** Effect of prolonged radiotherapy treatment time on survival outcomes after intensity-modulated radiation therapy in nasopharyngeal carcinom*a. J PloS one*. 2015;10(10):e0141332.
7. **Devereux S.** State of disaster: causes, consequences & policy lessons from Malawi. 2002.
8. **Sibbald B, Shen J, McBride A**. Changing the skill-mix of the health care workforce. *J Journal of health services research policy.* 2004;9(1_suppl):28-38.
9. **Callaghan M, Ford N, Schneider H.** A systematic review of task-shifting for HIV treatment and care in Africa. *J Human resources for health.* 2010;8(1):8.
10. **Ogedegbe G, Plange-Rhule J, Gyamfi J, Chaplin W, Ntim M, Apusiga K, *et al*.** A cluster-randomized trial of task shifting and blood pressure control in Ghana: study protocol. *J Implementation Science*. 2014;9(1):1-10.
11. **Bhutta ZA, Lassi ZS, Pariyo G, Huicho L.** Global experience of community health workers for delivery of health related millennium development goals: a systematic review, country case studies, and recommendations for integration into national health systems. *J Global health workforce Alliance*. 2010;1(249):61.
12. **Perry H, Zulliger R.** How effective are community health workers. 2012.
13. **Hadley M, Maher D.** Community involvement in tuberculosis control: lessons from other health care programmes. *J The International Journal of Tuberculosis Lung Disease.* 2000;4(5):401-8.
14. **Msyamboza KP, Ngwira B, Dzowela T, Mvula C, Kathyola D, Harries AD, *et al*.** The burden of selected chronic non-communicable diseases and their risk factors in Malawi: nationwide STEPS survey. *J PLoS One*. 2011;6(5).
15. **Price AJ, Crampin AC, Amberbir A, Kayuni-Chihana N, Musicha C, Tafatatha T, *et al***. Prevalence of obesity, hypertension, and diabetes, and cascade of care in sub-Saharan Africa: a cross-sectional, population-based study in rural and urban Malawi. *J The lancet Diabetes endocrinology.* 2018;6(3):208-22.
16. **Amberbir A, Lin SH, Berman J, Muula A, Jacoby D, Wroe E, *et al*.** Systematic Review of Hypertension and Diabetes Burden, Risk Factors, and Interventions for Prevention and Control in Malawi: The NCD BRITE Consortium. *J Global heart.* 2019;14(2):109-18.
17. **Nyaaba GN, Agyemang C, Masana L, Aikins Ad-G, Beune E, Larrea-Killinger C, *et al*.** Illness representations and coping practices for self-managing hypertension among sub-Saharan Africans: A comparative study among Ghanaian migrants and non-migrant Ghanaians. *J Patient education counseling.* 2019;102(9):1711-21.
18. 18. **Agyemang C, Attah-Adjepong G, Owusu-Dabo E, Aikins ADG, Addo J, Edusei A, *et al***. Stroke in Ashanti region of Ghana. *J Ghana medical journal*. 2012;46(2):12-7.
19. 19. **Agyemang C, Kieft S, Snijder MB, Beune EJ, van den Born B-J, Brewster LM, *et al*.** Hypertension control in a large multi-ethnic cohort in Amsterdam, The Netherlands: the HELIUS study. *J International Journal of Cardiology*. 2015;183:180-9.
20. **Phiri S, Neuhann F, Glaser N, Gass T, Chaweza T, Tweya H.** The path from a

volunteer initiative to an established institution: evaluating 15 years of the development and contribution of the Lighthouse trust to the Malawian HIV response. *J BMC health services research.* 2017;17(1):1-11.

21. **Van MM. Van Manen, Max**, Researching Lived Experience: Human Science for an Action Sensitive Pedagogy. Albany: State University of New York Press, 1990. with new Preface, London, Ontario: *The Althouse Press*, 1997. 1990.
22. **Phiri S, Weigel R, Housseinipour M, Boxshall M, Neuhann F.** The lighthouse: a centre for comprehensive HIV/AIDS treatment and care in Malawi: case study. The Lighthouse: a centre for comprehensive HIV/AIDS treatment and care in Malawi: case study2004. p. 17-.
23. **ZaMaC**. Implementation of evidence-based NCD care in Zambia and Malawi: Project document. 2017.
24. **Vouking MZ, Tamo VC, Mbuagbaw L.** The impact of community health workers (CHWs) on Buruli ulcer in sub-Saharan Africa: a systematic review. *Pan African Medical Journal.* 2013;15(1).
25. **Kane SS, Gerretsen B, Scherpbier R, Dal Poz M, Dieleman M.** A realist synthesis of randomised control trials involving use of community health workers for delivering child health interventions in low and middle income countries. J BMC health services research. 2010;10(1):1-7.
26. 26. **De Vries DH, Pool R.** The influence of community health resources on effectiveness and sustainability of community and lay health worker programs in lower-income countries: a systematic review. *J PLoS One.* 2017;12(1):e0170217.
27. **Maes K, Kalofonos I.** Becoming and remaining community health workers: perspectives from Ethiopia and Mozambique. *J Social Science Medicine.* 2013;87:52-9.
28. **Aikins Ad-G, Unwin N, Agyemang C, Allotey P, Campbell C, Arhinful D.** Tackling Africa's chronic disease burden: from the local to the global. *J Globalization health.* 2010;6(1):1-7.
29. **Nyaaba G, Masana L, Aikins Ad-G, Beune E, Agyemang C.** Factors hindering hypertension control: perspectives of front-line health professionals in rural Ghana. *J Public health nutrition.* 2020;181:16-23.
30. **Agyemang C, Nyaaba G, Beune E, Meeks K, Owusu-Dabo E, Addo J, *et al*.** Variations in hypertension awareness, treatment, and control among Ghanaian migrants living in Amsterdam, Berlin, London, and nonmigrant Ghanaians living in rural and urban Ghana–the RODAM study. *J Journal of hypertension.* 2018;36(1):169-77.
31. **Takasugi T, Lee A.** Why do community health workers volunteer? A qualitative study in Kenya. *J Public health nutrition.* 2012;126(10):839-45.
32. **Long H, Huang W, Zheng P, Li J, Tao S, Tang S, *et al*.** Barriers and facilitators of engaging community health Workers in non-Communicable Disease (NCD) prevention and control in China: a systematic review (2006–2016). *J International journal of environmental research public health.* 2018;15(11):2378.
33. **Sarfo FS, Mobula LM, Burnham G, Ansong D, Plange-Rhule J, Sarfo-Kantanka O, *et al*.** Factors associated with uncontrolled blood pressure among Ghanaians: evidence from a multicenter hospital-based study. *J PLoS One*. 2018;13(3):e0193494.
34. **Meyer JC, Schellack N, Stokes J, Lancaster R, Zeeman H, Defty D, *et al*.** Ongoing initiatives to improve the quality and efficiency of medicine use within the public healthcare system in South Africa; a preliminary study. *J Frontiers in pharmacology.* 2017;8:751.

35. **Singh P, Sachs JD.** 1 million community health workers in sub-Saharan Africa by 2015. *J The Lancet*. 2013;382(9889):363-5.
36. **Page IH.** Hypertension: a symptomless but dangerous disease. *Mass Medical Soc;* 1972.
37. **Bosu WK.** An overview of the nutrition transition in West Africa: implications for non-communicable diseases. *J Proceedings of the nutrition society.* 2015;74(4):466-77.
38. **Yeates K, Lohfeld L, Sleeth J, Morales F, Rajkotia Y, Ogedegbe O.** A global perspective on cardiovascular disease in vulnerable populations. *J Canadian Journal of Cardiology.* 2015;31(9):1081-93.
39. **Razee H, Whittaker M, Jayasuriya R, Yap L, Brentnall L**. Listening to the rural health workers in Papua New Guinea–the social factors that influence their motivation to work. *J Social science medicine*. 2012;75(5):828-35.
40. **Safary E, Mwandeti M, Matanje B, Beiersmann C, Mtaita C, Shiroya V. *et al*.** Role of community volunteers in identifying people with elevated blood pressure for diagnosis and monitoring of hypertension in Malawi: A qualitative study. (Unpublished)**.**

Appendix

Table 1: Characteristics of Study Participants

Characteristic	**Number (percentage)**
Gender	
Male	4 (14.29%)
Female	24 (85.71%)
Age group	
30 – 35	5 (17.86%)
36 – 41	10 (35.71%)
42 – 47	9 (32.14%)
48+	4 (14.29%)
Level of education	
Primary education (8 years)	7 (25.00%)
Junior certificate level (2 years)	17 (60.71%)
Malawi secondary certificate level (2 years)	4 (14.29%)
CBO site	
Mitundu	7 (25.00%)
Kawale	12 (42.86%)
Area 18	9 (32.14%)
Years of experience as a CHV	
1 – 2 years	9 (32.14%)
3 – 4 years	13 (46.43%)
5+ years	6 (21.43%)

Table 2: Themes and Summary Code of The Study

Themes	Summary Codes
Individual factors	• Limited training and continuous education • Lack of financial incentives • Poor communication with health facilities
Health system factors	• Lack of well-functioning referral system • Limited number of volunteers • Shortage of drugs
Patient-related factors	• Non-adherence to medication • Financial constraint • Use of alternative remedies for treatment of hypertension