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Applying the Consolidated Framework for Implementation Research to understand the stakeholder's perspective on the determinants of CHW-delivered home management of hypertension intervention in Zimbabwe

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ABSTRACT

Objective: Implementing evidence-based innovations often fails to translate into meaningful outcomes in practice due to dynamic real-world contextual factors. Identifying these influencing factors is pivotal to implementation success. We aimed to determine the barriers and facilitators of implementing Community Health Worker (CHW)-delivered home management of hypertension intervention from a stakeholder's perspective using the Consolidated Framework for Implementation Research (CFIR).

Design, setting, and participants: We conducted pre-implementation baseline interviews using qualitative methods. In-depth interviews were used to collect data from City health administrators and nurses at the public health clinics, and semi-structured interviews were conducted for CHWs in an urban setting. Data analysis was based on audio-recorded scripts and field notes, and NVivo software was used in data coding. The transformation technique involved developing codes based on the research question and then transforming the codes to reflect the CFIR framework's components.

Results: Perceived barriers were staff shortage, patient privacy and confidentiality, access to antihypertensive medication, shortage of equipment, as well as patient knowledge and beliefs about hypertension. The proposed innovation was superior to the current practice, easy to implement, and adaptable in the local context. Perceived facilitating factors were commitment from health system leadership, CHW training and support, regular engagement, CHW incentives, community partnerships, and CHW self-efficacy and knowledge and skills.

Conclusion: The CFIR Framework can be instrumental in organizing implementation evidence for planning the implementation of community-based interventions and integrating CHWs into chronic disease management into health service delivery can potentially improve health service access, particularly in low-resource settings.

Keywords: Hypertension, Community Health Worker, CFIR, Intervention

Word count: 7,030

Strengths and Limitations of this Study

- Data were collected from a diverse group of stakeholders with a major influence on the implementation process. This resulted in rich nuanced findings on barriers and facilitators of implementing CHW-delivered home management of hypertension intervention. Two experienced interviewers and two note-takers were responsible for collecting the data to ensure consistency of the data collected.
- We customized the CFIR Framework to guide data collection and analysis. This helped in structuring the study with a validated framework of implementation science.
- The study demonstrates the high acceptability and feasibility of CHW-delivered home management of hypertension among hypertension patients highlighting the barriers and facilitators to guide implementers of similar programs. A CHW-led blood pressure

management program can help expand patient coverage, offer more accessible and individualized care, and reduce barriers in limited-resourced contexts.

- Although we had male participants in the CHW category, all nurses and health authorities interviewed were female, and this may have introduced gender bias to the responses obtained.
- Excluding private health facilities, and professionals from the private sector may have introduced selection bias that resulted in a lack of different perspectives considering the differences in job satisfaction, remuneration, resources, and medication availability between public and private health sectors.

INTRODUCTION

The General Assembly of the United Nations adopted a declaration to prevent and control non-communicable diseases (NCDs), such as hypertension, with a particular emphasis on developing national capacities in low and middle-income countries (LMICs).[1] This was proposed because of poor screening, control, and management in LMICs during the last three decades, as the prevalence of hypertension in LMICs soared exponentially from 55 million in 1990 to 130 million in 2010. The number of people living with hypertension is predicted to increase to 217 million by 2030.[2–4] An analysis of 1.1 million adults from LMICs showed that about 26% had never had their blood pressure (BP) measured, 39% had hypertension, 30% were on treatment; however only 10% had controlled BP.[5] Among the four LMIC regions included in the analysis, Sub-Saharan Africa showed the worst performance, with less than 5% of hypertension patients achieving BP control in 10 of 16 countries.[5]

Most people living in LMICs have poor awareness of hypertension, and there is a need to expand the implementation of BP management programs in these regions. Although hypertension control programs are highly cost-effective and easy to implement, there are substantial gaps in evidence on the fundamental program components for successful implementation.[6] Implementing evidence-based innovations often fails to translate into meaningful outcomes in practice due to dynamic real-world contextual factors such as resource constraints, competing demands, and lack of support from stakeholders.[7] Because they influence the outcomes of implementation efforts, these contextual factors must be well aligned with the innovation to ensure a synergistic interaction between the context and the innovation. Determinant frameworks such as the

Consolidated Framework for Implementation Research (CFIR) can be used to predict the challenges and enablers of practical implementation.[8] The CFIR helps to identify implementation barriers and facilitators, produce actionable findings, and address the practical needs of the intervention implementers.[9] CFIR comprises five domains to inform implementers about the contextual factors: intervention characteristics, outer setting, inner setting, individual characteristics, and intervention process. The observed contextual challenges and enablers can be used for hypothesis generation to inform implementation strategies prospectively.[10]

One strategy that could reduce modifiable barriers to BP management and control in resource-limited settings is task shifting.[11] This involves using trained nonprofessional cadres such as Community Health Workers (CHWs) to ensure access to essential health services in underserved communities.[12] By delegating essential yet simple activities to trained CHWs, the overstretched professional health workers can concentrate on more complex tasks. Thus, CHWs can reduce the burden of NCDs, such as hypertension, within communities while enhancing the quality of service delivery at healthcare facilities.[13,14] Randomized controlled trials (RCTs) have shown the effectiveness of home-based management of hypertension.[15–18] However, in RCTs, the interventions are tested under strictly controlled contexts that are different from the dynamic real-life settings. Thus, further studies are needed to determine the feasibility of CHW-delivered home management of hypertension in a real-world setting. Reports predict that scaling up primary health care (PHC) interventions can save an estimated 60 million lives and increase life expectancy by 3.7 years by 2030 in LMICs.[19]

The most common barriers noted in the integration of CHWs in NCD care were lack of support and resources, while the facilitators were integrated health system, trust, quality of training, and CHW capacitation.[20] The CFIR is a well-operationalized pragmatic framework that guides the basis of the identification of significant barriers and facilitators to effective intervention implementation[21] before matching the strategies to overcome the barriers to the integration of CHWs into hypertension patient care. This study aimed to identify the barriers and facilitators of implementing CHW-delivered home management of hypertension intervention from a stakeholder's perspective.

METHODS

Study design and setting

We conducted a prospective formative study using a qualitative design to ascertain the barriers and facilitators to implementing the CHW-delivered HoMHyper intervention. Face-to-face

interviews were conducted among stakeholders (clinicians, health authorities, and CHWs). A multiple-stakeholder approach that covers relevant aspects relative to the implementers' perspective on the successful implementation of the intervention was employed. The CFIR was used to guide the development of interview questions, organize the coding process, and summarize the findings.[22] The HoMHyper intervention is a multicentric project covering five urban primary healthcare centers/clinics (PHCs) in Mutare, Zimbabwe's third most populous city, located on the country's eastern border with Mozambique. There were eight public primary care clinics and an estimated 22 private medical facilities focused on outpatient health services for most of the city residents. Three clinics (Chikanga, Dangamvura, and Hobhouse) were primarily high-density residential suburbs, while Florida and City clinics mainly covered low- and middle-density suburbs. Data were collected between June and July 2023.

Proposed Intervention

The Home Management of Hypertension (HoMHyper) program is a CHW-delivered home management of hypertension in a low-resource urban setting in Zimbabwe. This will be a phased project that involves exploring intervention components, implementing well-planned intervention activities, and evaluating the program activities. This study was part of the preliminary exploration phase conducted before program implementation. The proposed intervention involves the selection of CHWs with assistance from stakeholders such as clinic nurses, community health nurses, and community leaders. Enrolled CHWs will be trained in patient care, correct BP measurement, psychosocial support, health education for hypertension patients, and ethical issues in public health programs. Each CHW would then be tasked to provide services to at most eight clients through fortnightly focused home visits guided by a HoMHyper Curriculum. In addition, the CHWs will communicate outside the bimonthly home visits via phone. Standard Operating Procedure Manuals, checklists, and registers will be used to guide and record the program activities, and the CHWs will submit the statistical records and provide feedback to the local clinic once a month.

Study participants

This article reports the qualitative findings from in-depth interviews among 10 primary health care nurses, three health authorities, and semi-structured interviews among 25 CHWs. All participants were purposively selected, and clinic nurses were selected based on their involvement in chronic disease management. Five of the 10 nurses were nurse managers selected by the health team at the health facility. Health authorities were individuals with administrative roles based at the city

health department offices, and these were selected according to how active they were in community-based programs. CHWs were individuals who had actively participated in community mobilization and community health programs over the last 12 months and resided within the clinic's catchment area. The nurse manager provided the names of potential CHW interviewees. Participants were called to ascertain their interest in participating in the interviews and upon agreeing to participate, the interview appointment date and time were reached by consensus.

Procedures

A team of four researchers comprising two public health officers (PTM and TH) and social scientists (CM and PZ) converged to select the likely CFIR constructs to influence intervention implementation. Interview questions addressed four of the CFIR domains relevant to the proposed work. The in-depth and semi-structured interview guides were pilot tested using two non-participating nurses and three CHWs, respectively.

A two-day training on qualitative data collection was conducted in May 2023. The interviews were conducted by LM (public health nurse) and PTM (doctoral epidemiology student) was a trained professional nurse in qualitative research work. The two note-takers had undergraduate degrees in social work and were also trained to transcribe interview questions, thus reducing interviewer bias. In-depth interviews were conducted in a private room at the health facilities (for nurses and CHWs) and health department offices (for health administrators). Guided by the Institutional Review Board protocol, written informed consent was obtained from all participants.

Before administering the interview guide, the interviewer described the proposed HoMHyper intervention to the participant. On average, each in-depth interview lasted about 50 minutes, and semi-structured interviews were 35 minutes long. Audio-recorded interviews with CHWs were conducted in Shona and translated to English during transcription, and those with health administrators were conducted in English. Field notes were taken during the interview session. The qualitative interviews were recorded using the Sony ICD-PX370 mono digital voice recorder and transcribed verbatim to Word document transcripts that were then imported into the NVivo 14 software.[23]

Data analysis

The analysis was based on transcribed files and field notes. A code frame was developed using contextually relevant CFIR codebook and memo template constructs. Data coding was done by PTM, PMM, and PZ, who have backgrounds in chronic disease epidemiology (PTM) and

qualitative data analysis in social sciences (PMM and PZ). The three coders reviewed the CFIR definitions before coding to standardize the process. The three investigators independently conducted the initial open coding process using the NVivo 14 software while considering the conceptual model. To incorporate the CFIR Framework into data analysis, we used the transformation technique, which involved developing codes based on the research question and then transforming the codes to reflect the components related to the CFIR framework using the data management software. The findings of the individual coding process were discussed by comparing and reconciling the identified codes, developing a theme, and assigning lucid quotes to each theme. In addition, the analysis team was collectively mindful of how reflexive they could be and avoided letting their personal experience and participation in the project influence the findings.[25] Although participants' quotes were used in reporting, we anonymized the participants to preserve confidentiality due to the small size of professional health workers who participated in the study.

Open codes were aggregated according to the CFIR domains, and each construct was rated as an implementation barrier or facilitator. The ratings were adopted from recommendations by Gimbel et al.[26], who classify scores as +2 (strong positive influence on implementation), +1 (weak positive influence on implementation, -1 (weak positive influence on implementation, and -2 (strongly hindering implementation). PTM, PMM, TH, and PZ individually reviewed the codebook and gave a valence score for each CFIR construct. The total valence score for each construct was the average individual score. We used the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines to report the study findings.

RESULTS

None of the invited participants refused to participate. Semi-structured interviews were conducted among 25 CHWs (five per clinic). The mean age and mean years of experience of the CHWs were 39.0±9.6 and 9.2±7.0 years, respectively. Sixty-four percent (64%) were females, 92% had a secondary education, and 88% were Christians. About 32% had a chronic condition; they all possessed a mobile phone and were willing to dedicate an average of 20 hours per week to program tasks. All the clinicians and health administrators were female. Participant quotes are italicized and minimally edited to improve conciseness and clarity. Table 1 displays the CFIR constructs and their perceived impacts on the program.

Table 1. CFIR constructs and their perceived impacts on the HoMHyper intervention

	Perceived Barriers (n=4)	Perceived facilitators (n=11)
Intervention characteristics		-better than current practice -easy to implement -adaptable to the local setting
Inner setting	-staff shortages	-organizational commitment -CHW training and support -CHW incentives
Outer setting	-patient privacy and confidentiality -access to medication, stockouts, and shortage of equipment	-community partnerships and connections
Individual characteristics	-patient knowledge and beliefs about hypertension	-CHW self-efficacy -CHW knowledge and skills
Process		- structured planning of activities -engagement and communication

We selected these CFIR domains based on the identified perceived barriers and facilitators to implementing the HoMHyper intervention and reported domain-specific themes.

DOMAIN 1. INTERVENTION CHARACTERISTICS

Theme 1. Relative advantage: "Great initiative better than current practice."

The participants perceived the proposed program as an essential strategy to improve coverage, considering that currently, hypertension patients were receiving suboptimal services, and the chronic disease surveillance system was virtually nonexistent. This was an opportunity to follow up and recover many participants who were no longer seeking services from the facilities. As some participants related:

"*All we can do for those* (patients) *who are unable to come to our clinics is simply to ask them to send a relative with their health cards to the clinic to get a resupply (medication), but we are not able to see the patient, we are not able to monitor them, and we are not sure whether this medication is working or not. This is a major* (service) *gap*."

"*It's a great initiative indeed! We need to support these patients. Some are bedridden due to stroke from uncontrolled BP, and it will be good for them to have CHWs monitoring them and alert us. It's costly to hire a vehicle to come to the clinic with a bedridden patient just for a BP check*."

"*We have many people with missing checkup visits and defaulters in the register. There is nothing we can do about it. The urban population only has one HPO* (Health Promotion Officer)*, and she needs help coordinating all the community health programs. This will be an excellent complementary program*."

Although some of the reasons why the hypertension patients had absconded were obvious, such reasons were mostly generalized assumptions, and the proposed intervention was an opportunity to offer individualized care and understand their unique explanations. In their perceptions, the HoMHyper intervention was superior to the current practice in hypertension management. One CHW shared:

"*I think the proposed approach will be very beneficial to the management of hypertension. The queues at the clinic are usually long, and they don't have the medication. The most common thing is that hypertension patients solicit health services when they are doomed and very sick.* (By that time) *the blood pressure is very high, and outcomes are often poor*. *Home BP measurements will help*."

Theme 2. Complexity: "The CHWs are not being asked to do medical surgery."

The intervention was perceived as simple, feasible, and achievable. Most CHWs felt they were already involved with almost similar tasks in their current scope of work. Despite the lack of information about hypertension care in the community, the functions and limits of the CHW operations are clearly outlined in the CHW guidelines developed by the Ministry of Health and Child Care. There were long-standing relationships and communication between the CHWs and the community, as well as between the CHWs and the nurses at the clinic, as relayed by the study participants:

"We already have CHWs relaying communicable disease information guided by the Village Health Worker Strategic Document. The use of community health workers will be beneficial to the community and the hypertensive patients because they are already doing it."

"We (CHWs) *used to do home follow-ups and counseling of stroke patients in the home-based care program and helped relieve the primary caregivers sometimes. We had to report to the clinic with information on the status of every patient under our care."*

"With a few training sessions. I am confident CHWs can accurately measure patient BP; it's not like this is medical surgery."

Theme 3. Adaptability: The existence of a model program for reference

This intervention was perceived to be feasible and a good fit for both the patients and the health system because a similar preexisting intervention had already proved successful in managing other conditions in this setting. An established model for CHW-delivered care for the HIV and Antiretroviral therapy (ART) program in which CHWs visit, organize community support groups, and counsel patients on nutrition and the importance of adherence to ART. Stable patients form Community ART Refill Groups (CARGs) to reduce the burden of frequent facility visits. This model could be adapted and modified to fit the needs of hypertension patients. In addition, CHWs in rural areas were responsible for malaria testing and dispensing antimalarial medication for uncomplicated malaria. By drawing existing evidence from the ART and Malaria programs, planners can use this information as a template for implementer training, fidelity support, and documentation and tailor it to meet the needs of the hypertension patients, as cited by some of the participants:

"It's being practiced for ART CARGs to cut on travel costs and time spent at the clinic, and this can also apply to hypertension patients."

“Well, this could be similar to the ART program. We do home visits except for hypertension; the medications are not free like anti-tuberculosis drugs and ART, where the medication is free and readily available."

"CHWs are already testing and treating malaria in rural areas, so including hypertension will be very helpful."

DOMAIN 2. INNER SETTING

Theme 1. Structural characteristics: Chronic shortage of staff was impeding hypertension care provision.

The selected participating sites were experiencing chronic staffing shortages. Despite the consensus that the Community Nurse and the Health Promotions Officer were integral to the project implementation, the study participants felt that these professionals may need help to participate in the project, given other competing responsibilities. Thus, a roving project coordinator was required to work closely with the two community health professionals.

“The working conditions are stressful due to a shortage of clinicians; this initiative will reduce the workload at the clinic and the waiting period of patients visiting the facility.

"The Community Nurses may help with monitoring the CHWs. However, they are just a few, and their schedules are swamped. I recommend you have your own coordinator to work with the Community Nurses."

Due to understaffing and high disease burden, health providers limited their consultation time to the minimum to serve as many patients as possible. As two nurses reflected on their daily frustration of a disproportionate work burden to health provider problems:

"Newly diagnosed patients are mostly given medication, but little or no education is unveiled. You cannot blame the overwhelmed nurse; she can only attend to as many patients within the time she has."

"It's a timely and appropriate program because, honestly, the staff shortage is extreme. We can't afford to see people in the community as registered nurses. It's near impossible because most nurses have gone kuchando (greener pastures, mostly Western countries)*."*

"The nurses are very busy because of the shortage of clinicians, so even when they are giving service, they are not giving enough time to each client because they (nurses) are in a hurry to attend to all patients, so they may not give the patient adequate health education."

Theme 2. Organizational commitment: "We will support the program."

The interviewed health authorities welcomed the program and perceived the program as acceptable and feasible. They were committed to assisting as necessary and helping unveil available human and material resources. The study participants acknowledged that the program would relieve the staff shortages at the public health clinics involved. In addition, they also alluded to the erratic antihypertensive medication supply from the central national pharmacy and recommended the inclusion of a medication component to the intervention.

"It's an excellent program as it improves access to services and medication adherence and increases awareness of the condition in the community. We assure you of our support to the best extent possible."

"This method is timely because most patients don't want to visit the clinic for monthly checkups when stable."

"It's a brilliant idea!"

Theme 3. CHW training and support: Increase CHW knowledge of hypertension

One of the fundamental enablers of implementing the intervention is clarity of the expected goals and expectations by all the stakeholders involved. The study participants consistently raised the need for rigorous training for the CHWs. CHWs should be trained in hypertension management, including BP measurement, lifestyle modification, patient counseling, medication adherence, and patient referral systems. The training will increase CHW's confidence and motivation through educational capacity. Participants suggested including pre-and post-tests, reflection sessions, and role plays to measure the assimilation of the desired knowledge during CHW training. The Community Nurse would then be instrumental in following up CHWs and observing them during the early phases of patient engagement before providing feedback on the observed session.

"I think there is a need for training the CHWs so that they can have adequate knowledge on the condition… supervision by the Community will be important, especially during the early stages of program implementation."

"*Capacity building through training, teaching the CHWs about blood pressure, signs and symptoms, and differential diagnosis. Educate them on lifestyle changes, diet, drug compliance, exercising, and healthy living."*

Regular surveillance audits will be necessary for ongoing program activity monitoring and evaluation to ascertain fidelity. The activity guiding principles would be developed with representatives from all stakeholders.

"To avoid confusion, proper record keeping will ensure accountability and simplify supervision channels, especially if you include an antihypertensive medication dispensing component."

Theme 4. Incentive system: CHW motivation

CHW allowances and incentives were essential to the project's success. Because CHWs may not have a different income source and are likely to face the same life stressors as other community members, incentives would help enhance their morale and sustain their dedication to project activities. Current programs involving CHWs hosted by the Ministry of Health were poorly funded, and the CHW incentives needed to be revised. To encourage intervention-related services and regular attendance of training sessions, the CHWs require incentives in the form of transport, food, and time reimbursements, and these were to be one of the priorities during budgeting. We also observed that most CHWs were highly dependent on these incentives for their day-to-day living since they did not have other sources of income.

"It will be important to motivate the CHW through incentives; if there are no incentives for that cadre or incentives are too little for that cadre, one might not be motivated to work."

On the one hand, we noted how the provision of program-branded regalia was perceived as a motivational factor, and this helped to identify them as appointed program officials. On the other hand, branded uniforms aided in the ease of recognition, acceptability, and program visibility by hypertension patients.

"Bringing this program, we need to make sure people are aware, people are well branded to know that these are CHWs, maybe if they wear some reflectors so that the community will quickly identify them. I suggest adding some IDs so that the patients are thoroughly convinced.

DOMAIN 3. OUTER SETTING

Theme 1. Local attitudes and conditions: Patient privacy and confidentiality

Patients' living conditions greatly impacted their participation in this intervention. Most responses mentioned patient privacy and confidentiality, considering that the CHWs were supposed to visit clients' homes. Most clients, particularly those residing in high-density suburbs, were tenants renting a few rooms and may feel uncomfortable with the CHW intruding into their space. In addition, some landowners restrict visitors who are supposed to enter their premises, which was noted as a barrier to home visiting.

"Some landlords prefer tenants to refrain from bringing in visitors. They want to keep their lives private."

"Some patients want to keep their health information confidential and may feel that the CHW may not be able to keep this information private since the CHW will be from the same community."

"Urban residents are not as communal as rural residents; in the urban area, people need their privacy and may not welcome the CHWs because they don't want other neighbors to know what is happening in their lives."

Given the observed complexities in living arrangements, providing individualized blood pressure monitoring would be imperative, considering the patient's preference and context.

Theme 2. Patient needs and resources: Access to medications, laboratory tests, and shortage of equipment

Most of the antihypertensive medications were not available at the primary care clinics, and many patients had to buy medications out-of-pocket from private pharmacies. The medication and diagnostic test access gap caused many losses to follow-up and nonadherence to treatment by patients who could not afford the antihypertensive medications due to high levels of unemployment and poverty within this population. Purchasing antihypertensive medications competed with other basic daily needs. The unavailability of medications and affordable laboratory tests played a significant role in clinic attendance rates, thus contributing to high losses to follow-up.

"*Whenever I prescribe for a patient to go and buy at a private pharmacy, it is difficult to tell if they go to buy or not. The drugs at the pharmacies are expensive for most of our patients. I am hypertensive, and I can attest to their plights when they say the prices are beyond their reach*."
"Right now, the main problem that they face is the inability to procure antihypertensive medications…The patients also take the medications for a long time without laboratory tests."

The nurses from all five primary care clinics reported that they were experiencing chronic antihypertensive medication shortages, and the only consistently available medication was Hydrochlorothiazide (HCT). Study participants emphasized that an intervention that provides BP measurement and health education without including a free or subsidized medication component was destined to fail.

"*Nurses are leaving the country in droves, and the few staff remaining are depressed from burnout. As leaders, there is very little we can do about it, and I hope your proposed work will come in handy to relieve the nurses at the clinic*."

"*I don't recall the last time we had drugs like Enalapril, Atenolol, or Captopril… we have never received some recent drugs like Losartan or Tenoric. The only drug in stock is HCT, but not all patients are on HCT*."

"*Nifedipine is one of the important hypertensive medications that we use to stabilize our patients when they come with very high BP. The last time we had it (*Nifedipine*) was four months ago. Imagine having to prescribe for the relatives to go and buy in town while you look at the patient suffering! (*As a nurse*), you feel helpless."*

"Cell phones so that they can call, and also, we need to have some log forms to record their daily activities, patient contacts, and dispensed medications."

The health facilities received medications from two suppliers, namely, i) NatPharm, a national pharmaceutical company under the Ministry of Health, and ii) the City Health Department. Antihypertensive medications from NatPharm were given to patients for free, and patients had to pay for the rare supplies from the City Health Department.

Most facilities had one functional electronic sphygmomanometer; in cases of breakdown, they sometimes went for days without a replacement. Resource limitations consequently disrupted hypertension patient management, and many patients stopped visiting the clinic for their routine BP monitoring.

"*Despite having multiple clinic departments here, we only have a single functional BP machine. In cases when one staff member is using it, I and the client have to wait, and you know our clients can be in a hurry sometimes.*"

Theme 3. Cosmopolitanism: Inter-organizational networks

Stakeholder engagements were highly recommended to maintain a network with external entities, and community consultations were crucial to the program planning, implementation, and evaluation phases. Creating relationships with community leadership and other organizations working in this community would promote adoption, ownership, resource pooling, and guidance on activity implementation. The health professionals mostly raised these sentiments:

"We must break the 'we against them' boundary between the community and health system. Let's share the vision with the community organizations in our monthly meetings. They know their community better and can support with early identification of challenges."

The preexisting relationships between the CHWs and the communities they worked for were perceived as a vital consideration for program planning. Using the local CHWs was appropriate to introduce an emic perspective to the program.

"Patients are likely to buy the idea from someone they already know and are well acquainted with. They (CHWs and hypertension patients) *are uniquely aware of what these patients experience, and they have a lot in common, like church or their children going to the same school."*

"I think dealing with local people from the same language, culture, and understanding will help enhance the transmission of health messages to the patients. I know this from working in the MHURI program."

DOMAIN 4. INDIVIDUAL CHARACTERISTICS

Theme 1. Motivation: CHW Self-efficacy

The delivery of the intervention by CHWs who resided in the same setting and shared almost the same social and economic conditions as the end-users was hailed to have an emic effect on the implementer-patient relationship. It was perceived that this would reduce communication barriers and enhance culturally sensitive counseling by the trained CHWs. Additionally, the CHWs acknowledged that their participation would be an opportunity to positively contribute to the community's health. Adequate training, resources, and supervision were perceived as crucial self-efficacy enhancers, as expressed by both the CHWs and HCWs:

"Dealing with our people of the same culture and the same understanding is more like a norm because we are helping each other at the same level. Home visits will also allow extended discussions. We all live here."

"*Also, the CHWs should be motivated to do their work. It's how they will portray themselves in the patient's presence."*

Theme 2. Capability: CHW traits, knowledge and skills

On personal attributes of the CHW, the health providers highlighted the need to engage CHWs who are in good standing with their local community and had shown good initiative from their previous health-related assignments either with the public health system or private partners working within the community. Achieving a team of CHWs with these qualities would require the involvement of the nurses at the clinic and local community leaders. The preferred demographic characteristics were middle-aged women with at least some Ordinary Level qualifications.

"CHWs must be capable of dispelling misconceptions, addressing patient concerns, referring when in doubt, and providing feedback to the nurses."

"They (CHWs) should be someone with a good reputation in their area, mature, and someone patients can trust with health information."

"For gender, I would prefer women. It's primarily women who are active in community work. Also, they don't raise suspicions when they are visiting homes. So I would prefer women, mature women.

Many CHWs had formal training in general patient care but were mostly competent in infectious disease and maternal and child health services care. Thus, there was a need for intensive training on BP measurement, BP reading interpretation, lifestyle modifications, and treatment adherence

as a way of capacitating them. Clarity of the roles and responsibilities of CHWs and facility nurses for hypertension management was identified as a core component of the intervention.

"I had an experience taking care of my mother, who had a stroke and high blood pressure, but I feel I only did what I had to do. The training on hypertension and support from nurses will help me understand more about hypertension patient care."

Theme 3. Innovation recipients: Lack of knowledge on hypertension

Hypertension patients' attitudes and current practices were reported to play a significant role in implementing the HoMHyper program. The study setting generally constitutes a low-income population, and hypertension knowledge was perceived as poor. Some cultural and religious beliefs were barriers to hypertension management, with some opting for this route because it is cheap and convenient. CHWs had a significant role to play in addressing these beliefs, and the participants predicted the waning of these practices if the proposed program were to provide affordable, subsidized, or free medications.

"Some patients take traditional concoctions or herbal preparations like avocado leaves and olives thinking they will help, while others say antihypertensive medication causes diabetes. Some treat antihypertensives like antibiotics courses and think they will get healed after finishing the month's supply."

"We still have people who believe hypertension is a sign of kufungisisa (stress caused by overthinking)*."*

"Although we have health service objectors mainly from the Apostolic sects, some patients use faith healing as an option because they can't afford the medication. You can't blame them!"

Because of the lack of health education on diagnosis, many hypertensive patients had limited knowledge of signs and symptoms, prevention, management, and control of hypertension. Some may stop taking their chronic medication after consulting spiritual healers. Unregistered alternative medicine vendors were also exploiting desperate hypertension patients, promising them cheaper solutions for their disease management challenges.

"I know of some women who have been going around selling herbs purported to treat hypertension, and people buy them because they are sold cheaply."

"*Newly diagnosed patients are mostly given medication, but little or no education is unveiled. The nurses or pharmacists are overwhelmed. Some* [patients] *treat antihypertensives like antibiotics*

courses and think they will get healed after finishing the month's supply. They don't have all this information to know that they are on these drugs for life and are not aware of the lifestyle adjustment they have to make because of the diagnosis."

DOMAIN 5. PROCESS

Theme 1. Engagement and communication: The need for concerted efforts

Constant and clear communication and coordination between the community implementers and the health providers at the health facility was cited as an essential aspect of the project in ensuring that patient management data is consolidated into the formal records at the clinic. Formal and informal communication channels exist between the community and health system through the Community Nurses and CHWs. Regular supervision of CHWs can be conducted for quality control and documentation of activities such as blood pressure measurements, medication dispensed, counseling sessions, follow-up calls, and patient visit outcomes were also suggested.

"As a clinic, the initiative helps us track patients and encourage them to follow recommended lifestyle behaviors and medication adherence. Tracking treatment defaulters and patients on home-based care will be possible because many don't come to the clinic."

"We have social media WhatsApp groups, we can use phones, and CHWs can go and tell the patients what we want them to do. Recording activities, accountability, and supervision will be critical, particularly for the dispensing component of the program."

"We need coordinated efforts from the nurses to the CHWs and the client. All of them must speak one language to avoid confusion. I think we can achieve more if we synchronize our efforts."

The nature of communication would vary depending on the services required. Regular supportive supervision of CHWs by the community nurse through observation sessions and phone calls was mentioned as an essential activity to ensure intervention fidelity. Furthermore, monthly CHW visits to the clinic would enable routine supervision and feedback from the facility nurse. Addressing challenges and brainstorming solutions during these visits would likely optimize project fidelity and accomplish the set goals.

Theme 2. Structured planning: Well-planned and organized activities

The assembling of the intervention was considered a primary attribute to the failure or success of the intervention. To implement distinctive work, the program planners ensure that all program

components are in place, accessible to the implementers, and, at the same time, acceptable and satisfactory to the patients. This was mirrored in the responses of most of the participants:

"*These CHWs must be trained and have resources like blood pressure machines, log forms, screening tools, registers, and proper training on hypertension, the signs and symptoms, where to refer, and when to refer. We need active CHWs who are dedicated and knowledgeable of their duties. Phones for the CHWs can also help for easy communication.*"

"*If the community is not sensitized enough, patients will not be open to the CHWs because of the lack of information on the new initiative. The organization of activities must be of high quality. Also, the CHWs must be easily identifiable with branded uniforms. You know, many people are skeptical of bogus individuals.*"

"*We mostly have HCT* (hydrochlorothiazide) *only, and for the rest, we give them prescriptions to go and buy. Monitoring patient BP to see if it is controlled is only one of our challenges. Our patients are poor and can't afford medication. The program should bring in a range of medications to fill the medication gap.*"

Table 2 shows the valence scores coded by the authors and the code tree for the codes identified in the interviews.

Table 2. Valence scores for stakeholder perceptions assigned to CFIR constructs.

Domain	Construct	Score
1. Intervention characteristics	Adaptability	1.75
	Relative advantage	2.00
	Complexity	1.50
2. Inner setting	Structural characteristics	-0.50
	Organizational commitment	1.50
	CHW training and support	2.00
	Engagement and communication	1.50
	Incentive system	1.75
3. Outer setting	Local attitudes and conditions	-0.50
	Critical incidents	-1.25
	Partnerships and connections	1.50
4. Individual domain	CHW motivation	1.75
	Capability	1.50

	Innovation recipients	-1.00
	Patient's knowledge and beliefs	-1.00
5. Process	Structured planning	2.00
	Engagement and communication	

A positive score denotes a positive influence, while a negative score denotes a negative influence on intervention implementation.

DISCUSSION

We used the CFIR Framework to determine the barriers and facilitators to implementing the home-based hypertension management program. Different constructs were identified as barriers or facilitators under the different CFIR domains. The perceived universal barriers were the shortage of staff, patient privacy and confidentiality, access to antihypertensive medication, and shortage of equipment, as well as patient knowledge and beliefs about hypertension. The study participants cited that the proposed innovation was superior to the current practice, was easy to implement, and adaptable in the local context. Commitment from health system leadership, CHW training and support, regular engagement, and CHW incentives were perceived as program facilitators. In addition, community partnerships, CHW self-efficacy, and knowledge and skills.

As innovation deliverers, CHWs were noted to be an integral part of the program. CHWs increase access to health services in low-resource settings affected by challenges such as low health provider-to-population ratio, cultural and language differences, and poor geographical accessibility.[27] With adequate training on the expected tasks, CHWs can bridge the gap between providers and communities. Besides improving confidence in performing tasks, training ensures the standardization of competencies and skills. There was a need to incentivize them adequately to enhance the program's performance. In a resource-constrained context such as Mutare, economic opportunities are limited, and most people live in poverty. Incentivizing the program activities can attract CHWs for recruitment, motivate them to perform well, and retain them in the program. Other studies also emphasized the importance of motivating the CHWs.[28,29] The Continuity of the program can be enhanced by creating an environment where the innovation deliverers feel valued, particularly when they view the tasks as opportunities for personal growth.[30] In addition, clarity of roles and responsibilities of the CHWs can aid in ensuring the flow of prom activities.[30]

CHW-delivered hypertension management can offer a significant return on investment[31] primarily because their activities can be leveraged on preexisting resources to provide widespread benefits. For instance, they may not require complex equipment, protracted training, and infrastructure. However, the study findings revealed the lack of basic supplies for hypertension management, e.g., sphygmomanometers and point-of-care diagnostic equipment at the health facility level, and it will be imperative for the program to consider additional supplies to capacitate the affected clinics and advocate for alternative funding to promote sustainability.

Task-shifting models that involve trained nonprofessionals can help to relieve staff shortages in the healthcare system. Burnout due to staff shortages, high disease burden, lack of support, and resource limitations is high among nurses in sub-Saharan Africa (prevalence=33-87%)[32] and this has a deleterious effect on achieving sustainable development goal number 3.[33] The interviewed study participants agreed that structural interventions such as adding CHWs and advocating for better resources for blood pressure management would partly reduce staff workload and burnout at the clinics. Similarly, the supporting role of CHW was reported to ease work pressure, significantly reduce patient waiting times, expand service reach, improve patient retention, and increase uptake of services in HIV programs in sub-Saharan Africa.[34] Due to the low staffing at the health facility level, persistent lobbying for additional staff members and improving working conditions, remuneration, and job satisfaction may reduce the high turnover in the public health sector.[35]

Leadership engagement and partnership emerged as strong facilitators for the intervention implementation in inner and outer settings. Sustained program implementation depends on political and financial commitment, and these can only be guaranteed if health authorities and community leadership are consulted and integrated into the program design and implementation processes.[36] Leadership can be a decisive pillar that defines the strength and quality of implementation because individuals in authority influence implementers' recruitment, motivation, performance, and retention.[37] Thus, the health authorities, nurses at the facilities, and trusted community leaders will be vital for implementing this program.

We noted that individual characteristics of patients, particularly confidentiality, knowledge, and practices of hypertension management, could influence program implementation. The use of alternative medicine and spiritual healing due to misinformation and the inability to afford medications was rife in this setting. This is consistent with other similar settings where hypertension patients preferred alternative medicine and feared adverse outcomes of treatment.[38] Despite the proven effectiveness of some complementary therapies in the management of

hypertension,[39] most of the herbal preparations used locally have not been scientifically tested, and therefore, their efficacy and dosage are unknown. A study in Nigeria also reported that complementary medicine was perceived to reduce the burden of hypertension treatment, mostly among patients from poor households. Medical pluralism among patients is common in sub-Saharan Africa[40], and this can reduce or modify the potency of the antihypertensive treatment and cause adverse outcomes. Further investigations will be needed to understand the preference and sentiments around the use of complementary to allopathic medicine, given that there is limited empirical evidence of the impact of alternative medication for hypertension management in Zimbabwe.

Limitations

Our study had the following limitations. We cannot generalize our findings to all clinicians, administrators, and CHWs since the data analyzed only presented their perceptions and experiences. Although we had male participants in the CHW category, all nurses and health authorities interviewed were female, and this may have introduced gender bias to the responses obtained. We only included the health facilities in the public health sector, and professionals from the private sector may have different perspectives considering the differences in job satisfaction, remuneration, resources, and medication availability.

Conclusions

Our qualitative analysis findings demonstrate that the CFIR Framework can be instrumental in organizing implementation evidence for planning the implementation of community-based interventions. In the face of chronic health staff and resource shortages, it will be crucial for health systems to be adaptable and proactive to reduce NCD disease burden and optimize the available resources to meet and sustain health goals. The findings demonstrate the potential roadblocks and drivers for CHW-delivered interventions for managing hypertension and other chronic diseases within the community. The emphasis is on involving innovation deliverer, leadership, and end-user perceptions for planning and recruiting the implementation team. Improving coverage of chronic disease management requires strong support from health and community leadership, building community trust, and coordinated communication. Training and supervising the CHWs will be essential to ensure program fidelity, while program branding and incentivizing the CHWs can motivate participants and sustain the program. Integrating CHWs and expanding their roles to chronic disease management into health service delivery is an effective strategy, particularly for low-resource settings.

Authors' information

The researchers hold the following credentials: PTM (BSN, MPH, Ph.D. Student), MM (BSN, MPH Student), PM (MPH, MD, Ph.D Student), TH (BOT, MPH), LM (BSN, MPH), PZ (BA, MScDS), PMM (Dip Ed., BSc Soc, MPhilRD, PhD, and FMM (MPH, MD). During the study period, PTM and PM were PhD students, MM was an MPH Student, TH was a Research Technical Assistant, PZ was a Programs Officer, PMM was a Senior Lecturer LM was a Program Coordinator, and FFM was the Director of the Africa University Clinical Research Center. Only PTM, PZ and MM were males researchers.

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References

1. World Health Organization. *Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases*.; 2011. https://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf

2. Adeloye D, Basquill S. Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *PLoS One*. 2014;9(8). doi:10.1371/JOURNAL.PONE.0104300

3. Zhou B, Carrillo-Larco RM, Danaei G, et al. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet*. 2021;398(10304):957-980. doi:10.1016/S0140-6736(21)01330-1

4. Wozniak G, Khan T, Gillespie C, et al. Hypertension Control Cascade: A Framework to Improve Hypertension Awareness, Treatment, and Control. *J Clin Hypertens*. 2016;18(3):232-239. doi:10.1111/jch.12654

5. Geldsetzer P, Manne-Goehler J, Marcus ME, et al. The state of hypertension care in 44 low-income and middle-income countries: a cross-sectional study of nationally representative individual-level data from 1·1 million adults. *Lancet*. 2019;394(10199):652-662. doi:10.1016/S0140-6736(19)30955-9

6. Kostova D, Spencer G, Moran AE, et al. The cost-effectiveness of hypertension management in low-income and middle-income countries: a review. *BMJ Glob Heal*. 2020;5(9):e002213. doi:10.1136/bmjgh-2019-002213

7. Nilsen P, Birken S. Epilogue. In: *Handbook on Implementation Science*. Edward Elgar Publishing; 2020:527-528.

8. Nilsen P. Making sense of implementation theories , models and frameworks. *BMC Implement Sci*. Published online 2015:1-13. doi:10.1186/s13012-015-0242-0

9. Damschroder L, Reardon C, Widerquist M, Lowery JC. The updated Consolidated Framework for Implementation Research based on user feedback. *Implement Sci*. 2022;17(75). doi:10.1186/s13012-022-01245-0

10. Damschroder LJ. Clarity out of chaos: Use of theory in implementation research. *Psychiatry Res*. 2020;283:112461. doi:10.1016/j.psychres.2019.06.036

11. Okoroafor SC, Christmals C Dela. Task Shifting and Task Sharing Implementation in Africa: A Scoping Review on Rationale and Scope. *Healthc (Basel, Switzerland)*. 2023;11(8). doi:10.3390/healthcare11081200

12. LeBan K, Kok M, Perry HB. Community health workers at the dawn of a new era: 9. CHWs' relationships with the health system and communities. *Heal Res Policy Syst*. 2021;19(S3):116. doi:10.1186/s12961-021-00756-4

13. Jeet G, Thakur JS, Prinja S, Singh M. Community health workers for non-communicable diseases prevention and control in developing countries: Evidence and implications. Maulik PK, ed. *PLoS One*. 2017;12(7):e0180640. doi:10.1371/journal.pone.0180640

14. Kim K, Choi JS, Choi E, et al. Effects of Community-Based Health Worker Interventions to Improve Chronic Disease Management and Care Among Vulnerable Populations: A Systematic Review. *Am J Public Health*. 2016;106(4):e3-e28. doi:10.2105/AJPH.2015.302987

15. Bosworth HB, Powers B, Olsen M, et al. Home Blood Pressure Management and Improved Blood Pressure Control. *Arch Intern Med*. 2011;171(13):1173. doi:10.1001/archinternmed.2011.276

16. McManus RJ, Little P, Stuart B, et al. Home and Online Management and Evaluation of Blood Pressure (HOME BP) using a digital intervention in poorly controlled hypertension: randomised controlled trial. *BMJ*. Published online January 19, 2021:m4858. doi:10.1136/bmj.m4858

17. Green BB, Cook AJ, Ralston JD, et al. Effectiveness of Home Blood Pressure Monitoring, Web Communication, and Pharmacist Care on Hypertension Control. *JAMA*. 2008;299(24):2857. doi:10.1001/jama.299.24.2857

18. Allen JK, Dennison-Himmelfarb CR, Szanton SL, et al. Community Outreach and Cardiovascular Health (COACH) Trial. *Circ Cardiovasc Qual Outcomes*. 2011;4(6):595-602. doi:10.1161/CIRCOUTCOMES.111.961573

19. World Health Organization. *Primary Health Care*.; 2021. https://www.who.int/news-room/fact-sheets/detail/primary-health-care

20. Long H, Huang W, Zheng P, 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). *Int J Environ Res Public Health*. 2018;15(11):2378. doi:10.3390/ijerph15112378

21. Keith RE, Crosson JC, O'Malley AS, Cromp D, Taylor EF. Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: a rapid-cycle evaluation approach to improving implementation. *Implement Sci*. 2017;12(1):15. doi:10.1186/s13012-017-0550-7

22. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*. 2009;4(1):50. doi:10.1186/1748-5908-4-50

23. Lumivero. NVivo (Version 14). Published online 2023. www.lumivero.com

24. CFIR Research Team-Center for Clinical Management Research. Qualitative data collection: interview guide tool. https://cfirguide.org/evaluation-design/qualitative-data

25. Cayir E, Felder TM, Nkwonta CA, Jackson JR, Dawson R. Discovering New Connections: Insights From Individual and Collective Reflexivity in a Mixed Methods Study. *Int J Qual Methods*. 2022;21:160940692211057. doi:10.1177/16094069221105707

26. Gimbel S, Rustagi AS, Robinson J, et al. Evaluation of a Systems Analysis and Improvement Approach to Optimize Prevention of Mother-To-Child Transmission of HIV Using the Consolidated Framework for Implementation Research. *JAIDS J Acquir Immune Defic Syndr*. 2016;72(2):S108-S116. doi:10.1097/QAI.0000000000001055

27. Coffinbargar M, AJ D, Westfall J. Risks And Benefits To Community Health Worker Certification. Health Affairs Forefront. doi:10.1377/forefront.20220705.856203

28. Chitiyo C, Verhey R, Mboweni SN, et al. Applying the Consolidated Framework for Implementation Research to Optimize Implementation Strategies for the Friendship Bench Psychological Intervention in Zimbabwe. *Glob Implement Res Appl*. 2023;3(3):245-258. doi:10.1007/s43477-023-00093-4

29. Maes K, Kalofonos I. Becoming and remaining community health workers: Perspectives from Ethiopia and Mozambique. *Soc Sci Med*. 2013;87:52-59. doi:10.1016/j.socscimed.2013.03.026

30. Colvin CJ, Hodgins S, Perry HB. Community health workers at the dawn of a new era: 8. Incentives and remuneration. *Heal Res policy Syst*. 2021;19(Suppl 3):106. doi:10.1186/s12961-021-00750-w

31. Kangovi S, Mitra N, Grande D, Long JA, Asch DA. Evidence-Based Community Health Worker Program Addresses Unmet Social Needs And Generates Positive Return On Investment. *Health Aff*. 2020;39(2):207-213. doi:10.1377/hlthaff.2019.00981

32. Owuor RA, Mutungi K, Anyango R, Mwita CC. Prevalence of burnout among nurses in sub-Saharan Africa: a systematic review. *JBI Evid Synth*. 2020;18(6):1189-1207. doi:10.11124/JBISRIR-D-19-00170

33. World Health Organization. *Targets of Sustainable Development Goal 3*.; 2023. https://www.who.int/europe/about-us/our-work/sustainable-development-goals/targets-of-sustainable-development-goal-3#:~:text=3.2.&text=By 2030%2C end preventable deaths,25 per 1000 live births.

34. Mwai GW, Mburu G, Torpey K, Frost P, Ford N, Seeley J. Role and outcomes of community health workers in HIV care in sub-Saharan Africa: a systematic review. *J Int AIDS Soc*. 2013;16(1):18586. doi:10.7448/IAS.16.1.18586

35. Dubale BW, Friedman LE, Chemali Z, et al. Systematic review of burnout among healthcare providers in sub-Saharan Africa. *BMC Public Health*. 2019;19(1):1247. doi:10.1186/s12889-019-7566-7

36. Colombini M, Dockerty C, Mayhew SH. Barriers and Facilitators to Integrating Health Service Responses to Intimate Partner Violence in Low- and Middle-Income Countries: A Comparative Health Systems and Service Analysis. *Stud Fam Plann*. 2017;48(2):179-200. doi:10.1111/sifp.12021

37. Daniels K, Odendaal W, Nkonki L, Hongoro C, Colvin C, Lewis S. Incentives for lay health workers to improve recruitment, retention in service performance. *Cochrane Libr*. Published online 2014. doi:10.1002/14651858.cdo11201.pub2

38. Bhandari B, Narasimhan P, Vaidya A, Subedi M, Jayasuriya R. Barriers and facilitators for treatment and control of high blood pressure among hypertensive patients in Kathmandu, Nepal: a qualitative study informed by COM-B model of behavior change. *BMC Public Health*. 2021;21(1):1524. doi:10.1186/s12889-021-11548-4

39. Nahas R. Complementary and alternative medicine approaches to blood pressure reduction: An evidence-based review. *Can Fam Physician*. 2008;54(11):1529-1533. http://www.ncbi.nlm.nih.gov/pubmed/19005120

40. King R, Homsy J. Involving traditional healers in AIDS education and counselling in sub-Saharan Africa: a review. *AIDS*. 1997;11 Suppl A:S217-25. http://www.ncbi.nlm.nih.gov/pubmed/9451988

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Stakeholder perspectives to inform the implementation of a Community Health Worker-delivered home management of hypertension intervention in Zimbabwe

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ABSTRACT

Objective: Implementing evidence-based innovations often fails to translate into meaningful outcomes in practice due to dynamic real-world contextual factors. Identifying these influencing factors is pivotal to implementation success. This study aimed to determine the barriers and facilitators of implementing a Community Health Worker (CHW)-delivered home management of hypertension (HoMHyper) intervention from a stakeholder's perspective using the Consolidated Framework for Implementation Research (CFIR).

Design: Exploratory qualitative study.

Setting: Five primary healthcare facilities in Mutare City, Zimbabwe.

Participants: 25 Community Health Workers, 10 health facility nurses, and three Mutare City health administrators.

Results: Perceived barriers to implementation of the HoMHyper intervention were staff shortage, patient privacy and confidentiality, limited access to antihypertensive medication, CHW incentivization, and equipment shortage, as well as patient knowledge and beliefs about hypertension. The proposed intervention was superior to the current practice, easy to implement, and adaptable in the local context. Perceived facilitating factors were commitment from health system leadership, CHW training and support, regular engagement between CHWs and health providers, community partnerships, and CHW self-efficacy and knowledge and skills.

Conclusion: Integrating CHWs into chronic disease management can potentially improve health service access in low-resource settings. Well-coordinated planning guided by implementation evidence frameworks such as the CFIR significantly enhances the identification of important barriers and facilitators to inform implementation.

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Strengths and Limitations of this Study

- The present study offers unique and nuanced qualitative perceptions from a diverse group of stakeholders who will significantly influence the implementation process of the CHW-delivered home management of hypertension (HoMHyper) program.
- The study may inform program implementers about the determinants to prioritize to ensure optimal returns from implementation activities and promote sustainability.
- Although male participants were interviewed in the CHW category, all nurses and health authorities interviewed were female, and this may have introduced bias to the study findings.

- Using CFIR domains as pre-selected themes for the coding process may have resulted in missed barriers and facilitators that fall outside the domains of the framework .

INTRODUCTION

The General Assembly of the United Nations adopted a declaration to prevent and control non-communicable diseases (NCDs), such as hypertension, with a particular emphasis on developing national capacities in low and middle-income countries (LMICs).[1] This was proposed because of poor screening, control, and management in LMICs. During the last three decades, the prevalence of hypertension in LMICs soared exponentially from 55 million in 1990 to 130 million in 2010.[2] The number of people living with hypertension is predicted to increase to 217 million by 2030.[2–4] An analysis of 1.1 million adults from LMICs showed that about 26% had never had their blood pressure (BP) measured, 39% had hypertension and 30% were on treatment; however, only 10% had controlled BP.[5] Among the countries from four LMIC regions (Southeast Asia and the western Pacific, Latin America and the Caribbean, Europe and the eastern Mediterranean, and sub-Saharan Africa) included in the analysis, countries from sub-Saharan Africa showed the worst performance, with less than 5% of hypertension patients achieving BP control in 10 of 16 countries.[5] Most people living in LMICs have poor awareness of hypertension, and there is a need to expand the implementation of BP management programs in these regions.

One strategy that could reduce modifiable barriers to BP management and control in resource-limited settings is task shifting.[6] This involves using trained nonprofessional cadres such as Community Health Workers (CHWs) to ensure access to essential health services in underserved communities.[7] By delegating essential yet straightforward activities to trained CHWs, the overstretched professional health workers can concentrate on more complex tasks. Thus, CHWs can reduce the burden of NCDs, such as hypertension, within communities while enhancing the quality of service delivery at healthcare facilities.[8,9] Randomized controlled trials (RCTs) have shown the effectiveness of home-based management of hypertension.[10–13] However, in RCTs, the interventions are tested under strictly controlled contexts that are different from the dynamic real-life settings. Thus, further studies are needed to determine the feasibility and effectiveness of CHW-delivered home management of hypertension in a real-world setting. By scaling up primary health care (PHC) interventions in LMICs, reports predict that an estimated 60 million lives can be saved, and life expectancy will increase by 3.7 years by 2030.[14]

Despite the cost-effectiveness and ease of implementing hypertension control programs compared to other diseases and health conditions, there are substantial gaps in evidence on the

fundamental program components for successful implementation.[15] The effectiveness of hypertension management, lifestyle counseling, and blood pressure monitoring under controlled conditions is well known; however, sustained monitoring within the community remains elusive.[16,17] Implementing evidence-based innovations often fails to translate into meaningful outcomes in practice due to dynamic real-world contextual factors such as resource constraints, competing demands, and lack of support from stakeholders.[18] Because they influence the outcomes of implementation efforts, these contextual factors must be well aligned with the innovation and locally feasible to ensure a synergistic interaction between the context and the intervention.

Determinant frameworks such as the Consolidated Framework for Implementation Research (CFIR) can be used to predict the challenges and enablers of practical implementation.[19] The CFIR helps to identify implementation barriers and facilitators, produce actionable findings, and address the practical needs of the intervention implementation.[20] CFIR comprises five domains that inform implementers about the contextual factors: intervention characteristics, inner setting, outer setting, individual characteristics, and intervention process. According to the framework, intervention characteristics refer to the 'thing' being implemented, and the inner setting is the setting in which the intervention is implemented.[20] The inner setting exists in the outer setting; the individual domain entails the roles and characteristics of individuals involved in the implementation, and the intervention process refers to the activities and strategies used to implement the intervention.[20] The observed contextual challenges and enablers can be used to generate hypotheses and inform implementation strategies prospectively.[21]

The most common barriers noted in integrating CHWs in NCD care were lack of support and resources, while the facilitators were the integrated health system, trust, quality of training, and CHW capacity.[22] The CFIR is a well-operationalized pragmatic framework that guides the identification of significant implementation barriers and facilitators.[23] The identified factors can then be used to adapt the facilitators and overcome the implementation barriers. This study aimed to identify the barriers and facilitators of implementing CHW-delivered home management of hypertension intervention from a stakeholder's perspective prior to intervention implementation.

METHODS

Proposed Intervention

The Home Management of Hypertension (HoMHyper) program is a CHW-delivered home management of hypertension intervention among diagnosed patients in a low-resource urban

setting in Zimbabwe. This will be a phased project that involves exploring intervention components, implementing well-planned `intervention activities, and evaluating the program activities. This study was part of the preliminary exploration phase conducted before program implementation. The proposed intervention involves the selection of CHWs with assistance from stakeholders such as clinic nurses, community health nurses, and community leaders. Enrolled CHWs will be trained in patient care, correct BP measurement, psychosocial support, health education for hypertension patients, and ethical issues in public health programs. Each CHW will then be tasked to provide services such as routine BP measurement, health education and counseling, symptom monitoring, and referring patients to at most eight clients through fortnightly focused home visits guided by the HoMHyper Curriculum. In addition, the CHWs will communicate outside the bimonthly home visits via phone. Standard Operating Procedure Manuals, checklists, and registers will be used to guide and record the program activities, and the CHWs will submit the statistical records and provide monthly feedback to the local clinic nurse.

Study design and setting

We conducted a prospective formative study using an exploratory qualitative design to ascertain the barriers and facilitators before implementing the CHW-delivered HoMHyper intervention. Face-to-face interviews were conducted among stakeholders (nurses, health authorities, and CHWs). Health authorities included the Mutare City Health Director, City Health Nursing Manager, and City Health Promotion Officer. The interviewed CHWs were individuals who actively participated in community mobilization and community health programs over the last 12 months and resided within the clinic's catchment area. A multiple-stakeholder approach that covers relevant aspects relative to the implementers' perspective on the successful implementation of the intervention was employed. The CFIR was used to guide the development of interview questions, organize the coding process, and summarize the findings.[24] The HoMHyper intervention is a multicentric project covering five urban primary healthcare centers/clinics (PHCs) in Mutare, Zimbabwe's third most populous city, located on the country's eastern border with Mozambique. There are eight public primary care clinics and an estimated 22 private medical facilities focused on outpatient health services for most of the city residents. The five clinics included in this study were all public health facilities. Three clinics (Chikanga, Dangamvura, and Hobhouse) were primarily high-density residential suburbs with residential stands ranging from 70 to 200 m^2, while Florida and City clinics mainly covered low- and middle-density suburbs with

residential stands ranging from 300 to 2000 m^2.[25] Data were collected between June and July 2023.

Study participants

This article reports the qualitative findings from in-depth interviews among 10 primary health care nurses, three health authorities, and semi-structured interviews among 25 CHWs. All participants were purposively selected, and clinic nurses were selected based on their involvement in chronic disease management. Health authorities were based at the city health department offices, and these were selected according to how active they were in community-based programs. The nurse manager provided the names of potential CHW interviewees. Participants were called to ascertain their interest in the interviews, and the appointment date and time were set upon their agreement to participate.

Patient and Public Involvement

Hypertension patients were not involved in this exploratory qualitative study; however, we conducted a patient survey prior to this study.[26] The patient inputs from that survey were instrumental in developing the research question and interview guides for the present study. Patients and their families were included in the community meetings conducted to disseminate the study findings. Since the intervention will be implemented within the community, we plan to involve the patients and encourage community member involvement during the iterative planning process of implementation activities and program evaluation.

Procedures

A team of four researchers (primary investigators) comprising two public health officers (PTM and TH) and social scientists (CM and PZ) developed the interview guides based on barriers and facilitators to community interventions from the literature. Consensus on which components to include in the interview guides was reached based on individual clinical and epidemiological expertise, as well as evidence from the patient survey conducted prior to the in-depth interviews.[26] The in-depth interview guide (Supplementary File 1) and semi-structured interview guide (Supplementary File 2) were pilot-tested using two non-participating nurses and three CHWs.

A two-day training on qualitative data collection was conducted in May 2023. The interviews were conducted by LM (Public Health Nurse) and PTM (Ph.D. Student in Epidemiology). Two note-takers with undergraduate degrees in social work were also trained to transcribe interview questions to reduce interviewer bias. One interviewer and a note-taker interviewed each

participant in a private room at the health facilities (for nurses and CHWs) and health department offices (for health administrators). Guided by the protocol approved by the Africa University Research Ethics Committee and the Medical Research Council of Zimbabwe, written informed consent was obtained from all participants.

Before administering the interview guide, the interviewer described the proposed HoMHyper intervention to the participant. Audio-recorded interviews with CHWs were conducted in Shona and transcribed verbatim first in Shona, then translated to English by two linguistic experts from Africa University. Nurses and health administrators' interviews were conducted in English. Field notes were taken during the interview session. The qualitative interviews were recorded using the Sony ICD-PX370 mono digital voice recorder and transcribed verbatim to Word document transcripts that were then imported into the NVivo 14 software.[27]

Data analysis

The analysis was based on transcribed files and field notes. We used the deductive approach to develop a coding frame based on contextually relevant CFIR domains. PTM, PMM, and PZ conducted the data coding process. The three coders reviewed the CFIR definitions before coding to standardize the process. The initial coding process was conducted independently using the NVivo 14 software while considering the conceptual model. To incorporate the CFIR into data coding, we used the transformation technique, which involved developing codes based on the research question and then transforming the codes to reflect the components related to the CFIR. The findings of the individual coding were compared and reconciled through an iterative process until an agreement was reached on the identified set of codes. The codes were then categorized to develop themes and assign relevant quotes to each theme. In case of conflicting coding results between two coders, the third coder acted as the tiebreaker. In addition, the analysis team was collectively mindful of how reflexive they could be and avoided letting their personal experience and participation in the project influence the findings.[28] Although participants' quotes were used in reporting, we anonymized the participants to preserve confidentiality due to the small size of professional health workers who participated in the study.

Open codes were aggregated according to the CFIR domains, and each construct was rated as an implementation barrier or facilitator by PTM, PMM, TH, and PZ. The ratings were adopted from recommendations by Gimbel et al.[29], who classify scores as +2 (strong positive influence on implementation), +1 (weak positive influence on implementation, -1 (weak positive influence on implementation, and -2 (strongly hindering implementation). The four raters individually reviewed

the codebook, rated each CFIR construct, and gave a valence score. The total valence score for each construct was the average individual score from the raters. We used the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines to report the study findings.

RESULTS

All invited participants agreed to participate in the study. Semi-structured interviews were conducted among 25 CHWs (five per clinic). About 32% of the CHWs had a chronic condition, all possessed a mobile phone and were willing to dedicate an average of 20 hours per week to program implementation. On average, each in-depth interview lasted about 50 minutes, and semi-structured interviews were 35 minutes long. Participant quotes are italicized and minimally edited to improve conciseness and clarity. Table 1 displays the sociodemographic characteristics of participants and Table 2 shows the CFIR constructs and their perceived impacts on the program and the valence scores for stakeholder perceptions assigned to the constructs by the authors.

Table 1. Sociodemographic characteristics of participants (n=38)

Variable	Characteristics	Community Health Workers (n=25)	Nurses (n=10)	Health authorities (n=3)
Age (years)	Mean±standard deviation	39.0±9.6	35.4±4.6	43±6.1
Work Experience (years)	Mean±standard deviation	5.6±3.1	6.0±3.3	6.2±4.9
Sex	Male	9	0	0
	Female	16	10	3
Highest level of education	Primary	2	0	0
	Ordinary level	23	0	0
	Diploma	0	8	0
	Undergraduate degree	0	2	2
	Master's degree	0	0	1
Religion	Christian	22	9	3
	None/Other	3	1	0

Table 2. CFIR constructs and their perceived impacts on the HoMHyper intervention and valence scores for stakeholder perceptions assigned to the constructs

Domain	Construct		Valence Score*
	Perceived Barriers (n=5)	**Perceived facilitators (n=10)**	
Intervention characteristics		Better than current practice	2.00
		Easy to implement	1.50
		Adaptable to the local setting	1.75
Inner setting	Staff shortages		-0.50
	CHW incentivization		-2.00
		Organizational commitment	1.50
		CHW training and support	2.00
Outer setting	Patient privacy and confidentiality		-1.25
	Access to medication, stockouts, and equipment shortage		-2.00
		Community partnership and connections	1.50
Individual domain	Patient knowledge and beliefs about hypertension		-1.00
		CHW self-efficacy	1.50
		CHW knowledge and skills	1.75
Process		Structured planning of activities	2.00
		Engagement and communication	1.75

**A positive score denotes a positive influence, while a negative score denotes a negative influence on intervention implementation.*

DOMAIN 1. INTERVENTION CHARACTERISTICS

Theme 1. Intervention better than current practice `

The participants perceived the proposed program as an essential strategy to improve coverage, considering that currently, hypertension patients were receiving suboptimal services, and the

chronic disease surveillance system was virtually nonexistent. This was an opportunity to follow up and recover many participants who were no longer seeking services from the facilities. As some participants related:

> "*All we can do for those* (patients) *who are unable to come to our clinics is simply to ask them to send a relative with their health cards to the clinic to get a resupply (medication), but we are not able to see the patient, we are not able to monitor them, and we are not sure whether this medication is working or not. This is a major* (service) *gap*."

> "*We have many people with missing checkup visits and defaulters in the register. There is nothing we can do about it. The urban population only has one HPO* (Health Promotion Officer)*, and she needs help coordinating all the community health programs. This will be an excellent complementary program*."

Although some of the reasons why the hypertension patients had absconded were obvious, such reasons were mostly generalized assumptions, and the proposed intervention was an opportunity to offer individualized care and understand their unique explanations. In their perceptions, the HoMHyper intervention was superior to the current practice in hypertension management. One CHW shared:

> "*I think the proposed approach will be very beneficial to the management of hypertension. The queues at the clinic are usually long, and they don't have the medication. The most common thing is that hypertension patients solicit health services when they are doomed and very sick.* (By that time) *the blood pressure is very high, and outcomes are often poor. Home BP measurements will help*."

Theme 2. Easy to implement

The intervention was perceived as simple, feasible, and achievable. Most CHWs felt they were already involved with almost similar tasks in their current scope of work. Despite the lack of information about hypertension care in the community, the functions and limits of the CHW operations are clearly outlined in the CHW guidelines developed by the Ministry of Health and Child Care. There were long-standing relationships and communication between the CHWs and the community, as well as between the CHWs and the nurses at the clinic, as relayed by the study participants:

"We (CHWs) *used to do home follow-ups and counseling of stroke patients in the home-based care program and helped relieve the primary caregivers sometimes. We had to report to the clinic with information on the status of every patient under our care."*

"With a few training sessions. I am confident CHWs can accurately measure patient BP; it's not like this is medical surgery."

Theme 3. Adaptable to the local setting

This intervention was perceived to be feasible and a good fit for both the patients and the health system because a similar preexisting intervention had already proved successful in managing other conditions in this setting. An established model for CHW-delivered care for the HIV and Antiretroviral therapy (ART) program in which CHWs visit, organize community support groups, and counsel patients on nutrition and the importance of adherence to ART. Stable patients form Community ART Refill Groups (CARGs) to reduce the burden of frequent facility visits. This model could be adapted and modified to fit the needs of hypertension patients. In addition, CHWs in rural areas were responsible for malaria testing and dispensing antimalarial medication for uncomplicated malaria. By drawing existing evidence from the ART and Malaria programs, planners can use this information as a template for implementer training, fidelity support, and documentation and tailor it to meet the needs of the hypertension patients, as cited by some of the participants:

"It's being practiced for ART CARGs to cut on travel costs and time spent at the clinic, and this can also apply to hypertension patients."

"Well, this could be similar to the ART program. We do home visits except for hypertension; the medications are not free like anti-tuberculosis drugs and ART, where the medication is free and readily available."

DOMAIN 2. INNER SETTING

Theme 1. Staff shortages

The selected participating sites were experiencing chronic staffing shortages. Despite the consensus that the Community Nurse and the Health Promotions Officer were integral to the project implementation, the study participants felt that these professionals may need help to participate in the project, given other competing responsibilities. Thus, a roving project coordinator was required to work closely with the two community health professionals.

"The working conditions are stressful due to a shortage of clinicians; this initiative will reduce the workload at the clinic and the waiting period of patients visiting the facility.

"The Community Nurses may help with monitoring the CHWs. However, they are just a few, and their schedules are swamped. I recommend you have your own coordinator to work with the Community Nurses."

Due to understaffing and high disease burden, health providers limited their consultation time to the minimum to serve as many patients as possible. As two nurses reflected on their daily frustration of a disproportionate work burden to health provider problems:

"It's a timely and appropriate program because, honestly, the staff shortage is extreme. We can't afford to see people in the community as registered nurses. It's near impossible because most nurses have gone kuchando (greener pastures, mostly Western countries)*."*

Theme 2. Organizational commitment

The interviewed health authorities welcomed the program and perceived the program as acceptable and feasible. They were committed to assisting as necessary and helping unveil available human and material resources. The study participants acknowledged that the program would relieve the staff shortages at the public health clinics involved. In addition, they also alluded to the erratic antihypertensive medication supply from the central national pharmacy and recommended the inclusion of a medication component to the intervention.

"It's an excellent program as it improves access to services and medication adherence and increases awareness of the condition in the community. We assure you of our support to the best extent possible."

"This method is timely because most patients don't want to visit the clinic for monthly checkups when stable."

Theme 3. CHW training and support

One of the fundamental enablers of implementing the intervention is clarity of the expected goals and expectations by all the stakeholders involved. The study participants consistently raised the need for rigorous training for the CHWs. CHWs should be trained in hypertension management, including BP measurement, lifestyle modification, patient counseling, medication adherence, and patient referral systems. The training will increase CHW's confidence and motivation through educational capacity. Participants suggested including pre-and post-tests, reflection sessions,

and role plays to measure the assimilation of the desired knowledge during CHW training. The Community Nurse would then be instrumental in following up CHWs and observing them during the early phases of patient engagement before providing feedback on the observed session.

> "*Capacity building through training, teaching the CHWs about blood pressure, signs and symptoms, and differential diagnosis. Educate them on lifestyle changes, diet, drug compliance, exercising, and healthy living."*

Regular surveillance audits will be necessary for ongoing program activity monitoring and evaluation to ascertain fidelity. The activity guiding principles would be developed with representatives from all stakeholders.

> *"To avoid confusion, proper record keeping will ensure accountability and simplify supervision channels, especially if you include an antihypertensive medication dispensing component."*

Theme 4. CHW incentivization

CHW allowances and incentives were perceived as essential to motivate them during implementation. Because CHWs may not have a different income source and are likely to face the same life stressors as other community members, incentives would help enhance their morale and sustain their dedication to project activities. Current programs involving CHWs hosted by the Ministry of Health were poorly funded, and the CHW incentives needed to be revised. To encourage intervention-related services and regular attendance of training sessions, the CHWs require incentives in the form of transport, food, and time reimbursements, and these were to be one of the priorities during budgeting. We also observed that most CHWs were highly dependent on these incentives for their day-to-day living since they did not have other sources of income.

> *"It will be important to motivate the CHW through incentives; if there are no incentives for that cadre or incentives are too little for that cadre, one might not be motivated to work."*

On the one hand, we noted how the provision of program-branded regalia was perceived as a motivational factor, and this helped to identify them as appointed program officials. On the other hand, branded uniforms aided in the ease of recognition, acceptability, and program visibility by hypertension patients.

> *"Bringing this program, we need to make sure people are aware, people are well branded to know that these are CHWs, maybe if they wear some reflectors so that the community*

will quickly identify them. I suggest adding some IDs so that the patients are thoroughly convinced.

DOMAIN 3. OUTER SETTING

Theme 1. Patient privacy and confidentiality

Patients' living conditions will significantly impact their participation in this intervention. Most female participants mentioned patient privacy and confidentiality, considering that the CHWs were supposed to visit clients' homes. Most clients, particularly those residing in high-density suburbs, were tenants renting a few rooms and may feel uncomfortable with the CHW intruding into their space. In addition, some landowners restrict visitors who are supposed to enter their premises, which was noted as a barrier to home visiting.

"Some patients want to keep their health information confidential and may feel that the CHW may not be able to keep this information private since the CHW will be from the same community."

"Urban residents are not as communal as rural residents; in the urban area, people need their privacy and may not welcome the CHWs because they don't want other neighbors to know what is happening in their lives."

Given the observed complexities in living arrangements, providing individualized blood pressure monitoring would be imperative, considering the patient's preference and context.

Theme 2. Access to medications, stockouts, and shortage of equipment

Most antihypertensive medications were not available at the primary care clinics, and many patients purchased medications out-of-pocket from private pharmacies. The medication and diagnostic test access gap caused many losses to follow-up and nonadherence to treatment by patients who could not afford the antihypertensive medications due to high levels of unemployment and poverty within this population. Purchasing antihypertensive medications competed with other basic daily needs. The unavailability of medications and affordable laboratory tests played a significant role in clinic attendance rates, thus contributing to high losses to follow-up.

"*Whenever I prescribe for a patient to go and buy at a private pharmacy, it is difficult to tell if they go to buy or not. The drugs at the pharmacies are expensive for most of our patients. I am hypertensive, and I can attest to their plights when they say the prices are beyond their reach*."

The nurses from all five primary care clinics reported that they were experiencing chronic antihypertensive medication shortages, and the only consistently available medication was Hydrochlorothiazide (HCT). Study participants emphasized that an intervention that provides BP measurement and health education without including a free or subsidized medication component was destined to fail.

"*Nifedipine is one of the important hypertensive medications that we use to stabilize our patients when they come with very high BP. The last time we had it (*Nifedipine*) was four months ago. Imagine having to prescribe for the relatives to go and buy in town while you look at the patient suffering! (*As a nurse*), you feel helpless."*

The health facilities received medications from two suppliers, namely, i) NatPharm, a national pharmaceutical company under the Ministry of Health, and ii) the City Health Department. Antihypertensive medications from NatPharm were given to patients for free, and patients had to pay for the rare supplies from the City Health Department.

Most facilities had one functional electronic sphygmomanometer; in cases of breakdown, they sometimes went for days without a replacement. Resource limitations consequently disrupted hypertension patient management, and many patients stopped visiting the clinic for their routine BP monitoring.

"*Despite having multiple clinic departments here, we only have a single functional BP machine. In cases when one staff member is using it, I and the client have to wait, and you know our clients can be in a hurry sometimes.*"

Theme 3. Community partnerships and connections

Stakeholder engagements were highly recommended to maintain a network with external entities, and community consultations were crucial to the program planning, implementation, and evaluation phases. Creating relationships with community leadership and other organizations working in this community would promote adoption, ownership, resource pooling, and guidance on activity implementation. The health professionals mostly raised these sentiments:

"We must break the 'we against them' boundary between the community and health system. Let's share the vision with the community organizations in our monthly meetings. They know their community better and can support with early identification of challenges."

The preexisting relationships between the CHWs and the communities they worked for were perceived as a vital consideration for program planning. Using the local CHWs was appropriate to introduce an emic perspective to the program.

"Patients are likely to buy the idea from someone they already know and are well acquainted with. They (CHWs and hypertension patients) *are uniquely aware of what these patients experience, and they have a lot in common, like church or their children going to the same school."*

"I think dealing with local people from the same language, culture, and understanding will help enhance the transmission of health messages to the patients. I know this from working in the MHURI program."

DOMAIN 4. INDIVIDUAL CHARACTERISTICS

Theme 1. CHW self-efficacy

The delivery of the intervention by CHWs who resided in the same setting and shared almost the same social and economic conditions as the end-users was hailed to have an emic effect on the implementer-patient relationship. It was perceived that this would reduce communication barriers and enhance culturally sensitive counseling by the trained CHWs. Additionally, the CHWs acknowledged that their participation would be an opportunity to positively contribute to the community's health. Adequate training, resources, and supervision were perceived as crucial self-efficacy enhancers, as expressed by both the CHWs and HCWs:

"Dealing with our people of the same culture and the same understanding is more like a norm because we are helping each other at the same level. Home visits will also allow extended discussions. We all live here."

"*Also, the CHWs should be motivated to do their work. It's how they will portray themselves in the patient's presence."*

Theme 2. CHW knowledge and skills

On personal attributes of the CHW, the health providers highlighted the need to engage CHWs who are in good standing with their local community and had shown good initiative from their

previous health-related assignments either with the public health system or private partners working within the community. Achieving a team of CHWs with these qualities would require the involvement of the nurses at the clinic and local community leaders. The preferred demographic characteristics were middle-aged women with at least some Ordinary Level qualifications.

> *"CHWs must be capable of dispelling misconceptions, addressing patient concerns, referring when in doubt, and providing feedback to the nurses."*

> *"They (CHWs) should be someone with a good reputation in their area, mature, and someone patients can trust with health information."*

Many CHWs had formal training in general patient care but were mostly competent in infectious disease and maternal and child health services care. Thus, there was a need for intensive training on BP measurement, BP reading interpretation, lifestyle modifications, and treatment adherence as a way of capacitating them. Clarity of the roles and responsibilities of CHWs and facility nurses for hypertension management was identified as a core component of the intervention.

> *"I had an experience taking care of my mother, who had a stroke and high blood pressure, but I feel I only did what I had to do. The training on hypertension and support from nurses will help me understand more about hypertension patient care."*

Theme 3. Patient knowledge and beliefs about hypertension

Hypertension patients' attitudes and current practices were reported to play a significant role in implementing the HoMHyper program. The study setting generally constitutes a low-income population, and hypertension knowledge was perceived as poor. Some cultural and religious beliefs were barriers to hypertension management, with some opting for this route because it is cheap and convenient. CHWs had a significant role to play in addressing these beliefs, and the participants predicted the waning of these practices if the proposed program were to provide affordable, subsidized, or free medications.

> *"Some patients take traditional concoctions or herbal preparations like avocado leaves and olives thinking they will help, while others say antihypertensive medication causes diabetes. Some treat antihypertensives like antibiotics courses and think they will get healed after finishing the month's supply. You can't blame them!"*

Because of the lack of health education on diagnosis, many hypertensive patients had limited knowledge of signs and symptoms, prevention, management, and control of hypertension. Some may stop taking their chronic medication after consulting spiritual healers. Unregistered

alternative medicine vendors were also exploiting desperate hypertension patients, promising them cheaper solutions for their disease management challenges.

> "*Newly diagnosed patients are mostly given medication, but little or no education is unveiled. The nurses or pharmacists are overwhelmed. Some* [patients] *treat antihypertensives like antibiotics courses and think they will get healed after finishing the month's supply. They don't have all this information to know that they are on these drugs for life and are not aware of the lifestyle adjustment they have to make because of the diagnosis."*

DOMAIN 5. PROCESS

Theme 1. Engagement and communication

Constant and clear communication and coordination between the community implementers and the health providers at the health facility were cited as essential aspects of the project to ensure that patient management data is consolidated into the formal records at the clinic. Formal and informal communication channels exist between the community and health system through the Community Nurses and CHWs. Regular supervision of CHWs can be conducted for quality control and documentation of activities such as blood pressure measurements, medication dispensed, counseling sessions, follow-up calls, and patient visit outcomes were also suggested.

> *"As a clinic, the initiative helps us track patients and encourage them to follow recommended lifestyle behaviors and medication adherence. Tracking treatment defaulters and patients on home-based care will be possible because many don't come to the clinic."*

> *"We have social media WhatsApp groups, we can use phones, and CHWs can go and tell the patients what we want them to do. Recording activities, accountability, and supervision will be critical, particularly for the dispensing component of the program."*

The nature of communication would vary depending on the services required. Regular supportive supervision of CHWs by the community nurse through observation sessions and phone calls was mentioned as an essential activity to ensure intervention fidelity. Furthermore, monthly CHW visits to the clinic would enable routine supervision and feedback from the facility nurse. Addressing challenges and brainstorming solutions during these visits would likely optimize project fidelity and accomplish the set goals.

Theme 2. Structured planning of activities

The assembling of the intervention was considered a primary attribute to the failure or success of the intervention. To implement distinctive work, the program planners ensure that all program components are in place, accessible to the implementers, and, at the same time, acceptable and satisfactory to the patients. This was mirrored in the responses of most of the participants:

> "*These CHWs must be trained and have resources like blood pressure machines, log forms, screening tools, registers, and proper training on hypertension, the signs and symptoms, where to refer, and when to refer. We need active CHWs who are dedicated and knowledgeable of their duties. Phones for the CHWs can also help for easy communication.*"

> "*If the community is not sensitized enough, patients will not be open to the CHWs because of the lack of information on the new initiative. The organization of activities must be of high quality. Also, the CHWs must be easily identifiable with branded uniforms. You know, many people are skeptical of bogus individuals*."

DISCUSSION

We used the CFIR to determine the barriers and facilitators to implementing the HoMHyper program. Different constructs were identified as barriers or facilitators under the different CFIR domains. The perceived universal barriers were the shortage of staff, patient privacy and confidentiality, access to antihypertensive medication, and shortage of equipment, CHW incentives as well as patient knowledge and beliefs about hypertension. The study participants cited that the proposed innovation was superior to the current practice, was easy to implement, and adaptable in the local context. Commitment from health system leadership, CHW training and support, regular engagement between CHWs and health providers, community partnerships, CHW self-efficacy, and knowledge and skills were perceived as program facilitators.

As innovation deliverers, CHWs were noted to be an integral part of the program. CHWs increase access to health services in low-resource settings affected by challenges such as low health provider-to-population ratio, cultural and language differences, and poor geographical accessibility.[30] With adequate training on the expected tasks, CHWs can bridge the gap between providers and communities. Besides improving confidence in performing tasks, training ensures the standardization of competencies and skills. Furthermore, the CHWs will have to be adequately

incentivized to execute the implementation tasks with diligence. In a resource-constrained context such as Mutare, economic opportunities are limited, and most people live in poverty. Incentivizing the program activities can attract CHWs for recruitment, motivate them to perform well, and retain them in the program. Other studies also emphasized the importance of motivating the CHWs.[31,32] Creating an environment where the CHWs feel valued will likely enhance the program fidelity, ownership and continuity.[33] However, if substantial, CHW incentives may limit program sustenance in resource-constrained contexts, given the bureaucratic barriers and competing priorities confronting traditional funding sources such as local government, volunteer-based or community budgets.[34] Underinvestment and limited political support in CHW programs in Zimbabwe may negatively affect their future sustainability. These issues can be addressed through innovative financing strategies. Implementing a social health insurance scheme can help improve CHW service coverage.[34]

CHW-delivered hypertension management can offer a significant return on investment[35] primarily because their activities can be leveraged on preexisting resources to provide widespread benefits. For instance, they may not require complex equipment, protracted training, or infrastructure such as offices and workstations. However, the study findings revealed the lack of basic supplies for hypertension management, e.g., sphygmomanometers and point-of-care diagnostic equipment at the primary health facility level, which is the first point of patient contact with the formal health system. It will be imperative for the program to consider additional supplies to capacitate the affected clinics and advocate for alternative funding to promote sustainability.

Task-shifting models that involve trained nonprofessionals can help to relieve staff shortages in the healthcare system. Burnout due to staff shortages, high disease burden, lack of support, and resource limitations is high among nurses in sub-Saharan Africa (prevalence: 33-87%)[36] and this has a deleterious effect on achieving sustainable development goal number 3.[37] The interviewed study participants agreed that structural interventions such as adding CHWs and advocating for better resources for blood pressure management would partly reduce staff workload and burnout at the clinics. Similarly, the supporting role of CHW was reported to ease work pressure, significantly reduce patient waiting times, expand service reach, improve patient retention, and increase uptake of services in HIV programs in sub-Saharan Africa.[38] This work supports the notion that task-shifting approaches can help enhance health service delivery in contexts of low staff coverage.

Leadership engagement and partnership emerged as strong facilitators for the intervention implementation in inner and outer settings. Sustained program implementation depends on

political and financial commitment, and these can only be guaranteed if health authorities and community leadership are consulted and integrated into the program design and implementation processes.[39] Leadership can be a decisive pillar that defines the strength and quality of implementation because individuals in authority influence implementers' recruitment, motivation, performance, and retention.[40] Thus, engagement with health authorities, nurses at the facilities, and trusted community leaders will be vital for implementing this program.

We noted that the individual characteristics of patients, particularly confidentiality, knowledge, and practices of hypertension management, could influence program implementation. The use of alternative medicine and spiritual healing due to misinformation and the inability to afford medications was rife in this setting. This is consistent with other similar settings where hypertension patients preferred alternative medicine and feared adverse outcomes of treatment.[41] Despite the proven effectiveness of some complementary therapies in the management of hypertension,[42] most of the herbal preparations used locally have not been scientifically tested, and therefore, their efficacy and dosage are unknown. A study in Nigeria also reported that complementary medicine was perceived to reduce the burden of hypertension treatment, mostly among patients from poor households. Medical pluralism among patients is common in sub-Saharan Africa[43], and this can reduce or modify the potency of the antihypertensive treatment and cause adverse outcomes. Further investigations will be needed to understand the preference and sentiments around the use of complementary to allopathic medicine, given that there is limited empirical evidence of the impact of alternative medication for hypertension management in Zimbabwe.

Limitations

Our study had the following limitations. We cannot generalize our findings to all clinicians, administrators, and CHWs since the data analyzed only presented their perceptions and experiences. By using the inductive approach in which CFIR domains were pre-selected for coding, we may have missed barriers and facilitators that fall outside the domains of the framework. Although we had male participants in the CHW category, all nurses and health authorities interviewed were female, and this may have introduced bias to the responses obtained. We only included the health facilities in the public health sector, and professionals from the private sector may have different perspectives considering the differences in job satisfaction, remuneration, resources, and medication availability. However, selecting the public health clinics was a sensible sampling strategy since most underserved hypertension patients seek health services from these facilities.

Conclusions

Our qualitative analysis findings demonstrate that the integration of CHWs into chronic disease management into health service delivery can potentially improve health service access, particularly in low-resource settings. Using the CFIR can be instrumental in organizing implementation evidence for planning the implementation of community-based interventions in low-income settings. In the face of chronic health staff and resource shortages, it will be crucial for health systems to be adaptable and proactive to reduce NCD burden and optimize the available resources to meet and sustain health goals. The findings demonstrate the potential roadblocks and drivers for CHW-delivered interventions for managing hypertension and other chronic diseases within the community. The emphasis is on involving implementers, leadership, and end-user perceptions for planning and recruiting the implementation team. Improving coverage of chronic disease management requires strong support from health and community leadership, building community trust, and coordinated communication. Training and supervising the CHWs will be essential to ensure program fidelity, while program branding and incentivizing the CHWs can motivate participants and sustain the program. However, program planners must anticipate and prearrange to overcome mainstay challenges that may disrupt intervention delivery. In this study, a sustainable funding source to cover program essentials such as medication availability and CHW incentives plays a significant role in intervention sustainability.

Authors' information

The researchers hold the following credentials: PTM (BSN, MPH, Ph.D. Student), MM (BSN, MPH Student), PM (MPH, MD, Ph.D Student), TH (BOT, MPH), LM (BSN, MPH), PZ (BA, MScDS), PMM (Dip Ed., BSc Soc, MPhilRD, PhD, and FMM (MPH, MD). During the study period, PTM and PM were PhD students, MM was an MPH Student, TH was a Research Technical Assistant, PZ was a Programs Officer, PMM was a Senior Lecturer, LM was the Project Coordinator, and FFM was the Director of the Africa University Clinical Research Center. Only PTM, PZ, and MM were male researchers.

Author Contributions: PTM, PZ, and PMM contributed to the concept and design. LM, TH, PMM, and PTM contributed to the recruitment of participants for this study. PTM, MM, TH, FMM, and PM contributed to the drafting of the manuscript. PTM and PMM contributed to the administrative, technical, or material support. PTM, PZ, LM, and PMM had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors contributed to and approved the final manuscript. The corresponding author affirms that

all listed authors meet authorship criteria. PTM is the guarantor and is responsible for the overall content of the manuscript.

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References

1. World Health Organization. *Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases*.; 2011. https://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf

2. Zhou B, Carrillo-Larco RM, Danaei G, et al. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet*. 2021;398(10304):957-980. doi:10.1016/S0140-6736(21)01330-1

3. Adeloye D, Basquill S. Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *PLoS One*. 2014;9(8). doi:10.1371/JOURNAL.PONE.0104300

4. Wozniak G, Khan T, Gillespie C, et al. Hypertension Control Cascade: A Framework to

Improve Hypertension Awareness, Treatment, and Control. *J Clin Hypertens*. 2016;18(3):232-239. doi:10.1111/jch.12654

5. Geldsetzer P, Manne-Goehler J, Marcus ME, et al. The state of hypertension care in 44 low-income and middle-income countries: a cross-sectional study of nationally representative individual-level data from 1·1 million adults. *Lancet*. 2019;394(10199):652-662. doi:10.1016/S0140-6736(19)30955-9

6. Okoroafor SC, Christmals C Dela. Task Shifting and Task Sharing Implementation in Africa: A Scoping Review on Rationale and Scope. *Healthc (Basel, Switzerland)*. 2023;11(8). doi:10.3390/healthcare11081200

7. LeBan K, Kok M, Perry HB. Community health workers at the dawn of a new era: 9. CHWs' relationships with the health system and communities. *Heal Res Policy Syst*. 2021;19(S3):116. doi:10.1186/s12961-021-00756-4

8. Jeet G, Thakur JS, Prinja S, Singh M. Community health workers for non-communicable diseases prevention and control in developing countries: Evidence and implications. Maulik PK, ed. *PLoS One*. 2017;12(7):e0180640. doi:10.1371/journal.pone.0180640

9. Kim K, Choi JS, Choi E, et al. Effects of Community-Based Health Worker Interventions to Improve Chronic Disease Management and Care Among Vulnerable Populations: A Systematic Review. *Am J Public Health*. 2016;106(4):e3-e28. doi:10.2105/AJPH.2015.302987

10. Bosworth HB, Powers B, Olsen M, et al. Home Blood Pressure Management and Improved Blood Pressure Control. *Arch Intern Med*. 2011;171(13):1173. doi:10.1001/archinternmed.2011.276

11. McManus RJ, Little P, Stuart B, et al. Home and Online Management and Evaluation of Blood Pressure (HOME BP) using a digital intervention in poorly controlled hypertension: randomised controlled trial. *BMJ*. Published online January 19, 2021:m4858. doi:10.1136/bmj.m4858

12. Green BB, Cook AJ, Ralston JD, et al. Effectiveness of Home Blood Pressure Monitoring, Web Communication, and Pharmacist Care on Hypertension Control. *JAMA*. 2008;299(24):2857. doi:10.1001/jama.299.24.2857

13. Allen JK, Dennison-Himmelfarb CR, Szanton SL, et al. Community Outreach and

Cardiovascular Health (COACH) Trial. *Circ Cardiovasc Qual Outcomes*. 2011;4(6):595-602. doi:10.1161/CIRCOUTCOMES.111.961573

14. World Health Organization. *Primary Health Care*.; 2021. https://www.who.int/news-room/fact-sheets/detail/primary-health-care

15. Kostova D, Spencer G, Moran AE, et al. The cost-effectiveness of hypertension management in low-income and middle-income countries: a review. *BMJ Glob Heal*. 2020;5(9):e002213. doi:10.1136/bmjgh-2019-002213

16. Jafar TH, Gandhi M, de Silva HA, et al. A Community-Based Intervention for Managing Hypertension in Rural South Asia. *N Engl J Med*. 2020;382(8):717-726. doi:10.1056/nejmoa1911965

17. Thapa R, Zengin A, Neupane D, et al. Sustainability of a 12-month lifestyle intervention delivered by community health workers in reducing blood pressure in Nepal: 5-year follow-up of the COBIN open-label, cluster randomised trial. *Lancet Glob Heal*. 2023;11(7):e1086-e1095. doi:10.1016/S2214-109X(23)00214-0

18. Nilsen P, Birken S. Epilogue. In: *Handbook on Implementation Science*. Edward Elgar Publishing; 2020:527-528.

19. Nilsen P. Making sense of implementation theories , models and frameworks. *BMC Implement Sci*. Published online 2015:1-13. doi:10.1186/s13012-015-0242-0

20. Damschroder L, Reardon C, Widerquist M, Lowery JC. The updated Consolidated Framework for Implementation Research based on user feedback. *Implement Sci*. 2022;17(75). doi:10.1186/s13012-022-01245-0

21. Damschroder LJ. Clarity out of chaos: Use of theory in implementation research. *Psychiatry Res*. 2020;283:112461. doi:10.1016/j.psychres.2019.06.036

22. Long H, Huang W, Zheng P, 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). *Int J Environ Res Public Health*. 2018;15(11):2378. doi:10.3390/ijerph15112378

23. Keith RE, Crosson JC, O'Malley AS, Cromp D, Taylor EF. Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: a rapid-cycle evaluation approach to improving implementation. *Implement Sci*. 2017;12(1):15.

doi:10.1186/s13012-017-0550-7

24. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*. 2009;4(1):50. doi:10.1186/1748-5908-4-50

25. Marongwe N, Mukoto S, Chatiza K. *Scoping Study: Governance of Urban Land Markets in Zimbabwe*.; 2011. https://housingfinanceafrica.org/app/uploads/scoping_study_gov_ulm_zimbabwe.pdf

26. Mundagowa PT, Zambezi P, Muchemwa-Munasirei P. The prevalence and determinants of blood pressure control among hypertension patients in eastern Zimbabwe: A cross-sectional study. Makurumidze R, ed. *PLoS One*. 2024;19(3):e0293812. doi:10.1371/journal.pone.0293812

27. Lumivero. NVivo (Version 14). Published online 2023. www.lumivero.com

28. Cayir E, Felder TM, Nkwonta CA, Jackson JR, Dawson R. Discovering New Connections: Insights From Individual and Collective Reflexivity in a Mixed Methods Study. *Int J Qual Methods*. 2022;21:160940692211057. doi:10.1177/16094069221105707

29. Gimbel S, Rustagi AS, Robinson J, et al. Evaluation of a Systems Analysis and Improvement Approach to Optimize Prevention of Mother-To-Child Transmission of HIV Using the Consolidated Framework for Implementation Research. *JAIDS J Acquir Immune Defic Syndr*. 2016;72(2):S108-S116. doi:10.1097/QAI.0000000000001055

30. Coffinbargar M, AJ D, Westfall J. Risks And Benefits To Community Health Worker Certification. Health Affairs Forefront. doi:10.1377/forefront.20220705.856203

31. Chitiyo C, Verhey R, Mboweni SN, et al. Applying the Consolidated Framework for Implementation Research to Optimize Implementation Strategies for the Friendship Bench Psychological Intervention in Zimbabwe. *Glob Implement Res Appl*. 2023;3(3):245-258. doi:10.1007/s43477-023-00093-4

32. Maes K, Kalofonos I. Becoming and remaining community health workers: Perspectives from Ethiopia and Mozambique. *Soc Sci Med*. 2013;87:52-59. doi:10.1016/j.socscimed.2013.03.026

33. Colvin CJ, Hodgins S, Perry HB. Community health workers at the dawn of a new era: 8.

Incentives and remuneration. *Heal Res policy Syst*. 2021;19(Suppl 3):106. doi:10.1186/s12961-021-00750-w

34. Adjagba A, Gabida M, Akoth C, et al. Sustainable Financing of Community Health Workers: Could Social Health Insurance be a Panacea? Center for Global Development (CGD). Published 2024. https://www.cgdev.org/blog/sustainable-financing-community-health-workers-could-social-health-insurance-be-panacea

35. Kangovi S, Mitra N, Grande D, Long JA, Asch DA. Evidence-Based Community Health Worker Program Addresses Unmet Social Needs And Generates Positive Return On Investment. *Health Aff*. 2020;39(2):207-213. doi:10.1377/hlthaff.2019.00981

36. Owuor RA, Mutungi K, Anyango R, Mwita CC. Prevalence of burnout among nurses in sub-Saharan Africa: a systematic review. *JBI Evid Synth*. 2020;18(6):1189-1207. doi:10.11124/JBISRIR-D-19-00170

37. World Health Organization. *Targets of Sustainable Development Goal 3*.; 2023. https://www.who.int/europe/about-us/our-work/sustainable-development-goals/targets-of-sustainable-development-goal-3#:~:text=3.2.&text=By 2030%2C end preventable deaths,25 per 1000 live births.

38. Mwai GW, Mburu G, Torpey K, Frost P, Ford N, Seeley J. Role and outcomes of community health workers in HIV care in sub-Saharan Africa: a systematic review. *J Int AIDS Soc*. 2013;16(1):18586. doi:10.7448/IAS.16.1.18586

39. Colombini M, Dockerty C, Mayhew SH. Barriers and Facilitators to Integrating Health Service Responses to Intimate Partner Violence in Low- and Middle-Income Countries: A Comparative Health Systems and Service Analysis. *Stud Fam Plann*. 2017;48(2):179-200. doi:10.1111/sifp.12021

40. Daniels K, Odendaal W, Nkonki L, Hongoro C, Colvin C, Lewis S. Incentives for lay health workers to improve recruitment, retention in service performance. *Cochrane Libr*. Published online 2014. doi:10.1002/14651858.cdo11201.pub2

41. Bhandari B, Narasimhan P, Vaidya A, Subedi M, Jayasuriya R. Barriers and facilitators for treatment and control of high blood pressure among hypertensive patients in Kathmandu, Nepal: a qualitative study informed by COM-B model of behavior change. *BMC Public Health*. 2021;21(1):1524. doi:10.1186/s12889-021-11548-4

42. Nahas R. Complementary and alternative medicine approaches to blood pressure reduction: An evidence-based review. *Can Fam Physician*. 2008;54(11):1529-1533. http://www.ncbi.nlm.nih.gov/pubmed/19005120

43. King R, Homsy J. Involving traditional healers in AIDS education and counseling in sub-Saharan Africa: a review. *AIDS*. 1997;11 Suppl A:S217-25. http://www.ncbi.nlm.nih.gov/pubmed/9451988

Version 1.1 10.03.23

Nurse and Health Administrator interview guide

Participant ID:_____

Health Facility: _____ Date: _____

Good morning/afternoon

You are welcome to this discussion. My name is _____

I am a researcher from the Africa University College of Health, Agriculture, and Natural Resources. Thank you for accepting to interview with us. We would like to have a discussion on your perceptions of the barriers and facilitators as well as the feasibility of blood pressure management and patient education about hypertension as delivered by Community Health Workers (CHWs) among people with hypertension. CHWs will be trained before implementation. During the discussion, we will solicit perceptions regarding appropriateness, discontinuation, satisfaction, facilitators, and barriers to the implementation of the intervention in Mutare City. The purpose of this discussion is to get your views and take appropriate steps in our plans to implement the intervention in Mutare City. The recommendations will also help healthcare providers and the Ministry of Health and Child Care understand the feasibility of integrating Community Health Worker-delivered home management of hypertension intervention into routine care.

Sociodemographic information

1. How old are you *(in completed years)*? _____
2. What is your sex? Male [ ] Female [ ]
3. Do you have a working mobile phone? Yes [ ] No [ ]
4. What is your highest level of education?

a. None [ ]

b. Primary [ ]

c. Secondary [ ]

d. Diploma[ ]

e. Undergraduate degree [ ]

f. Masters/ Doctoral studies [ ]

5. What is your religion?

a. Pentecostal [ ]

b. Protestant [ ]

c. Apostolic [ ]

d. Moslem [ ]

e. Africa traditional religion [ ]

f. None [ ]

6. How long (in years) have you worked with patients as a nurse/administrator? [ ]

In-depth Interview Questions

1. In Zimbabwe, many individuals living with chronic hypertension need continuous monitoring and health education. We would like to utilize trained community health workers (CHWs) instead of professional health providers like nurses. What do you think about this method of managing hypertension and patient education?

2. In your opinion, what are the:

a. enablers/facilitators of hypertension-related patient monitoring and counseling delivered by CHWs in urban communities?

b. barriers of hypertension-related patient monitoring and counseling delivered by CHWs in urban communities?

3. What are the benefits of using CHWs for hypertension-centered management and patient education among hypertension patients?

4. How sustainable will a CHW-delivered blood pressure measurement and patient education among hypertension patients be?

Explain your answer.

5. Are there any cultural or community practices related to patient education on Hypertension that may affect the use of CHWs for this intervention?

If yes, how do those practices affect the patient education program on hypertension? (*Probe further about traditions and beliefs around patient education by CHWs*)

6. What suggestions do you think would increase CHWs' ability to educate hypertension patients in the community?

7. What key issues do we need to consider in making home management of hypertension by trained CHWs acceptable by the:

a. patients

b. community

c. professional health workers

8. In the past six months, have you received adequate medication to allow for multiple-month dispensing and the availability of medication for local hypertension patients?

10. How often do you get antihypertensive supplies as Mutare City Health Department?

11. How have you been supporting hypertension patients with challenges in frequenting this clinic per set medical timelines?

12. How often do you expect hypertensive patients to visit clinics for routine check-ups?

13. How frequently do you feel comfortable supporting CHWs carrying out BP management to community members?

14. What type of individual do you recommend for recruiting as a CHW to support hypertension patients?

(*Probe: Gender, Age, Education, Residence status, Attitudes and behavior*)

15. What training do you think CHWs need to effectively provide home hypertension management?

16. What support mechanisms are needed to ensure CHWs can timely activate referrals before further complications?

17. Do you see it appropriate for CHWs to collect antihypertensive on behalf of the patients? Explain your answer.

18. As a nurse/ administrator, how do you plan to communicate, engage, and support CHWs involved in the home management of hypertension?

19. Do you have any additional suggestions on strategies to make this program successful?

20. Do you have any questions for me?

THANK YOU FOR YOUR TIME

Version 1.1 10/3/23

Community Health Worker Interview guide

Socio-demographic information

Participant ID:_____

Health Facility: _____ Date: _____

Good morning/afternoon

You are welcome to this discussion. My name is _____

I am a researcher from the Africa University College of Health, Agriculture, and Natural Resources. Thank you for accepting to interview with us. We would like to have a discussion on your perceptions of the barriers and facilitators as well as the feasibility of blood pressure management and patient education about hypertension as delivered by Community Health Workers among people with hypertension. CHWs will be trained before implementation. During the discussion, we will solicit perceptions regarding appropriateness, discontinuation, satisfaction, facilitators, and barriers to the implementation of the intervention in Mutare City. The purpose of this discussion is to get your views and take appropriate steps in our plans to implement the intervention in Mutare City. The recommendations will also help healthcare providers and the Ministry of Health and Child Care understand the feasibility of integrating Community Health Worker-delivered home management of hypertension intervention into routine care.

1. How old are you *(in completed years)*? _____
2. What is your sex? Male [ ] Female [ ]
3. Do you have a working mobile phone? Yes [ ] No [ ]
4. What is your highest level of education?

a. None [ ]
b. Primary [ ]
c. Secondary [ ]
d. Diploma[ ]
e. Undergraduate degree [ ]
f. Masters/ Doctoral studies [ ]

5. What is your religion?

a. Pentecostal [ ]
b. Protestant [ ]
c. Apostolic [ ]

d. Moslem [ ]

e. Africa traditional religion [ ]

f. None [ ]

Experience in providing community-driven patient services

6. How many years have you been working with patients in the community? _____

7. Do you have any of the following medical conditions? (*Tick all that apply*)

Disease	**YES**	**NO**
Hypertension		
Diabetes Mellitus		
Asthma		
Chronic obstructive pulmonary disease		
Cancer		
Kidney disease		
Musculoskeletal disease		
Stroke		
HIV/AIDS		
Other (*specify*)		

8. What distance are you comfortable/capable of traveling to support patients? [ ]

9. Estimate the time you can be able to commit to support hypertension patients in a week (in hours) [ ]

10. From your experience as a Community Health Workers, do you think you have the basic skills to support hypertensive patients?

Yes [ ] No [ ]

Please explain your answer

11. Have you ever used a BP machine before? Yes [ ] No [ ]

12. Are you able to interpret BP readings? Yes [ ] No [ ]

13. Are you trained in the following:

a. Patient counseling? Yes [ ] No [ ]

b. Referring hypertensive patients? Yes [ ] No [ ]

c. Recommended lifestyle behaviors for people living with hypertension?

Yes [ ] No [ ]

14. How frequently are you comfortable visiting/ meeting nurses to discuss issues to do with hypertensive patients' care and support?

a. Days per week [ ]

b. Days per month [ ]

Explain your answer.

15. Do you think the management of hypertension by Community Health Workers will be:

a. Successful? Yes [ ] No [ ] Explain your answer.

b. Effective? Yes [ ] No [ ] Explain your answer.

16. What kind of support would you need to provide health services to hypertensive patients in your community?

17. What skills should the Community Health Worker possess to offer effective home management of hypertension services?

18. What kind of training would enhance the effective execution of the proposed duties and responsibilities?

19. In terms of supervision, how often do you want to be supervised by the following key cadres in your work supporting patients by nurses and why?

a. clinic nurse

b. community nurse

c. CHW coordinator

20. What do you consider to be the factors that may lead to program success at the:

a. patient level?

b. Community Health Worker level?

c. health provider level?

21. What do you consider to be the factors that may lead to program success at the:

a. patient level?

b. Community Health Worker level?

c. health provider level?

22. Do you have any additional suggestions on strategies to make this program successful?

23. Do you have any questions for me?

THANK YOU FOR YOUR TIME

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Stakeholder perspectives to inform the implementation of a Community Health Worker-delivered home management of hypertension intervention in Zimbabwe

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Stakeholder perspectives to inform the implementation of a Community Health Worker-delivered home management of hypertension intervention in Zimbabwe

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ABSTRACT

Objective: Implementing evidence-based innovations often fails to translate into meaningful outcomes in practice due to dynamic real-world contextual factors. Identifying these influencing factors is pivotal to implementation success. This study aimed to determine the barriers and facilitators of implementing a Community Health Worker (CHW)-delivered home management of hypertension (HoMHyper) intervention from a stakeholder's perspective using the Consolidated Framework for Implementation Research (CFIR).

Design: Exploratory qualitative study.

Setting: Five primary healthcare facilities in Mutare City, Zimbabwe.

Participants: 25 Community Health Workers, 10 health facility nurses, and three Mutare City health administrators.

Results: Perceived barriers to implementation of the HoMHyper intervention were staff shortage, patient privacy and confidentiality, limited access to antihypertensive medication, CHW incentivization, and equipment shortage, as well as patient knowledge and beliefs about hypertension. The proposed intervention was superior to the current practice, easy to implement, and adaptable in the local context. Perceived facilitating factors were commitment from health system leadership, CHW training and support, regular engagement between CHWs and health providers, community partnerships, and CHW self-efficacy and knowledge and skills.

Conclusion: Integrating CHWs into chronic disease management can potentially improve health service access in low-resource settings. Well-coordinated planning guided by implementation evidence frameworks such as the CFIR significantly enhances the identification of important barriers and facilitators to inform implementation.

Word count: 6,819

Strengths and Limitations of this Study

- The study included a diverse group of professional and non-professional stakeholders directly in hypertension patient care.
- The interviews were conducted in an urban context where health services and resources are relatively better compared to peri-urban and rural contexts which limits the generalizability of the findings.
- Although male participants were interviewed in the CHW category, all nurses and health authorities interviewed were female, which may have introduced bias to the study findings.
- Using CFIR domains as pre-selected themes for the coding process may have resulted in missed barriers and facilitators that fall outside the domains of the framework.

INTRODUCTION

The General Assembly of the United Nations adopted a declaration to prevent and control non-communicable diseases (NCDs), such as hypertension, with a particular emphasis on developing national capacities in low and middle-income countries (LMICs).[1] This was proposed because of poor screening, control, and management in LMICs. During the last three decades, the prevalence of hypertension in LMICs soared exponentially from 55 million in 1990 to 130 million in 2010.[2] The number of people living with hypertension is predicted to increase to 217 million by 2030.[2–4] An analysis of 1.1 million adults from LMICs showed that about 26% had never had their blood pressure (BP) measured, 39% had hypertension and 30% were on treatment; however, only 10% had controlled BP.[5] Among the countries from four LMIC regions (Southeast Asia and the western Pacific, Latin America and the Caribbean, Europe and the eastern Mediterranean, and sub-Saharan Africa) included in the analysis, countries from sub-Saharan Africa showed the worst performance, with less than 5% of hypertension patients achieving BP control in 10 of 16 countries.[5] Most people living in LMICs have poor awareness of hypertension, and there is a need to expand the implementation of BP management programs in these regions.

One strategy that could reduce modifiable barriers to BP management and control in resource-limited settings is task shifting.[6] This involves using trained nonprofessional cadres such as Community Health Workers (CHWs) to ensure access to essential health services in underserved communities.[7] By delegating essential yet straightforward activities to trained CHWs, the overstretched professional health workers can concentrate on more complex tasks. Thus, CHWs can reduce the burden of NCDs, such as hypertension, within communities while enhancing the quality of service delivery at healthcare facilities.[8,9] Randomized controlled trials (RCTs) have shown the effectiveness of home-based management of hypertension.[10–13] However, in RCTs, the interventions are tested under strictly controlled contexts that are different from the dynamic real-life settings. Thus, further studies are needed to determine the feasibility and effectiveness of CHW-delivered home management of hypertension in a real-world setting. By scaling up primary health care (PHC) interventions in LMICs, reports predict that an estimated 60 million lives can be saved, and life expectancy will increase by 3.7 years by 2030.[14]

Despite the cost-effectiveness and ease of implementing hypertension control programs compared to other diseases and health conditions, there are substantial gaps in evidence on the fundamental program components for successful implementation.[15] The effectiveness of hypertension management, lifestyle counseling, and blood pressure monitoring under controlled conditions is well known; however, sustained monitoring within the community remains

elusive.[16,17] Implementing evidence-based innovations often fails to translate into meaningful outcomes in practice due to dynamic real-world contextual factors such as resource constraints, competing demands, and lack of support from stakeholders.[18] Because they influence the outcomes of implementation efforts, these contextual factors must be well aligned with the innovation and locally feasible to ensure a synergistic interaction between the context and the intervention.

Determinant frameworks such as the Consolidated Framework for Implementation Research (CFIR) can be used to predict the challenges and enablers of practical implementation.[19] The CFIR helps to identify implementation barriers and facilitators, produce actionable findings, and address the practical needs of the intervention implementation.[20] CFIR comprises five domains that inform implementers about the contextual factors: intervention characteristics, inner setting, outer setting, individual characteristics, and intervention process. According to the framework, intervention characteristics refer to the 'thing' being implemented, and the inner setting is the setting in which the intervention is implemented.[20] The inner setting exists in the outer setting; the individual domain entails the roles and characteristics of individuals involved in the implementation, and the intervention process refers to the activities and strategies used to implement the intervention.[20] The observed contextual challenges and enablers can be used to generate hypotheses and inform implementation strategies prospectively.[21]

The most common barriers noted in integrating CHWs in NCD care were lack of support and resources, while the facilitators were the integrated health system, trust, quality of training, and CHW capacity.[22] The CFIR is a well-operationalized pragmatic framework that guides the identification of significant implementation barriers and facilitators.[23] The identified factors can then be used to adapt the facilitators and overcome the implementation barriers. This study aimed to identify the barriers and facilitators of implementing CHW-delivered home management of hypertension intervention from a stakeholder's perspective prior to intervention implementation.

METHODS

Proposed Intervention

The Home Management of Hypertension (HoMHyper) program is a CHW-delivered home management of hypertension intervention among diagnosed patients in a low-resource urban setting in Zimbabwe. This will be a phased project that involves exploring intervention components, implementing well-planned `intervention activities, and evaluating the program activities. This study was part of the preliminary exploration phase conducted before program

implementation. The proposed intervention involves the selection of CHWs with assistance from stakeholders such as clinic nurses, community health nurses, and community leaders. Enrolled CHWs will be trained in patient care, correct BP measurement, psychosocial support, health education for hypertension patients, and ethical issues in public health programs. Each CHW will then be tasked to provide services such as routine BP measurement, health education and counseling, symptom monitoring, and referring patients to at most eight clients through fortnightly focused home visits guided by the HoMHyper Curriculum. In addition, the CHWs will communicate outside the bimonthly home visits via phone. Standard Operating Procedure Manuals, checklists, and registers will be used to guide and record the program activities, and the CHWs will submit the statistical records and provide monthly feedback to the local clinic nurse.

Study design and setting

We conducted a prospective formative study using an exploratory qualitative design to ascertain the barriers and facilitators before implementing the CHW-delivered HoMHyper intervention. Face-to-face interviews were conducted among stakeholders (nurses, health authorities, and CHWs). Health authorities included the Mutare City Health Director, City Health Nursing Manager, and City Health Promotion Officer. The interviewed CHWs were individuals who actively participated in community mobilization and community health programs over the last 12 months and resided within the clinic's catchment area. A multiple-stakeholder approach that covers relevant aspects relative to the implementers' perspective on the successful implementation of the intervention was employed. The CFIR was used to guide the development of interview questions, organize the coding process, and summarize the findings.[24] The HoMHyper intervention is a multicentric project covering five urban primary healthcare centers/clinics (PHCs) in Mutare, Zimbabwe's third most populous city, located on the country's eastern border with Mozambique. There are eight public primary care clinics and an estimated 22 private medical facilities focused on outpatient health services for most of the city residents. The five clinics included in this study were all public health facilities. Three clinics (Chikanga, Dangamvura, and Hobhouse) were primarily high-density residential suburbs with residential stands ranging from 70 to 200 m^2, while Florida and City clinics mainly covered low- and middle-density suburbs with residential stands ranging from 300 to 2000 m^2.[25] Data were collected between June and July 2023.

Study participants

This article reports the qualitative findings from in-depth interviews among 10 primary health care nurses, three health authorities, and semi-structured interviews among 25 CHWs. All participants were purposively selected, and clinic nurses were selected based on their involvement in chronic disease management. Health authorities were based at the city health department offices, and these were selected according to how active they were in community-based programs. The nurse manager provided the names of potential CHW interviewees. Participants were called to ascertain their interest in the interviews, and the appointment date and time were set upon their agreement to participate.

Patient and Public Involvement

Hypertension patients were not involved in this exploratory qualitative study; however, we conducted a patient survey prior to this study.[26] The patient inputs from that survey were instrumental in developing the research question and interview guides for the present study. Patients and their families were included in the community meetings conducted to disseminate the study findings. Since the intervention will be implemented within the community, we plan to involve the patients and encourage community member involvement during the iterative planning process of implementation activities and program evaluation.

Procedures

A team of four researchers (primary investigators) comprising two public health officers (PTM and TH) and social scientists (CM and PZ) developed the interview guides based on barriers and facilitators to community interventions from the literature. Consensus on which components to include in the interview guides was reached based on individual clinical and epidemiological expertise, as well as evidence from the patient survey conducted prior to the in-depth interviews.[26] The in-depth interview guide (Supplementary File 1) and semi-structured interview guide (Supplementary File 2) were pilot-tested using two non-participating nurses and three CHWs.

A two-day training on qualitative data collection was conducted in May 2023. The interviews were conducted by LM (Public Health Nurse) and PTM (Ph.D. Student in Epidemiology). Two note-takers with undergraduate degrees in social work were also trained to transcribe interview questions to reduce interviewer bias. One interviewer and a note-taker interviewed each participant in a private room at the health facilities (for nurses and CHWs) and health department offices (for health administrators). Guided by the protocol approved by the Africa University Research Ethics Committee and the Medical Research Council of Zimbabwe, written informed consent was obtained from all participants.

Before administering the interview guide, the interviewer described the proposed HoMHyper intervention to the participant. Audio-recorded interviews with CHWs were conducted in Shona and transcribed verbatim first in Shona, then translated to English by two linguistic experts from Africa University. Nurses and health administrators' interviews were conducted in English. Field notes were taken during the interview session. The qualitative interviews were recorded using the Sony ICD-PX370 mono digital voice recorder and transcribed verbatim to Word document transcripts that were then imported into the NVivo 14 software.[27]

Data analysis

The analysis was based on transcribed files and field notes. We used the deductive approach to develop a coding frame based on contextually relevant CFIR domains. PTM, PMM, and PZ conducted the data coding process. The three coders reviewed the CFIR definitions before coding to standardize the process. The initial coding process was conducted independently using the NVivo 14 software while considering the conceptual model. To incorporate the CFIR into data coding, we used the transformation technique, which involved developing codes based on the research question and then transforming the codes to reflect the components related to the CFIR. The findings of the individual coding were compared and reconciled through an iterative process until an agreement was reached on the identified set of codes. The codes were then categorized to develop themes and assign relevant quotes to each theme. In case of conflicting coding results between two coders, the third coder acted as the tiebreaker. In addition, the analysis team was collectively mindful of how reflexive they could be and avoided letting their personal experience and participation in the project influence the findings.[28] Although participants' quotes were used in reporting, we anonymized the participants to preserve confidentiality due to the small size of professional health workers who participated in the study.

Open codes were aggregated according to the CFIR domains, and each construct was rated as an implementation barrier or facilitator by PTM, PMM, TH, and PZ. The ratings were adopted from recommendations by Gimbel et al.[29], who classify scores as +2 (strong positive influence on implementation), +1 (weak positive influence on implementation, -1 (weak positive influence on implementation, and -2 (strongly hindering implementation). The four raters individually reviewed the codebook, rated each CFIR construct, and gave a valence score. The total valence score for each construct was the average individual score from the raters. We used the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines to report the study findings.

RESULTS

All invited participants agreed to participate in the study. Semi-structured interviews were conducted among 25 CHWs (five per clinic). About 32% of the CHWs had a chronic condition, all possessed a mobile phone and were willing to dedicate an average of 20 hours per week to program implementation. On average, each in-depth interview lasted about 50 minutes, and semi-structured interviews were 35 minutes long. Participant quotes are italicized and minimally edited to improve conciseness and clarity. Table 1 displays the sociodemographic characteristics of participants and Table 2 shows the CFIR constructs and their perceived impacts on the program and the valence scores for stakeholder perceptions assigned to the constructs by the authors.

Table 1. Sociodemographic characteristics of participants (n=38)

Variable	Characteristics	Community Health Workers (n=25)	Nurses (n=10)	Health authorities (n=3)
Age (years)	Mean±standard deviation	39.0±9.6	35.4±4.6	43±6.1
Work Experience (years)	Mean±standard deviation	5.6±3.1	6.0±3.3	6.2±4.9
Sex	Male	9	0	0
	Female	16	10	3
Highest level of education	Primary	2	0	0
	Ordinary level	23	0	0
	Diploma	0	8	0
	Undergraduate degree	0	2	2
	Master's degree	0	0	1
Religion	Christian	22	9	3
	None/Other	3	1	0

Table 2. CFIR constructs and their perceived impacts on the HoMHyper intervention and valence scores for stakeholder perceptions assigned to the constructs

Domain	Construct	Valence Score*

	Perceived Barriers (n=5)	Perceived facilitators (n=10)	
Intervention characteristics		Better than current practice	2.00
		Easy to implement	1.50
		Adaptable to the local setting	1.75
Inner setting	Staff shortages		-0.50
	CHW incentivization		-2.00
		Organizational commitment	1.50
		CHW training and support	2.00
Outer setting	Patient privacy and confidentiality		-1.25
	Access to medication, stockouts, and equipment shortage		-2.00
		Community partnership and connections	1.50
Individual domain	Patient knowledge and beliefs about hypertension		-1.00
		CHW self-efficacy	1.50
		CHW knowledge and skills	1.75
Process		Structured planning of activities	2.00
		Engagement and communication	1.75

**A positive score denotes a positive influence, while a negative score denotes a negative influence on intervention implementation.*

DOMAIN 1. INTERVENTION CHARACTERISTICS

Theme 1. Intervention better than current practice `

The participants perceived the proposed program as an essential strategy to improve coverage, considering that currently, hypertension patients were receiving suboptimal services, and the chronic disease surveillance system was virtually nonexistent. This was an opportunity to follow up and recover many participants who were no longer seeking services from the facilities. As some participants related:

> "*All we can do for those* (patients) *who are unable to come to our clinics is simply to ask them to send a relative with their health cards to the clinic to get a resupply (medication),*

but we are not able to see the patient, we are not able to monitor them, and we are not sure whether this medication is working or not. This is a major (service) *gap*."

"*We have many people with missing checkup visits and defaulters in the register. There is nothing we can do about it. The urban population only has one HPO* (Health Promotion Officer)*, and she needs help coordinating all the community health programs. This will be an excellent complementary program*."

Although some of the reasons why the hypertension patients had absconded were obvious, such reasons were mostly generalized assumptions, and the proposed intervention was an opportunity to offer individualized care and understand their unique explanations. In their perceptions, the HoMHyper intervention was superior to the current practice in hypertension management. One CHW shared:

"*I think the proposed approach will be very beneficial to the management of hypertension. The queues at the clinic are usually long, and they don't have the medication. The most common thing is that hypertension patients solicit health services when they are doomed and very sick.* (By that time) *the blood pressure is very high, and outcomes are often poor. Home BP measurements will help*."

Theme 2. Easy to implement

The intervention was perceived as simple, feasible, and achievable. Most CHWs felt they were already involved with almost similar tasks in their current scope of work. Despite the lack of information about hypertension care in the community, the functions and limits of the CHW operations are clearly outlined in the CHW guidelines developed by the Ministry of Health and Child Care. There were long-standing relationships and communication between the CHWs and the community, as well as between the CHWs and the nurses at the clinic, as relayed by the study participants:

"We (CHWs) *used to do home follow-ups and counseling of stroke patients in the home-based care program and helped relieve the primary caregivers sometimes. We had to report to the clinic with information on the status of every patient under our care."*

"With a few training sessions. I am confident CHWs can accurately measure patient BP; it's not like this is medical surgery."

Theme 3. Adaptable to the local setting

This intervention was perceived to be feasible and a good fit for both the patients and the health system because a similar preexisting intervention had already proved successful in managing other conditions in this setting. An established model for CHW-delivered care for the HIV and Antiretroviral therapy (ART) program in which CHWs visit, organize community support groups, and counsel patients on nutrition and the importance of adherence to ART. Stable patients form Community ART Refill Groups (CARGs) to reduce the burden of frequent facility visits. This model could be adapted and modified to fit the needs of hypertension patients. In addition, CHWs in rural areas were responsible for malaria testing and dispensing antimalarial medication for uncomplicated malaria. By drawing existing evidence from the ART and Malaria programs, planners can use this information as a template for implementer training, fidelity support, and documentation and tailor it to meet the needs of the hypertension patients, as cited by some of the participants:

> *"It's being practiced for ART CARGs to cut on travel costs and time spent at the clinic, and this can also apply to hypertension patients."*

> *"Well, this could be similar to the ART program. We do home visits except for hypertension; the medications are not free like anti-tuberculosis drugs and ART, where the medication is free and readily available."*

DOMAIN 2. INNER SETTING

Theme 1. Staff shortages

The selected participating sites were experiencing chronic staffing shortages. Despite the consensus that the Community Nurse and the Health Promotions Officer were integral to the project implementation, the study participants felt that these professionals may need help to participate in the project, given other competing responsibilities. Thus, a roving project coordinator was required to work closely with the two community health professionals.

> *"The working conditions are stressful due to a shortage of clinicians; this initiative will reduce the workload at the clinic and the waiting period of patients visiting the facility.*

> *"The Community Nurses may help with monitoring the CHWs. However, they are just a few, and their schedules are swamped. I recommend you have your own coordinator to work with the Community Nurses."*

Due to understaffing and high disease burden, health providers limited their consultation time to the minimum to serve as many patients as possible. As two nurses reflected on their daily frustration of a disproportionate work burden to health provider problems:

> *"It's a timely and appropriate program because, honestly, the staff shortage is extreme. We can't afford to see people in the community as registered nurses. It's near impossible because most nurses have gone kuchando* (greener pastures, mostly Western countries)*."*

Theme 2. Organizational commitment

The interviewed health authorities welcomed the program and perceived the program as acceptable and feasible. They were committed to assisting as necessary and helping unveil available human and material resources. The study participants acknowledged that the program would relieve the staff shortages at the public health clinics involved. In addition, they also alluded to the erratic antihypertensive medication supply from the central national pharmacy and recommended the inclusion of a medication component to the intervention.

> *"It's an excellent program as it improves access to services and medication adherence and increases awareness of the condition in the community. We assure you of our support to the best extent possible."*

> *"This method is timely because most patients don't want to visit the clinic for monthly checkups when stable."*

Theme 3. CHW training and support

One of the fundamental enablers of implementing the intervention is clarity of the expected goals and expectations by all the stakeholders involved. The study participants consistently raised the need for rigorous training for the CHWs. CHWs should be trained in hypertension management, including BP measurement, lifestyle modification, patient counseling, medication adherence, and patient referral systems. The training will increase CHW's confidence and motivation through educational capacity. Participants suggested including pre-and post-tests, reflection sessions, and role plays to measure the assimilation of the desired knowledge during CHW training. The Community Nurse would then be instrumental in following up CHWs and observing them during the early phases of patient engagement before providing feedback on the observed session.

> "*Capacity building through training, teaching the CHWs about blood pressure, signs and symptoms, and differential diagnosis. Educate them on lifestyle changes, diet, drug compliance, exercising, and healthy living."*

Regular surveillance audits will be necessary for ongoing program activity monitoring and evaluation to ascertain fidelity. The activity guiding principles would be developed with representatives from all stakeholders.

> *"To avoid confusion, proper record keeping will ensure accountability and simplify supervision channels, especially if you include an antihypertensive medication dispensing component."*

Theme 4. CHW incentivization

CHW allowances and incentives were perceived as essential to motivate them during implementation. Because CHWs may not have a different income source and are likely to face the same life stressors as other community members, incentives would help enhance their morale and sustain their dedication to project activities. Current programs involving CHWs hosted by the Ministry of Health were poorly funded, and the CHW incentives needed to be revised. To encourage intervention-related services and regular attendance of training sessions, the CHWs require incentives in the form of transport, food, and time reimbursements, and these were to be one of the priorities during budgeting. We also observed that most CHWs were highly dependent on these incentives for their day-to-day living since they did not have other sources of income.

> *"It will be important to motivate the CHW through incentives; if there are no incentives for that cadre or incentives are too little for that cadre, one might not be motivated to work."*

On the one hand, we noted how the provision of program-branded regalia was perceived as a motivational factor, and this helped to identify them as appointed program officials. On the other hand, branded uniforms aided in the ease of recognition, acceptability, and program visibility by hypertension patients.

> *"Bringing this program, we need to make sure people are aware, people are well branded to know that these are CHWs, maybe if they wear some reflectors so that the community will quickly identify them. I suggest adding some IDs so that the patients are thoroughly convinced.*

DOMAIN 3. OUTER SETTING

Theme 1. Patient privacy and confidentiality

Patients' living conditions will significantly impact their participation in this intervention. Most female participants mentioned patient privacy and confidentiality, considering that the CHWs were supposed to visit clients' homes. Most clients, particularly those residing in high-density suburbs, were tenants renting a few rooms and may feel uncomfortable with the CHW intruding into their space. In addition, some landowners restrict visitors who are supposed to enter their premises, which was noted as a barrier to home visiting.

> *"Some patients want to keep their health information confidential and may feel that the CHW may not be able to keep this information private since the CHW will be from the same community."*

> *"Urban residents are not as communal as rural residents; in the urban area, people need their privacy and may not welcome the CHWs because they don't want other neighbors to know what is happening in their lives."*

Given the observed complexities in living arrangements, providing individualized blood pressure monitoring would be imperative, considering the patient's preference and context.

Theme 2. Access to medications, stockouts, and shortage of equipment

Most antihypertensive medications were not available at the primary care clinics, and many patients purchased medications out-of-pocket from private pharmacies. The medication and diagnostic test access gap caused many losses to follow-up and nonadherence to treatment by patients who could not afford the antihypertensive medications due to high levels of unemployment and poverty within this population. Purchasing antihypertensive medications competed with other basic daily needs. The unavailability of medications and affordable laboratory tests played a significant role in clinic attendance rates, thus contributing to high losses to follow-up.

> "*Whenever I prescribe for a patient to go and buy at a private pharmacy, it is difficult to tell if they go to buy or not. The drugs at the pharmacies are expensive for most of our patients. I am hypertensive, and I can attest to their plights when they say the prices are beyond their reach*."

The nurses from all five primary care clinics reported that they were experiencing chronic antihypertensive medication shortages, and the only consistently available medication was Hydrochlorothiazide (HCT). Study participants emphasized that an intervention that provides BP measurement and health education without including a free or subsidized medication component was destined to fail.

> "*Nifedipine is one of the important hypertensive medications that we use to stabilize our patients when they come with very high BP. The last time we had it (*Nifedipine*) was four months ago. Imagine having to prescribe for the relatives to go and buy in town while you look at the patient suffering! (*As a nurse*), you feel helpless."*

The health facilities received medications from two suppliers, namely, i) NatPharm, a national pharmaceutical company under the Ministry of Health, and ii) the City Health Department. Antihypertensive medications from NatPharm were given to patients for free, and patients had to pay for the rare supplies from the City Health Department.

Most facilities had one functional electronic sphygmomanometer; in cases of breakdown, they sometimes went for days without a replacement. Resource limitations consequently disrupted hypertension patient management, and many patients stopped visiting the clinic for their routine BP monitoring.

> "*Despite having multiple clinic departments here, we only have a single functional BP machine. In cases when one staff member is using it, I and the client have to wait, and you know our clients can be in a hurry sometimes.*"

Theme 3. Community partnerships and connections

Stakeholder engagements were highly recommended to maintain a network with external entities, and community consultations were crucial to the program planning, implementation, and evaluation phases. Creating relationships with community leadership and other organizations working in this community would promote adoption, ownership, resource pooling, and guidance on activity implementation. The health professionals mostly raised these sentiments:

> *"We must break the 'we against them' boundary between the community and health system. Let's share the vision with the community organizations in our monthly meetings. They know their community better and can support with early identification of challenges."*

The preexisting relationships between the CHWs and the communities they worked for were perceived as a vital consideration for program planning. Using the local CHWs was appropriate to introduce an emic perspective to the program.

> *"Patients are likely to buy the idea from someone they already know and are well acquainted with. They* (CHWs and hypertension patients) *are uniquely aware of what these patients experience, and they have a lot in common, like church or their children going to the same school."*

> *"I think dealing with local people from the same language, culture, and understanding will help enhance the transmission of health messages to the patients. I know this from working in the MHURI program."*

DOMAIN 4. INDIVIDUAL CHARACTERISTICS

Theme 1. CHW self-efficacy

The delivery of the intervention by CHWs who resided in the same setting and shared almost the same social and economic conditions as the end-users was hailed to have an emic effect on the implementer-patient relationship. It was perceived that this would reduce communication barriers and enhance culturally sensitive counseling by the trained CHWs. Additionally, the CHWs acknowledged that their participation would be an opportunity to positively contribute to the community's health. Adequate training, resources, and supervision were perceived as crucial self-efficacy enhancers, as expressed by both the CHWs and HCWs:

> *"Dealing with our people of the same culture and the same understanding is more like a norm because we are helping each other at the same level. Home visits will also allow extended discussions. We all live here."*

> "*Also, the CHWs should be motivated to do their work. It's how they will portray themselves in the patient's presence."*

Theme 2. CHW knowledge and skills

On personal attributes of the CHW, the health providers highlighted the need to engage CHWs who are in good standing with their local community and had shown good initiative from their previous health-related assignments either with the public health system or private partners working within the community. Achieving a team of CHWs with these qualities would require the

involvement of the nurses at the clinic and local community leaders. The preferred demographic characteristics were middle-aged women with at least some Ordinary Level qualifications.

> *"CHWs must be capable of dispelling misconceptions, addressing patient concerns, referring when in doubt, and providing feedback to the nurses."*

> *"They (CHWs) should be someone with a good reputation in their area, mature, and someone patients can trust with health information."*

Many CHWs had formal training in general patient care but were mostly competent in infectious disease and maternal and child health services care. Thus, there was a need for intensive training on BP measurement, BP reading interpretation, lifestyle modifications, and treatment adherence as a way of capacitating them. Clarity of the roles and responsibilities of CHWs and facility nurses for hypertension management was identified as a core component of the intervention.

> *"I had an experience taking care of my mother, who had a stroke and high blood pressure, but I feel I only did what I had to do. The training on hypertension and support from nurses will help me understand more about hypertension patient care."*

Theme 3. Patient knowledge and beliefs about hypertension

Hypertension patients' attitudes and current practices were reported to play a significant role in implementing the HoMHyper program. The study setting generally constitutes a low-income population, and hypertension knowledge was perceived as poor. Some cultural and religious beliefs were barriers to hypertension management, with some opting for this route because it is cheap and convenient. CHWs had a significant role to play in addressing these beliefs, and the participants predicted the waning of these practices if the proposed program were to provide affordable, subsidized, or free medications.

> *"Some patients take traditional concoctions or herbal preparations like avocado leaves and olives thinking they will help, while others say antihypertensive medication causes diabetes. Some treat antihypertensives like antibiotics courses and think they will get healed after finishing the month's supply. You can't blame them!"*

Because of the lack of health education on diagnosis, many hypertensive patients had limited knowledge of signs and symptoms, prevention, management, and control of hypertension. Some may stop taking their chronic medication after consulting spiritual healers. Unregistered alternative medicine vendors were also exploiting desperate hypertension patients, promising them cheaper solutions for their disease management challenges.

> "*Newly diagnosed patients are mostly given medication, but little or no education is unveiled. The nurses or pharmacists are overwhelmed. Some* [patients] *treat antihypertensives like antibiotics courses and think they will get healed after finishing the month's supply. They don't have all this information to know that they are on these drugs for life and are not aware of the lifestyle adjustment they have to make because of the diagnosis."*

DOMAIN 5. PROCESS

Theme 1. Engagement and communication

Constant and clear communication and coordination between the community implementers and the health providers at the health facility were cited as essential aspects of the project to ensure that patient management data is consolidated into the formal records at the clinic. Formal and informal communication channels exist between the community and health system through the Community Nurses and CHWs. Regular supervision of CHWs can be conducted for quality control and documentation of activities such as blood pressure measurements, medication dispensed, counseling sessions, follow-up calls, and patient visit outcomes were also suggested.

> *"As a clinic, the initiative helps us track patients and encourage them to follow recommended lifestyle behaviors and medication adherence. Tracking treatment defaulters and patients on home-based care will be possible because many don't come to the clinic."*

> *"We have social media WhatsApp groups, we can use phones, and CHWs can go and tell the patients what we want them to do. Recording activities, accountability, and supervision will be critical, particularly for the dispensing component of the program."*

The nature of communication would vary depending on the services required. Regular supportive supervision of CHWs by the community nurse through observation sessions and phone calls was mentioned as an essential activity to ensure intervention fidelity. Furthermore, monthly CHW visits to the clinic would enable routine supervision and feedback from the facility nurse. Addressing challenges and brainstorming solutions during these visits would likely optimize project fidelity and accomplish the set goals.

Theme 2. Structured planning of activities

The assembling of the intervention was considered a primary attribute to the failure or success of the intervention. To implement distinctive work, the program planners ensure that all program components are in place, accessible to the implementers, and, at the same time, acceptable and satisfactory to the patients. This was mirrored in the responses of most of the participants:

> "*These CHWs must be trained and have resources like blood pressure machines, log forms, screening tools, registers, and proper training on hypertension, the signs and symptoms, where to refer, and when to refer. We need active CHWs who are dedicated and knowledgeable of their duties. Phones for the CHWs can also help for easy communication.*"

> "*If the community is not sensitized enough, patients will not be open to the CHWs because of the lack of information on the new initiative. The organization of activities must be of high quality. Also, the CHWs must be easily identifiable with branded uniforms. You know, many people are skeptical of bogus individuals*."

DISCUSSION

We used the CFIR to determine the barriers and facilitators to implementing the HoMHyper program. Different constructs were identified as barriers or facilitators under the different CFIR domains. The perceived universal barriers were the shortage of staff, patient privacy and confidentiality, access to antihypertensive medication, and shortage of equipment, CHW incentives as well as patient knowledge and beliefs about hypertension. The study participants cited that the proposed innovation was superior to the current practice, was easy to implement, and adaptable in the local context. Commitment from health system leadership, CHW training and support, regular engagement between CHWs and health providers, community partnerships, CHW self-efficacy, and knowledge and skills were perceived as program facilitators.

As innovation deliverers, CHWs were noted to be an integral part of the program. CHWs increase access to health services in low-resource settings affected by challenges such as low health provider-to-population ratio, cultural and language differences, and poor geographical accessibility.[30] With adequate training on the expected tasks, CHWs can bridge the gap between providers and communities. Besides improving confidence in performing tasks, training ensures the standardization of competencies and skills. Furthermore, the CHWs will have to be adequately incentivized to execute the implementation tasks with diligence. In a resource-constrained context

such as Mutare, economic opportunities are limited, and most people live in poverty. Incentivizing the program activities can attract CHWs for recruitment, motivate them to perform well, and retain them in the program. Other studies also emphasized the importance of motivating the CHWs.[31,32] Creating an environment where the CHWs feel valued will likely enhance the program fidelity, ownership and continuity.[33] However, if substantial, CHW incentives may limit program sustenance in resource-constrained contexts, given the bureaucratic barriers and competing priorities confronting traditional funding sources such as local government, volunteer-based or community budgets.[34] Underinvestment and limited political support in CHW programs in Zimbabwe may negatively affect their future sustainability. These issues can be addressed through innovative financing strategies. Implementing a social health insurance scheme can help improve CHW service coverage.[34]

CHW-delivered hypertension management can offer a significant return on investment[35] primarily because their activities can be leveraged on preexisting resources to provide widespread benefits. For instance, they may not require complex equipment, protracted training, or infrastructure such as offices and workstations. However, the study findings revealed the lack of basic supplies for hypertension management, e.g., sphygmomanometers and point-of-care diagnostic equipment at the primary health facility level, which is the first point of patient contact with the formal health system. It will be imperative for the program to consider additional supplies to capacitate the affected clinics and advocate for alternative funding to promote sustainability.

Task-shifting models that involve trained nonprofessionals can help to relieve staff shortages in the healthcare system. Burnout due to staff shortages, high disease burden, lack of support, and resource limitations is high among nurses in sub-Saharan Africa (prevalence: 33-87%)[36] and this has a deleterious effect on achieving sustainable development goal number 3.[37] The interviewed study participants agreed that structural interventions such as adding CHWs and advocating for better resources for blood pressure management would partly reduce staff workload and burnout at the clinics. Similarly, the supporting role of CHW was reported to ease work pressure, significantly reduce patient waiting times, expand service reach, improve patient retention, and increase uptake of services in HIV programs in sub-Saharan Africa.[38] This work supports the notion that task-shifting approaches can help enhance health service delivery in contexts of low staff coverage.

Leadership engagement and partnership emerged as strong facilitators for the intervention implementation in inner and outer settings. Sustained program implementation depends on political and financial commitment, and these can only be guaranteed if health authorities and

community leadership are consulted and integrated into the program design and implementation processes.[39] Leadership can be a decisive pillar that defines the strength and quality of implementation because individuals in authority influence implementers' recruitment, motivation, performance, and retention.[40] Thus, engagement with health authorities, nurses at the facilities, and trusted community leaders will be vital for implementing this program.

We noted that the individual characteristics of patients, particularly confidentiality, knowledge, and practices of hypertension management, could influence program implementation. The use of alternative medicine and spiritual healing due to misinformation and the inability to afford medications was rife in this setting. This is consistent with other similar settings where hypertension patients preferred alternative medicine and feared adverse outcomes of treatment.[41] Despite the proven effectiveness of some complementary therapies in the management of hypertension,[42] most of the herbal preparations used locally have not been scientifically tested, and therefore, their efficacy and dosage are unknown. A study in Nigeria also reported that complementary medicine was perceived to reduce the burden of hypertension treatment, mostly among patients from poor households. Medical pluralism among patients is common in sub-Saharan Africa[43], and this can reduce or modify the potency of the antihypertensive treatment and cause adverse outcomes. Further investigations will be needed to understand the preference and sentiments around the use of complementary to allopathic medicine, given that there is limited empirical evidence of the impact of alternative medication for hypertension management in Zimbabwe.

Limitations

Our study had the following limitations. We cannot generalize our findings to all clinicians, administrators, and CHWs since the data analyzed only presented their perceptions and experiences. By using the inductive approach in which CFIR domains were pre-selected for coding, we may have missed barriers and facilitators that fall outside the domains of the framework. Although we had male participants in the CHW category, all nurses and health authorities interviewed were female, and this may have introduced bias to the responses obtained. We only included the health facilities in the public health sector, and professionals from the private sector may have different perspectives considering the differences in job satisfaction, remuneration, resources, and medication availability. However, selecting the public health clinics was a sensible sampling strategy since most underserved hypertension patients seek health services from these facilities.

Conclusions

Our qualitative analysis findings demonstrate that the integration of CHWs into chronic disease management into health service delivery can potentially improve health service access, particularly in low-resource settings. Using the CFIR can be instrumental in organizing implementation evidence for planning the implementation of community-based interventions in low-income settings. In the face of chronic health staff and resource shortages, it will be crucial for health systems to be adaptable and proactive to reduce NCD burden and optimize the available resources to meet and sustain health goals. The findings demonstrate the potential roadblocks and drivers for CHW-delivered interventions for managing hypertension and other chronic diseases within the community. The emphasis is on involving implementers, leadership, and end-user perceptions for planning and recruiting the implementation team. Improving coverage of chronic disease management requires strong support from health and community leadership, building community trust, and coordinated communication. Training and supervising the CHWs will be essential to ensure program fidelity, while program branding and incentivizing the CHWs can motivate participants and sustain the program. However, program planners must anticipate and prearrange to overcome mainstay challenges that may disrupt intervention delivery. In this study, a sustainable funding source to cover program essentials such as medication availability and CHW incentives plays a significant role in intervention sustainability.

Authors' information

The researchers hold the following credentials: PTM (BSN, MPH, Ph.D. Student), MM (BSN, MPH Student), PM (MPH, MD, Ph.D Student), TH (BOT, MPH), LM (BSN, MPH), PZ (BA, MScDS), PMM (Dip Ed., BSc Soc, MPhilRD, PhD, and FMM (MPH, MD). During the study period, PTM and PM were PhD students, MM was an MPH Student, TH was a Research Technical Assistant, PZ was a Programs Officer, PMM was a Senior Lecturer, LM was the Project Coordinator, and FFM was the Director of the Africa University Clinical Research Center. Only PTM, PZ, and MM were male researchers.

Author Contributions: PTM, PZ, and PMM contributed to the concept and design. LM, TH, PMM, and PTM contributed to the recruitment of participants for this study. PTM, MM, TH, FMM, and PM contributed to the drafting of the manuscript. PTM and PMM contributed to the administrative, technical, or material support. PTM, PZ, LM, and PMM had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors contributed to and approved the final manuscript. The corresponding author affirms that

all listed authors meet authorship criteria. PTM is the guarantor and is responsible for the overall content of the manuscript.

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References

1. World Health Organization. *Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases*.; 2011. https://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf

2. Zhou B, Carrillo-Larco RM, Danaei G, et al. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet*. 2021;398(10304):957-980. doi:10.1016/S0140-6736(21)01330-1

3. Adeloye D, Basquill S. Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *PLoS One*. 2014;9(8). doi:10.1371/JOURNAL.PONE.0104300

4. Wozniak G, Khan T, Gillespie C, et al. Hypertension Control Cascade: A Framework to

Improve Hypertension Awareness, Treatment, and Control. *J Clin Hypertens*. 2016;18(3):232-239. doi:10.1111/jch.12654

5. Geldsetzer P, Manne-Goehler J, Marcus ME, et al. The state of hypertension care in 44 low-income and middle-income countries: a cross-sectional study of nationally representative individual-level data from 1·1 million adults. *Lancet*. 2019;394(10199):652-662. doi:10.1016/S0140-6736(19)30955-9

6. Okoroafor SC, Christmals C Dela. Task Shifting and Task Sharing Implementation in Africa: A Scoping Review on Rationale and Scope. *Healthc (Basel, Switzerland)*. 2023;11(8). doi:10.3390/healthcare11081200

7. LeBan K, Kok M, Perry HB. Community health workers at the dawn of a new era: 9. CHWs' relationships with the health system and communities. *Heal Res Policy Syst*. 2021;19(S3):116. doi:10.1186/s12961-021-00756-4

8. Jeet G, Thakur JS, Prinja S, Singh M. Community health workers for non-communicable diseases prevention and control in developing countries: Evidence and implications. Maulik PK, ed. *PLoS One*. 2017;12(7):e0180640. doi:10.1371/journal.pone.0180640

9. Kim K, Choi JS, Choi E, et al. Effects of Community-Based Health Worker Interventions to Improve Chronic Disease Management and Care Among Vulnerable Populations: A Systematic Review. *Am J Public Health*. 2016;106(4):e3-e28. doi:10.2105/AJPH.2015.302987

10. Bosworth HB, Powers B, Olsen M, et al. Home Blood Pressure Management and Improved Blood Pressure Control. *Arch Intern Med*. 2011;171(13):1173. doi:10.1001/archinternmed.2011.276

11. McManus RJ, Little P, Stuart B, et al. Home and Online Management and Evaluation of Blood Pressure (HOME BP) using a digital intervention in poorly controlled hypertension: randomised controlled trial. *BMJ*. Published online January 19, 2021:m4858. doi:10.1136/bmj.m4858

12. Green BB, Cook AJ, Ralston JD, et al. Effectiveness of Home Blood Pressure Monitoring, Web Communication, and Pharmacist Care on Hypertension Control. *JAMA*. 2008;299(24):2857. doi:10.1001/jama.299.24.2857

13. Allen JK, Dennison-Himmelfarb CR, Szanton SL, et al. Community Outreach and

Cardiovascular Health (COACH) Trial. *Circ Cardiovasc Qual Outcomes*. 2011;4(6):595-602. doi:10.1161/CIRCOUTCOMES.111.961573

14. World Health Organization. *Primary Health Care*.; 2021. https://www.who.int/news-room/fact-sheets/detail/primary-health-care

15. Kostova D, Spencer G, Moran AE, et al. The cost-effectiveness of hypertension management in low-income and middle-income countries: a review. *BMJ Glob Heal*. 2020;5(9):e002213. doi:10.1136/bmjgh-2019-002213

16. Jafar TH, Gandhi M, de Silva HA, et al. A Community-Based Intervention for Managing Hypertension in Rural South Asia. *N Engl J Med*. 2020;382(8):717-726. doi:10.1056/nejmoa1911965

17. Thapa R, Zengin A, Neupane D, et al. Sustainability of a 12-month lifestyle intervention delivered by community health workers in reducing blood pressure in Nepal: 5-year follow-up of the COBIN open-label, cluster randomised trial. *Lancet Glob Heal*. 2023;11(7):e1086-e1095. doi:10.1016/S2214-109X(23)00214-0

18. Nilsen P, Birken S. Epilogue. In: *Handbook on Implementation Science*. Edward Elgar Publishing; 2020:527-528.

19. Nilsen P. Making sense of implementation theories , models and frameworks. *BMC Implement Sci*. Published online 2015:1-13. doi:10.1186/s13012-015-0242-0

20. Damschroder L, Reardon C, Widerquist M, Lowery JC. The updated Consolidated Framework for Implementation Research based on user feedback. *Implement Sci*. 2022;17(75). doi:10.1186/s13012-022-01245-0

21. Damschroder LJ. Clarity out of chaos: Use of theory in implementation research. *Psychiatry Res*. 2020;283:112461. doi:10.1016/j.psychres.2019.06.036

22. Long H, Huang W, Zheng P, 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). *Int J Environ Res Public Health*. 2018;15(11):2378. doi:10.3390/ijerph15112378

23. Keith RE, Crosson JC, O'Malley AS, Cromp D, Taylor EF. Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: a rapid-cycle evaluation approach to improving implementation. *Implement Sci*. 2017;12(1):15.

doi:10.1186/s13012-017-0550-7

24. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*. 2009;4(1):50. doi:10.1186/1748-5908-4-50

25. Marongwe N, Mukoto S, Chatiza K. *Scoping Study: Governance of Urban Land Markets in Zimbabwe*.; 2011. https://housingfinanceafrica.org/app/uploads/scoping_study_gov_ulm_zimbabwe.pdf

26. Mundagowa PT, Zambezi P, Muchemwa-Munasirei P. The prevalence and determinants of blood pressure control among hypertension patients in eastern Zimbabwe: A cross-sectional study. Makurumidze R, ed. *PLoS One*. 2024;19(3):e0293812. doi:10.1371/journal.pone.0293812

27. Lumivero. NVivo (Version 14). Published online 2023. www.lumivero.com

28. Cayir E, Felder TM, Nkwonta CA, Jackson JR, Dawson R. Discovering New Connections: Insights From Individual and Collective Reflexivity in a Mixed Methods Study. *Int J Qual Methods*. 2022;21:160940692211057. doi:10.1177/16094069221105707

29. Gimbel S, Rustagi AS, Robinson J, et al. Evaluation of a Systems Analysis and Improvement Approach to Optimize Prevention of Mother-To-Child Transmission of HIV Using the Consolidated Framework for Implementation Research. *JAIDS J Acquir Immune Defic Syndr*. 2016;72(2):S108-S116. doi:10.1097/QAI.0000000000001055

30. Coffinbargar M, AJ D, Westfall J. Risks And Benefits To Community Health Worker Certification. Health Affairs Forefront. doi:10.1377/forefront.20220705.856203

31. Chitiyo C, Verhey R, Mboweni SN, et al. Applying the Consolidated Framework for Implementation Research to Optimize Implementation Strategies for the Friendship Bench Psychological Intervention in Zimbabwe. *Glob Implement Res Appl*. 2023;3(3):245-258. doi:10.1007/s43477-023-00093-4

32. Maes K, Kalofonos I. Becoming and remaining community health workers: Perspectives from Ethiopia and Mozambique. *Soc Sci Med*. 2013;87:52-59. doi:10.1016/j.socscimed.2013.03.026

33. Colvin CJ, Hodgins S, Perry HB. Community health workers at the dawn of a new era: 8.

Incentives and remuneration. *Heal Res policy Syst*. 2021;19(Suppl 3):106. doi:10.1186/s12961-021-00750-w

34. Adjagba A, Gabida M, Akoth C, et al. Sustainable Financing of Community Health Workers: Could Social Health Insurance be a Panacea? Center for Global Development (CGD). Published 2024. https://www.cgdev.org/blog/sustainable-financing-community-health-workers-could-social-health-insurance-be-panacea

35. Kangovi S, Mitra N, Grande D, Long JA, Asch DA. Evidence-Based Community Health Worker Program Addresses Unmet Social Needs And Generates Positive Return On Investment. *Health Aff*. 2020;39(2):207-213. doi:10.1377/hlthaff.2019.00981

36. Owuor RA, Mutungi K, Anyango R, Mwita CC. Prevalence of burnout among nurses in sub-Saharan Africa: a systematic review. *JBI Evid Synth*. 2020;18(6):1189-1207. doi:10.11124/JBISRIR-D-19-00170

37. World Health Organization. *Targets of Sustainable Development Goal 3*.; 2023. https://www.who.int/europe/about-us/our-work/sustainable-development-goals/targets-of-sustainable-development-goal-3#:~:text=3.2.&text=By 2030%2C end preventable deaths,25 per 1000 live births.

38. Mwai GW, Mburu G, Torpey K, Frost P, Ford N, Seeley J. Role and outcomes of community health workers in HIV care in sub-Saharan Africa: a systematic review. *J Int AIDS Soc*. 2013;16(1):18586. doi:10.7448/IAS.16.1.18586

39. Colombini M, Dockerty C, Mayhew SH. Barriers and Facilitators to Integrating Health Service Responses to Intimate Partner Violence in Low- and Middle-Income Countries: A Comparative Health Systems and Service Analysis. *Stud Fam Plann*. 2017;48(2):179-200. doi:10.1111/sifp.12021

40. Daniels K, Odendaal W, Nkonki L, Hongoro C, Colvin C, Lewis S. Incentives for lay health workers to improve recruitment, retention in service performance. *Cochrane Libr*. Published online 2014. doi:10.1002/14651858.cdo11201.pub2

41. Bhandari B, Narasimhan P, Vaidya A, Subedi M, Jayasuriya R. Barriers and facilitators for treatment and control of high blood pressure among hypertensive patients in Kathmandu, Nepal: a qualitative study informed by COM-B model of behavior change. *BMC Public Health*. 2021;21(1):1524. doi:10.1186/s12889-021-11548-4

42. Nahas R. Complementary and alternative medicine approaches to blood pressure reduction: An evidence-based review. *Can Fam Physician*. 2008;54(11):1529-1533. http://www.ncbi.nlm.nih.gov/pubmed/19005120

43. King R, Homsy J. Involving traditional healers in AIDS education and counseling in sub-Saharan Africa: a review. *AIDS*. 1997;11 Suppl A:S217-25. http://www.ncbi.nlm.nih.gov/pubmed/9451988

Version 1.1 10.03.23

Nurse and Health Administrator interview guide

Participant ID:_____

Health Facility: _____ Date: _____

Good morning/afternoon

You are welcome to this discussion. My name is _____

I am a researcher from the Africa University College of Health, Agriculture, and Natural Resources. Thank you for accepting to interview with us. We would like to have a discussion on your perceptions of the barriers and facilitators as well as the feasibility of blood pressure management and patient education about hypertension as delivered by Community Health Workers (CHWs) among people with hypertension. CHWs will be trained before implementation. During the discussion, we will solicit perceptions regarding appropriateness, discontinuation, satisfaction, facilitators, and barriers to the implementation of the intervention in Mutare City. The purpose of this discussion is to get your views and take appropriate steps in our plans to implement the intervention in Mutare City. The recommendations will also help healthcare providers and the Ministry of Health and Child Care understand the feasibility of integrating Community Health Worker-delivered home management of hypertension intervention into routine care.

Sociodemographic information

1. How old are you *(in completed years)*? _____
2. What is your sex? Male [ ] Female [ ]
3. Do you have a working mobile phone? Yes [ ] No [ ]
4. What is your highest level of education?

a. None [ ]

b. Primary [ ]

c. Secondary [ ]

d. Diploma[ ]

e. Undergraduate degree [ ]

f. Masters/ Doctoral studies [ ]

5. What is your religion?

a. Pentecostal [ ]

b. Protestant [ ]

c. Apostolic [ ]

d. Moslem [ ]

e. Africa traditional religion [ ]

f. None [ ]

6. How long (in years) have you worked with patients as a nurse/administrator? [ ]

In-depth Interview Questions

1. In Zimbabwe, many individuals living with chronic hypertension need continuous monitoring and health education. We would like to utilize trained community health workers (CHWs) instead of professional health providers like nurses. What do you think about this method of managing hypertension and patient education?

2. In your opinion, what are the:

a. enablers/facilitators of hypertension-related patient monitoring and counseling delivered by CHWs in urban communities?

b. barriers of hypertension-related patient monitoring and counseling delivered by CHWs in urban communities?

3. What are the benefits of using CHWs for hypertension-centered management and patient education among hypertension patients?

4. How sustainable will a CHW-delivered blood pressure measurement and patient education among hypertension patients be?

Explain your answer.

5. Are there any cultural or community practices related to patient education on Hypertension that may affect the use of CHWs for this intervention?

If yes, how do those practices affect the patient education program on hypertension? (*Probe further about traditions and beliefs around patient education by CHWs*)

6. What suggestions do you think would increase CHWs' ability to educate hypertension patients in the community?

7. What key issues do we need to consider in making home management of hypertension by trained CHWs acceptable by the:

a. patients

b. community

c. professional health workers

8. In the past six months, have you received adequate medication to allow for multiple-month dispensing and the availability of medication for local hypertension patients?

10. How often do you get antihypertensive supplies as Mutare City Health Department?

11. How have you been supporting hypertension patients with challenges in frequenting this clinic per set medical timelines?

12. How often do you expect hypertensive patients to visit clinics for routine check-ups?

13. How frequently do you feel comfortable supporting CHWs carrying out BP management to community members?

14. What type of individual do you recommend for recruiting as a CHW to support hypertension patients?

(*Probe: Gender, Age, Education, Residence status, Attitudes and behavior*)

15. What training do you think CHWs need to effectively provide home hypertension management?

16. What support mechanisms are needed to ensure CHWs can timely activate referrals before further complications?

17. Do you see it appropriate for CHWs to collect antihypertensive on behalf of the patients? Explain your answer.

18. As a nurse/ administrator, how do you plan to communicate, engage, and support CHWs involved in the home management of hypertension?

19. Do you have any additional suggestions on strategies to make this program successful?

20. Do you have any questions for me?

THANK YOU FOR YOUR TIME

Version 1.1 10/3/23

Community Health Worker Interview guide

Socio-demographic information

Participant ID:_____

Health Facility: _____ Date: _____

Good morning/afternoon

You are welcome to this discussion. My name is _____

I am a researcher from the Africa University College of Health, Agriculture, and Natural Resources. Thank you for accepting to interview with us. We would like to have a discussion on your perceptions of the barriers and facilitators as well as the feasibility of blood pressure management and patient education about hypertension as delivered by Community Health Workers among people with hypertension. CHWs will be trained before implementation. During the discussion, we will solicit perceptions regarding appropriateness, discontinuation, satisfaction, facilitators, and barriers to the implementation of the intervention in Mutare City. The purpose of this discussion is to get your views and take appropriate steps in our plans to implement the intervention in Mutare City. The recommendations will also help healthcare providers and the Ministry of Health and Child Care understand the feasibility of integrating Community Health Worker-delivered home management of hypertension intervention into routine care.

1. How old are you *(in completed years)*? _____
2. What is your sex? Male [ ] Female [ ]
3. Do you have a working mobile phone? Yes [ ] No [ ]
4. What is your highest level of education?

a. None [ ]
b. Primary [ ]
c. Secondary [ ]
d. Diploma[ ]
e. Undergraduate degree [ ]
f. Masters/ Doctoral studies [ ]

5. What is your religion?

a. Pentecostal [ ]
b. Protestant [ ]
c. Apostolic [ ]

d. Moslem [ ]

e. Africa traditional religion [ ]

f. None [ ]

Experience in providing community-driven patient services

6. How many years have you been working with patients in the community? _____

7. Do you have any of the following medical conditions? (*Tick all that apply*)

Disease	**YES**	**NO**
Hypertension		
Diabetes Mellitus		
Asthma		
Chronic obstructive pulmonary disease		
Cancer		
Kidney disease		
Musculoskeletal disease		
Stroke		
HIV/AIDS		
Other (*specify*)		

8. What distance are you comfortable/capable of traveling to support patients? [ ]

9. Estimate the time you can be able to commit to support hypertension patients in a week (in hours) [ ]

10. From your experience as a Community Health Workers, do you think you have the basic skills to support hypertensive patients?

Yes [ ] No [ ]

Please explain your answer

11. Have you ever used a BP machine before? Yes [ ] No [ ]

12. Are you able to interpret BP readings? Yes [ ] No [ ]

13. Are you trained in the following:

a. Patient counseling? Yes [ ] No [ ]

b. Referring hypertensive patients? Yes [ ] No [ ]

c. Recommended lifestyle behaviors for people living with hypertension?

Yes [ ] No [ ]

14. How frequently are you comfortable visiting/ meeting nurses to discuss issues to do with hypertensive patients' care and support?

a. Days per week [ ]

b. Days per month [ ]

Explain your answer.

15. Do you think the management of hypertension by Community Health Workers will be:

a. Successful? Yes [ ] No [ ] Explain your answer.

b. Effective? Yes [ ] No [ ] Explain your answer.

16. What kind of support would you need to provide health services to hypertensive patients in your community?

17. What skills should the Community Health Worker possess to offer effective home management of hypertension services?

18. What kind of training would enhance the effective execution of the proposed duties and responsibilities?

19. In terms of supervision, how often do you want to be supervised by the following key cadres in your work supporting patients by nurses and why?

a. clinic nurse

b. community nurse

c. CHW coordinator

20. What do you consider to be the factors that may lead to program success at the:

a. patient level?

b. Community Health Worker level?

c. health provider level?

21. What do you consider to be the factors that may lead to program success at the:

a. patient level?

b. Community Health Worker level?

c. health provider level?

22. Do you have any additional suggestions on strategies to make this program successful?

23. Do you have any questions for me?

THANK YOU FOR YOUR TIME