Adapting a nurse-led primary care initiative to cardiovascular disease control in Ghana: A qualitative study

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Abstract

Background CVD is the leading cause of morbidity and mortality worldwide, and its prevalence is rising in Ghana. The Community-Based Health Planning and Services (CHPS) initiative has used community-level clinics, home visits by nurses, and outreach services to decrease maternal and child mortality across Ghana. However, CHPS currently lacks capacity to screen for or treat CVD and its risk factors. Methods We conducted in-depth interviews (IDIs) with 21 nurse community health officers (CHOs) and 10 supervising sub-district leaders (SDLs) to identify factors that constrain or facilitate CHPS screening and treatment for CVD through the World Health Organization's HEARTS protocol in the rural communities of the Kassena-Nankana East and West districts of Ghana. We transcribed audio recordings of the interviews, coded their content, and analyzed codes for key themes. Results Respondents spoke to CVD care barriers across three themes: community demand for CVD care; community access to CVD care; and provider capacity to render CVD care. CHOs and SDLs noted that community members were often unaware of CVD, despite high reported local prevalence of risk factors such as alcohol use and stress. Moreover, community members were unable to travel to or pay for treatment once diagnosed. CHOs lacked training on CVD and its risk factors, as well as medications and supplies to treat conditions such as high blood pressure. However, CHOs and SDLs recognized the importance of CVD care, expressed interest in acquiring further training, and emphasized the need to improve logistical support for primary care as a precondition for CVD care. Conclusion Nurses and supervisors associated with the CHPS program voiced multiple obstacles to CVD care, but also listed several feasible steps to address them. Initiatives such as CVD-focused training; provision of essential CVD equipment and pharmaceuticals; community education campaigns; and transportation to aid patients and providers could address these barriers. Future work will explore the feasibility and acceptability of these interventions among staff and community members, in preparation for a locally adapted pilot initiative drawing from the HEARTS initiative designed to control CVD risk factors such as hypertension, depression, and alcohol abuse.

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Keywords: cardiovascular disease; hypertension; nursing; Ghana; community health

Contributions to the Literature

The Community-Based Health Planning and Services (CHPS) initiative, a nurse-led program designed to provide primary maternal and child healthcare nationwide, remains poorly equipped to address the growing cardiovascular disease (CVD) epidemic in Ghana.

Through in-depth interviews (IDIs), we explored the perceptions of CHPS nurses and their supervisors regarding their capacity to implement the World Health Organization's (WHO) HEARTS protocol for CVD control, and perceived barriers and facilitators to doing so.

Although previous pilot studies have implemented select elements of the HEARTS protocol through CHPS, our work suggests means to adapt CHPS itself to allow uptake of this CVD care program, concurrent with other noncommunicable disease (NCD) management.

Background

CVD is the leading global cause of morbidity and mortality [1, 2], and the prevalence of CVD is rising in low- and middle-income countries (LMICs) [3, 4, 5, 6]. NCDs like CVD caused 70% of all global deaths in 2017, with CVD the leading contributor [2, 7]. These increases are due to demographic, epidemiologic, and nutritional transitions caused by the development and urbanization of LMICs [8]. Consequently, the burden of CVD is most acute in LMICs, where some 74% of global CVD morbidity and mortality occurs [1, 9]. Moreover, in both high- and low-income countries, CVD and other NCDs disproportionately affect the lowest-income populations [10]. In many LMICs, weak health infrastructure further undermines control of these conditions [11].

Recognizing the detrimental impact of NCDs on human health and sustainable development [6, 12], the WHO has developed strategies for their control, such as the 2010 Package of Essential NCD Interventions (WHO-PEN) [13]. In 2013, the WHO released a Global Action Plan for the Prevention and Control of NCDs, with a goal to achieve a 25% relative reduction in worldwide premature mortality from the estimated prevalence of NCDs in 2013 by 2025, via six action objectives [14]. Objective 4 of this Global Action Plan calls for adapting existing health systems by improving NCD primary health care prevention and services. The WHO next released the HEARTS intervention package in 2016, which builds on WHO-PEN by detailing cost-effective interventions to prevent and treat CVD and its risk factors using community-based health workers [15, 16].

This global agenda is particularly relevant in sub-Saharan Africa, where CVD prevalence is increasing dramatically [17, 18]. Adjusted for age, West African countries such as Ghana have among the highest prevalence of CVD and its risk factors globally [19]. Hypertension, for example, affects up to 32% of adults in Ghana [20] and 24.5% of individuals in the Kassena-Nankana East and West districts [21]. The rising tide of CVD in this region has prompted several initiatives to implement select elements of the WHO-PEN and HEARTS protocols [22, 23], including for the control of hypertension in Ghana. However, none have attempted to build the complete HEARTS CVD care model into an existing primary care system.

In regions where physicians are scarce, non-physician health workers (NPHWs) including nurses, pharmacists, and community health workers can effectively provide primary care [24, 25]. In Ghana, which has fewer than one physician per 10,000 people [26], the national CHPS program is staffed by CHOs, community health nurses who have been trained for 18 months in the provision of primary health care services and subsequently oriented for six months in community engagement and outreach. Although these CHOs practice predominantly at CHPS clinic compounds, most are also responsible for home visits and community health education.

CHPS' model for community-level primary care in Ghana is the outcome of a process of implementation science that commenced in 1994 and continues to the present [27, 28, 29, 30, 31]. Following the 1978 Declaration of Alma Ata, the Ghanaian government embraced the goal of "Health for All by the Year 2000," setting out to address primary causes of death and disability, such as infectious diseases of children under age five [32]. To develop a strategy for addressing the "Health for All" goal, the Ghana Health Service (GHS) convened an 18-month, three-village participatory pilot study to explore culturally compatible means of nurse deployment and support [28, 31]. Based on results of the pilot, the GHS convened a factorial experiment that involved redeploying nurses from sub-district and district clinics to live and work in autonomous satellite Community Health Compounds (CHCs) located in remote rural communities, and to provide door-to-door health screening and primary care to community members as CHOs [33]. Launched as a district-wide trial by the GHS-affiliated Navrongo Health Research Centre (NHRC), this study showed that nurse deployment could reduce childhood mortality by 50% in only three years [34]. That result led to a national policy to scale up the Navrongo model at nearly 4,500 CHCs

dispersed across all districts in Ghana [30, 33, 34, 35]. CHPS operations are supervised by SDLs, who are trained midwives accountable to the GHS.

Yet further reform and development of CHPS is needed. Since the conception of CHPS, CVD has emerged as a major cause of morbidity and mortality in Ghana [36, 37], and CHPS compounds designed primarily for management of maternal health and childhood illnesses remain poorly equipped to respond to this epidemic. Moreover, the feasibility of leveraging the CHPS model of nurse-led preventive and curative primary care for CVD and other NCDs has yet to be established as a coherent component of their work. However, recent work demonstrates that NPHWs are also effective in the control of CVD and other NCDs [26, 38, 39, 40]. As such, our study seeks to explore perceptions of NPHWs regarding their capacity to manage CVD - and barriers to locally implementing the WHO HEARTS package - at CHPS facilities in the UER of Ghana.

Materials And Methods

Study Design and Theoretical Framework

This qualitative appraisal derives from a mixed-methods implementation research study titled “Adapting the Package of Essential NCD Interventions for Primary Health Care to the Ghanaian CHPS Primary Care Model (CHPS-PEN).” CHPS-PEN aims to develop a protocol for testing the hypothesis that integrating WHO-PEN initiatives for CVD within the CHPS primary care program will reduce NCD morbidity and mortality.

Our research approach was rooted in a grounded theory design. Grounded theory is a type of qualitative descriptive study designs that seeks to generate actionable findings from the analysis of processes and interactions [41].

We utilized the social ecological model, a theoretical framework that seeks to understand the multifaceted and interrelated effects of individual and environmental factors in order to identify opportunities for health promotion [42]. The framework created a structure through which we explored barriers and facilitators – on the individual, interpersonal, institutional, community, and sociocultural levels – to implementing the WHO HEARTS package at UER CHPS facilities.

Sample

We conducted our study in the Kassena-Nankana East and West districts in the UER of Ghana. Study participants were NPHWs working in the CHC setting between April and August 2017. IDIs took place at CHCs, and the providers sampled were CHOs and SDLs.

Recruitment and Data Collection

We used convenience and purposive sampling to select CHOs and SDLs from CHCs throughout the study area. We excluded providers who were not fluent in English. We recruited participants through letters to

the Kassena-Nankana East and West districts' health directorate and SDLs, as well as through a stakeholder engagement meeting at the NHRC. We planned to recruit 20 NPHWs, as this sample size would allow for adequate data saturation [43, 44, 45].

The semi-structured IDI guides were designed to evaluate providers' clinical experiences with CVD, barriers to CVD care, training of CHOs, health literacy, community CVD burden, CVD risk factors, CVD prevention and treatment, CHPS resources, and CHO capabilities, as well as their suggestions for improvement. The final IDI guides can be found in the appendices (see Additional Files 1 and 2).

We conducted the interviews in English after obtaining written consent. The IDIs, which ranged from 19 to 49 minutes in length, were audio recorded. Members of the research team transcribed the IDIs, with the quality of transcripts checked by other members of the team. Data were de-identified prior to analysis.

Analysis

We developed codes and themes for the study by conventional content analysis, a method that uses qualitative data to identify emerging codes inductively in order to structure a thematic analysis [46]. Our use of the social ecological model allowed for exploration of the interrelationships between the experiences of individual providers and their broader environmental contexts. The process facilitated a holistic analysis from the patient to the system level of CHO and SDLs' perceptions regarding barriers and facilitators to implementing the WHO HEARTS package at CHPS facilities in the UER.

The coding process comprised of two researchers [LH, JF] using several selected IDI transcripts to independently create codes, and then sharing these codes with colleagues [DH, RA, EJ] to iteratively produce a standardized codebook of 15 codes. With this finalized codebook, the two researchers re-coded all interviews and generated summary reports using NVIVO software (version 11) [47]. The team then evaluated these reports for trends and themes, with final themes determined by team consensus.

Reporting

The Standards for Reporting Qualitative Research was used to guide the reporting of findings (see Additional File 3) [48].

Results

Our sample achieved thematic saturation and included 21 CHOs and 10 SDLs, for a total of 31 participants across 23 CHPS sub-districts. Respondents discussed barriers to CVD care – and solutions to these challenges – across three themes: community member barriers to CVD prevention and care; community member barriers to care access; and CHPS provider barriers to care provision.

1. Community Member (Demand-Side) Engagement Barriers to CVD Care

This theme refers to challenges NPHWs face with rendering CVD care – due to high risk factor burdens, poor health literacy, and other community member factors. Many participants believe that the communities that they serve experience a high burden of CVD risk factors. These risk factors include stress, alcohol and tobacco use, diet, and sedentary lifestyle.

The majority of SDLs said that stress, particularly family-related stress, is a leading cause of CVD in their communities. Participants pointed to several common stressors, such as family problems, work, overthinking, and emotional triggers. Common family problems included being “abandoned” when one’s children move to cities, being childless and unable to support oneself, having children who are “useless,” bad marriages where one is commonly insulted, and not being able to afford school tuition for children. Respondents spoke often about stress due to the migration of youth to nearby cities and towns. This has created an unprecedented problem in rural Ghana as traditional support for the elderly has declined. These social dynamics are described by an SDL at the Kassena-Nankana CHC:

“Some people have got a lot of problems.... Like you have delivered your children, all of them have run away and left you alone. You are old, and you are still doing everything for yourself. You see, that is a problem that can give you heart disease. And at times, some people don’t even have children. If you don’t have a child, how do, you see, you are old, and you needed somebody to support you, there is nobody to support you. So that, all that will lead to heart disease.” (SDL)

Participants were also worried about the degree of alcohol consumption that they see in their communities, and its implications for CVD and community health more generally. As an SDL from Pungu South describes,

“To me, the biggest one is the alcoholism.... Anywhere you move you see that everyone is just drunk, drunk, drunk.” (SDL)

This concern was compounded by the belief that patients are not forthcoming in speaking about their alcohol use with CHOs. Some CHOs have attempted to intervene on patients who use alcohol excessively, either by creating a therapeutic alliance with them or by involving their families, with varying levels of success.

Respondents reported that many community members smoke tobacco, and that this behavior is particularly common among men and youths:

“This is a tobacco farming community, and we all know that smoking is a very high-risk factor. And almost all the youth in this community smoke excessively, so actually it’s a problem here. The smoking. Almost all the youth, even teenagers, smoke here.” (CHO)

CHOs say that they are encouraged by their SDLs to counsel patients regarding the risks associated with smoking and the benefits of smoking cessation. Some CHOs found, however, that patients often try to conceal their smoking status from NPHWs.

Finally, participants feel that community members' diets and sedentary lifestyles put them at high risk for CVD. The diets described were heavy in salt, fat, meat, and soda, and deficient in vegetables. The CHOs say that they often counsel patients on the benefits of diet and exercise. These conversations can be difficult, however, due to conflicting cultural attitudes regarding diet, exercise, and weight:

"We don't see the need to exercise. We don't see the need to diet. You feel that growing big is something that is good in our society, that's what they think. When you are big, it's a sign of good living." (SDL)

In addition to having many CVD risk factors, community members lack a basic understanding of the symptoms and health consequences of CVD. As a result, individuals who develop CVD symptoms sometimes eschew care and instead attribute these symptoms to other diseases, such as malaria, or to divine judgment. Due to a combination of these factors, many individuals who are afflicted with CVD are unaware of their illness.

Medical screening of asymptomatic individuals for NCDs is exceedingly rare in Ghana, contributing to this low level of health literacy. In fact, many community members are unfamiliar with the concept of preventative screenings and asymptomatic treatment. This lack of familiarity was described by numerous respondents:

"It's lack of knowledge.... If you do not visit them, they don't know what check-ups are.... So they sit at home and then develop the pressure without managing it." (CHO)

"Some of them, when it is better, they don't take the medication. That is one problem we can face. They don't take the medication because they think they are fine." (CHO)

Once diagnosed with CVD, some community members do not feel comfortable discussing their health problems, representing a barrier to care. Participants mentioned patients who do not inform friends and family of their CVD because they do not want to burden them with the costs of their treatment. Others do not want to discuss their CVD because they do not understand the serious implications of their illness. Some CHOs also mentioned stigma surrounding CVD:

"They think when they share it out and you also tell others. Maybe this house gets to know that that house has someone suffering from this condition it means they will lose respect or something like that, so they will not even like others to know." (CHO)

Once connected to care, some patients demonstrate poor adherence to CVD treatment. CHOs routinely survey medication adherence both at CHPS compounds and on home visits. They say that community members often become ill because they discontinue their medications when they are feeling better. However, reasons for community members' poor adherence are likely multifactorial, including fear of potential side effects, cost, misunderstanding, polypharmacy, and lack of symptoms [49].

II. Poor Access to CVD Care at CHPS

This theme refers to community members' difficulty obtaining care for CVD – due to cost, distance, and other logistical factors.

CHPS workers say that they most often encounter heart disease patients on home visits, because these patients generally do not come to CHPS to receive care. As described by a CHO at the Nania Subdistrict compound:

"[T]hey don't come into the facility with that condition. Unless when we do home visiting and we identify them." (CHO)

Several participants said that patients with heart disease used to come to CHPS compounds more often. However, they do not anymore, because CHPS compounds no longer carry CVD medications.

"Some of the treatments for the other diseases, we don't have them here. So, somebody will say 'Why do I waste my time to come to this clinic, come and expose myself to them, after all they are not going to give me any treatment.'.... So it's better that I go to Navrongo than come to this facility." (CHO)

At present, CVD care is largely provided at referral centers. However, patients experience barriers to receiving care at these centers. Referral centers are often far away from the communities in which patients live; even when geographically close, many patients lack the means of transport to get there. Some patients, particularly the elderly, require help getting to referral centers, but do not have anyone to accompany them.

"Especially, the elderly one. Those who don't also have someone to support them.... So if the person cannot walk to Navrongo, there is no money to transport to Navrongo, so the patient will not go." (CHO)

Cost is a large barrier to receiving care at referral centers. Many patients will pay others for the fuel or vehicle needed for transport. But as referral centers often draw from low resource areas, this cost can be too great for some, as outlined by numerous participants:

"Sirigu is nearer, but before the person even gets there, maybe that person will need a motor rider, that person will need fuel, and that person has no money. And to talk of Navrongo, when you mention Navrongo, they even get frightened. So actually, it's very difficult for them." (SDL)

"You know when she came, and I mentioned referral, the mother went back to the house.... I'm sure they have to go to the market to look for the money, but when they get there, by all means, they will not buy medicines, they will have to eat and other things. So, the poverty level here is very high so when you are referring." (SDL)

"You see, this village like this is a deprived village. They don't have money. So, some of them, it is really a problem to them." (CHO)

As a result of these barriers, many patients with CVD or CVD risk factors such as hypertension do not successfully access care at referral centers.

III. Community Health Center (Supply-Side) Barriers to CVD Care

This theme referred to challenges CHOs and the CHPS program face with rendering CVD care – due to gaps in training, logistics, and other structural factors.

While many highlighted strengths with regards to CHOs' training, the majority of participants, particularly SDLs, expressed that CHOs lack important knowledge about CVD. CHOs were confident in their knowledge of topics such as CVD risk factors and detection. However, in a quiz administered at 21 CHCs, CHOs showed gaps in knowledge about CVD risk factors and causes, as well as the diagnosis and treatment of CVD.

Due to CHPS' origins as an organization focused on improving maternal and child health, CVD has not historically been at the core of CHO training. During their schooling, CHOs receive training about CVD that focuses primarily on prevention and diagnosis. However, many SDLs felt that this training is insufficient. Further, many CHOs expressed that they had not learned enough about CVD during their training. This sentiment was expressed by an SDL from Kajelo:

"[CHO knowledge of heart disease symptoms is] not adequate per my own assessment. Because some of them, they can't even tell you the treatment you give to maybe a patient with high blood pressure, diabetic, stroke." (SDL).

Contributing to these knowledge gaps is lack of exposure. Participants felt that knowledge gained during training is lost over time because CHOs do not often see CVD patients at CHPS facilities.

"After school scarcely will you open the book again.... But with the refresher training, it reminds you of the things you have forgotten, then you are refreshed to do the work better." (CHO)

As such, almost every CHO said that more in-service trainings would help them better understand and care for CVD. Participants felt that these trainings should focus on CVD prevention, symptoms, management, and treatment.

In addition to enhanced training, participants expressed a need for materials including CVD medications, blood pressure monitors, motorbikes, and fuel in order to provide adequate care for CVD at CHPS compounds. Presently, most CHPS compounds do not carry essential CVD medications such as antihypertensives, antihyperglycemics, and statins. This is because the National Health Insurance Scheme (NHIS) does not reimburse CHPS compounds for the CVD medications that they disburse. As a result, patients are forced to travel to larger regional health centers for treatment. As outlined previously, because these facilities are farther away and transportation to them is poor, CVD patients often choose not to go, and instead live with untreated CVD. For these reasons, participants feel that NHIS' decision to not reimburse CHPS for CVD medications is making their communities sicker.

While CHOs may not dispense medications, they are currently able to screen for, diagnose, monitor, and manage straightforward cases of CVD, as well as to refer to regional health centers. Some participants

felt that this level of care was not adequate to help patients with diseases such as hypertension. Others say that they turn CVD patients away because they know that they are unable to treat them. At times, patients do not understand the limitations placed on CHPS compounds, and this can be discouraging for CHOs. As a CHO from Pungu South states,

“They ask you questions like, ‘Now you come and stand and talk like this. How come when I tell you people, well I’m having BP, my drugs, you tell me I should go to hospital? Then what are you people doing?’ You see that? So sometimes those things discourage us. We feel bad. We just wish that we could be able to do it.” (CHO)

Most CHOs want to be able to treat CVD pharmacologically at CHPS compounds. Many participants felt that with more training, CHOs would be capable of treating straightforward CVD cases with medications. They feel that this effort would be beneficial to patients by making these medications more accessible.

“They can treat by sometimes giving some of the health centers, the smaller clinics, the opportunity to also treat.... Because some of us, we don’t have access to treatments. We only monitor, refer. And here, like this one, you tell them to go to Navrongo, it’s like you cursed them or something. They don’t want to go.” (CHO)

Many CHOs want a return to the “old system” in which NHIS reimbursed CHPS compounds for CVD medications, because they feel that this would reduce the burden on low-income patients and increase medication adherence.

“Most of the hypertensive cases who are put on drugs as they grow older, some today is on the drug, tomorrow the person is not. When asked why, they go ‘Oh, I don’t have money to buy.’ But if GHS is able to come out with drugs, that will cover health insurance, people will get with it.” (CHO)

In addition to medications, most participants claimed that their facilities lack equipment and materials necessary for managing CVD. Notably, they held that more blood pressure apparatuses are needed for adequate care. Several CHOs reported one apparatus was available at their facility; some CHPS compounds had none. Their absence prevents routine blood pressure surveillance during outreach and home visits, necessitating referral of patients to hospitals or CHCs for routine blood pressure readings. Non-adherence with such referrals thus impedes the provision of even the most basic of CVD interventions, as described by an SDL from Manyoro:

“Even to go around with the common BP apparatus, they don’t have. For the facility, we have one and it breaks down very often. So they don’t have. They only refer per symptoms.... It’s the BP apparatus that you use to measure, and if it’s broken down, you can’t tell whether the person’s BP has risen, whether it’s gone down.” (SDL)

Participants also lack the motorbikes and fuel required to go on home visits and to take patients to the hospital. Some say that due to NHIS underfunding, they currently use their personal motorbikes and fuel to transport patients, because many patients cannot afford their own transport:

"We go into the communities such cases, we interact with people, attend to old, the aged and all those things. Now we don't have motor bikes, we don't have fuel.... These are some of the things hampering the work. If those things are improved, it will go a long way to help." (CHO)

Discussion

To our knowledge, our study is the first to explore the perceptions of NPHWs within the CHPS program regarding their capacity to implement the HEARTS package in Ghana. Our use of IDIs allowed for a nuanced understanding of these barriers, which include inadequate CHO training; poor health literacy among community members; lack of access to CVD medications and other necessary resources; a high burden of CVD risk factors; and difficulty accessing CHPS compounds and referral centers. Although previous pilot studies have implemented elements of the HEARTS protocol through CHPS [50], our work suggests means to adapt CHPS itself from a program primarily focused on infectious disease and child and maternal health to that which functions across the lifespan to accommodate all aspects of this integrated CVD care model, as well as the care of other NCDs. These approaches include, among others, improved 1) access to essential medications; 2) provider training; 3) community member education; and 4) means of transportation to referral sites, as detailed below.

CHPS' current infrastructure struggles to provide the 23 medications that HEARTS considers essential for primary care CVD interventions [16], in large part due to lack of timely reimbursement by the NHIS; furthermore, CHOs are prohibited from prescribing these medications when available. However, CHOs expressed confidence in their capacity to prescribe and monitor patients taking these medications, consistent with evidence from other contexts that nurses can safely render such care [51, 52, 53, 54]. Abdel-All et al. (2017) found that training was effective in raising pre-training scores in assessments of knowledge about CVD, with moderate decline in scores six to eight months post-training, which could be minimized with refresher trainings [51]. The HEARTS package provides evidence-based resources that could be used to design such trainings [16]. Further work should test this hypothesis by permitting CHOs to prescribe hypertension medications under physician oversight. Most respondents also feel that their facilities also require more BP cuffs, motorbikes, and fuel, for which the HEARTS package suggests potential funding sources [16].

Although CHOs and SDLs voiced concern over community members' lack of awareness of CVD risk factors despite a high community CVD burden, they expressed optimism that individual counseling coupled with community durbars, radio broadcasts, and informative posters in local dialects could disburse health information. The HEARTS package provides a protocol that can be adapted to guide individual counseling, durbars, and other modes of communication to counsel patients on behaviors that promote cardiovascular health [16].

The distance and cost associated with travel to referral centers are major barriers to seeking care for many patients with CVD. Atuoye et al. (2015) underscore the need for public policy to address rural transport problems in Ghana in order to improve health and call for sustainable transport services driven

by community participation [55, 56]. Access to hospital-level CVD management could also be increased through further expansion of the National Ambulance Service [57].

Lastly, CHOs and SDLs spoke to the high prevalence of CVD risk factors such as stress, alcohol use, smoking, poor diet, and sedentary lifestyle in their communities. Each of these risk factors contributes to multiple other chronic conditions: for example, anxiety is highly associated with depression, musculoskeletal pain, and gastrointestinal disorders in addition to CVD [58]; alcohol and other substance abuse similarly contributes to each of these conditions. Future work to target these underlying CVD risk factors through CHPS, therefore, could have downstream effects on other diseases processes as well. Previous interventions in Ghana have addressed CVD risk factors in isolation, such as hypertension - but none have successfully impacted multiple risk factors [50, 59]. A pilot initiative to counsel vulnerable community members on these factors – for example, through counseling on alcohol and tobacco cessation – could therefore impact outcomes such as depression in addition to blood pressure control, especially if supplemented by medication, community outreach, and improved care accessibility as described above. This work could generate models for integrated chronic disease care beyond the HEARTS protocol, as a framework potentially adaptable to contexts outside the CHPS model.

Our approach has several limitations. While we sought to minimize bias in interview analysis through codes derived from the independent agreement of four analysts and validated by achievement of thematic saturation, our findings are subjective given the qualitative nature of this study. Additionally, our data analysts were external observers from the United States with prior beliefs regarding CVD care – especially regarding CVD treatment and risk factor management – that may have biased interpretation. Although all participants spoke English, not all learned English as a first language, and as such, language barriers may have impeded the accurate gathering of data. As this study represents only 31 participants from across the Kassena Nankana East and West districts, NPHWs who were not interviewed may have differing perceptions that were not captured. While NPHWs from all CHCs in the Kassena Nankana East and West districts were contacted for participation in this study, the group that chose to participate may non-randomly differ from non-participants. We sought to ask broad, open-ended questions about CVD care and its barriers, but our interviews omitted some potentially relevant topics, such as how CVD care was previously provided in the region, the role of health volunteers in providing counseling about CVD, and community members' behaviors related to CVD. Nevertheless, our findings represent an important first evaluation of the perception of NPHWs regarding barriers to implementing the WHO HEARTS package at CHPS facilities in the UER of Ghana.

Conclusion

We found that NPHWs in the UER of Ghana hold many strong beliefs regarding how to reform the CHPS program to provide care for CVD. While NPHWs voiced many concerns regarding obstacles to providing such care, they also listed several feasible interventions to address them, including enhanced training of CHOs and education of community members about CVD, more accessible methods for disbursement of CVD medications, increased funding for equipment, and improved means of transportation to referral

sites – each of which could improve CHPS’ care for CVD as well as other chronic diseases. This work provides an evidentiary basis to allow delivery of the WHO’s HEARTS protocol – among other previously-validated interventions – in a manner responsive to local cultural beliefs; available resources; and disease burden in the UER. Although further formative work to develop, test, and evaluate these solutions remains, our work suggests that the local uptake of this initiative is feasible in a low-resource setting with a growing burden of CVD – and suggests next steps for its design and implementation.

Abbreviations

CHC: Community health compound

CHO: Community health officer

CHPS: Community-Based Health Planning and Services

CHPS-PEN: Adapting the Package of Essential Non-Communicable Disease Interventions for Primary Health Care to the Ghanaian Community-Based Health Planning and Services Primary Care Model

CVD: Cardiovascular disease

GHS: Ghana Health Service

IDI: In-depth interview

LMIC: Low- or middle-income country

NCD: Non-communicable disease

NHIS: National Health Insurance Scheme

NHRC: Navrongo Health Research Centre

NPHW: Non-physician health worker

PEN: Package of Essential Non-Communicable Disease Interventions

SDL: Sub-district leader

UER: Upper East Region

WHO: World Health Organization

Declarations

Ethics Approval and Consent to Participate

The study design, consent forms, and data collection tools were approved by the Institutional Review Boards of the Icahn School of Medicine at Mount Sinai, NHRC, and Columbia Mailman School of Public Health.

Consent for Publication

All NPHWs completed written informed consent forms prior to participating in the study. This document included consent to publish participants' anonymous quotes.

Availability of Data and Materials

The de-identified IDI transcripts with or without coding generated during this study are available upon request to the corresponding author.

Competing Interests

Dr. Heller reports grant support from Teva Pharmaceuticals for a separate study. However, Teva Pharmaceuticals was not involved in any aspect of the design, conduct, or analysis of this study; the content of this manuscript; nor the decision to publish.

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Authors' Contributions

AO, AB, JP, and DH conceived of the study and developed the interview instrument. LH, JF, AA, EY, and ED conducted the qualitative interviews, with DA acting as an advisor. LH and JF coded the interview transcripts and performed a thematic analysis, with assistance from EJ, RA, and DH. LH wrote the manuscript, and made revisions based on comments from JF, ED, RA, EN, JP, and DH. All authors reviewed and approved of the final manuscript.

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