A qualitative study of current hypertension care coordination and feasibility of involving Female Community Health Volunteers in hypertension management in Kavre district, Nepal

by

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Thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science in the Department of
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ABSTRACT

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Abstract

Background: Hypertension and related conditions are major contributors to deaths and disabilities in Nepal. We aim to explore existing work flows, needs and challenges to hypertension care coordination and assess feasibility of establishing a Female Community Health Volunteers (FCHV)-based hypertension management program in Kavre, Nepal.

Design: We conducted one focus group discussion with eight FCHVs and 23 in depth-interviews with nine patients with hypertension, six health workers, four health officials, and four FCHVs in two village development committees of Kavre district, Nepal. Applied thematic analysis was performed using NVivo 12.

Results: Health literacy related to hypertension was low. Delay in treatment initiation and lost to follow up were common patterns despite comply with antihypertensive medication. Underutilization of primary healthcare institutions, communication gap and lack of grass-roots level educational campaigns were identified as major health system-related barriers. Community pharmacies, monthly health camps and increasing governmental attention to NCDs were favorable for hypertension management. This study also showed FCHVs had the potential to promote hypertension educational,

screening and referral in their catchments, if provided with adequate training and proper motivation.

Conclusions: Barriers and facilitators identified in this study have implications for future hypertension management intervention design. We recommend grassroot level hypertension education and screening across Nepal. FCHVs have the potential to take on these responsibilities, once they are empowered with appropriate training and motivated by proper incentives.

Keywords: hypertension management, barriers, facilitators, community health workers, female community health volunteers, Nepal, qualitative research

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1. Introduction

Elevated blood pressure is strongly associated with cardiovascular disease, kidney disease, disability and premature death (1). In the year 2010 alone, 9.4 million people lost their lives to hypertension-related complications (2). This prevalence of hypertension is disproportionately high in South East Asian region such as Nepal, Bhutan, and Sri Lanka (3).

1.1 Country profile of Nepal

The Federal Democratic Republic of Nepal is a landlocked, multi-religious, and impoverished nation in South-East Asia Region (SEAR). It strategically borders China (in the north by 1,389 km) and India (in the south, east, and west by 1,770), two of the largest economies worldwide (4) (see figure 1). Internally, Nepal is geographically divided into three ecological regions: Mountain (3,000-8,848 m), Hill (1,000-3,000 m), and Terai (plain area, less than 1,000 m) (4). The total population of Nepal was approximately 29.7 million (ranked 47th) among which 17.2% live below the poverty line and 34.1% are illiterate (4). Nepal's latest Gross Domestic Product (GDP) totaled 24.5 billion USD and 835.1 USD per capita, ranking 149th out of 189 countries on the Human Development Index (HDI) (5). Agriculture provides a livelihood for nearly two-thirds of the population, accounting for 27% of GDP (4). The income disparity is low in Nepal （Gini index 32.8%） (4) (Table 1).

As the youngest republican country, Nepal recently ended a 239-year-old unstable monarchy and became a federal, democratic, and secular country in 2015 (4).

Figure 1 Nepal Map

Table 1 Demographic and socioeconomic statistics of Nepal

WHO region	South-East Asia
World Bank income group	Low-income
Population (2018)	29,717,587
Caste/ethnic groups	125
Life expectancy at birth (years) (2018)	71.3 (Both sexes) 70.6 (Male) 72.0 (Female)

% Population live below the poverty line	17.2
% illiteracy rate	34.1
$ GDP per capita (2018)	835.1
% Agricultural sector as a percentage of GDP (2018)	27
% Gini Index (2010)	32.8
Human Development Index rank (2018)	149

Data source: World Factbook- Nepal 2018

1.2 Burden of hypertension in Nepal

In Nepal, an epidemiological transition to non-communicable diseases (NCDs) has recently brought forth a rise in hypertension (6, 7). The reported prevalence of hypertension varies from 22.4% to 38.6% (8), with a tripling in the last 25 years (9). The mortality rate of hypertension has been steadily increasing as well, from 135.6 to 145.2 per 100,000 persons from 1995 to 2015 (10). Hypertension and related complications have become major contributors to deaths and disabilities in Nepal (11). Although blood pressure can be lowered with simple interventions, hypertension control remains inadequate. Existing studies show a low hypertension control proportion ranging from 12% to 24% (12, 13) and poor adherence to medication is a large contributing factor. A survey indicated that in western Nepal, only 31% of individuals who knew they had hypertension were taking hypertension medication and of these 15% met blood pressure control targets (14). This gap demonstrates that substantial disease burden can be averted through strengthening hypertension care in Nepal. However, there is a lack of human resources in health to meet the growing demand of NCDs care in Nepal (15).

1.3 Previous studies

Surveys in other developing countries have suggested that community health workers (CHWs) can be promising health cadres to contribute to NCDs management (16-18). There are around 51,500 CHWs, known as Female Community Health Volunteers (FCHVs) in Nepal, providing basic health services and link communities to government health centers (19). The current role of FCHVs is to promote family planning, maternal and child health care (19). At least one FCHV serves in each ward, the smallest local administrative body with roughly 150 households (19). FCHVs are selected by the local Mother' group, a group of women active in social and health activities within their communities (20). After selection, FCHVs will receive 18-day basic training delivered by local health facility staff (21). National FCHV survey in Nepal shows that the median age of FCHVs is 41.3 years, and 45% of them have completed primary education, and 59% have served for over 10 years (22). A pioneering cluster-randomized controlled trial carried out in western Nepal, in which FCHVs performed blood pressure monitoring and home-based education for general population every four month, has suggested the effectiveness of FCHV-led lifestyle intervention in blood pressure reduction (23). However, the scalability and sustainability remain unknown, given the needs of intervention population, FCHVs compensatory system, and existing health system have not been clearly assessed.

To further incorporate FCHV into hypertension screening, education and referral work, more empirical evidence should be explored to understand current hypertension management coordination, potential obstacles in the field and demand of FCHVs, in order to design a cultural-appropriate FCHV-based intervention in Nepal. Hence, we aim to collect insights from multiple stakeholders to gain a comprehensive understanding of hypertension awareness and treatment, as well as assess the feasibility of FCHV participation in community hypertension management in Kavrepalanchok (Kavre) District, Nepal.

2. Methods

2.1 Study setting

The study was conducted in Kavrepalanchok (Kavre) District during June-July 2018. Kavre District is one of the seventy-seven districts located in central Nepal (1) (see Figure 2). With Dhulikhel as its district headquarters, Kavre District covers an area of 1,396 km² divided into 135 wards and has a population of 375,221 (24).

Two village development committees (VDCs) equipped with primary health facilities in Kavre District were conveniently selected **(**Table 2**)**. One is Dhunkharka VDC, with a government health post and a private outreach center affiliated to Dhulikhel hospital. The other is Panchkhal VDC, with a government primary health center (PHC). Household level data regarding hypertension was never assessed in these areas and the prevalence was unknown. In Dhunkharka VDC, the health post and outreach center oversee two wards, with 9 FCHVs within the catchment. Accordingly, we selected 2 wards as study sites and involved 9 FCHVs in Panchkhal VDC.

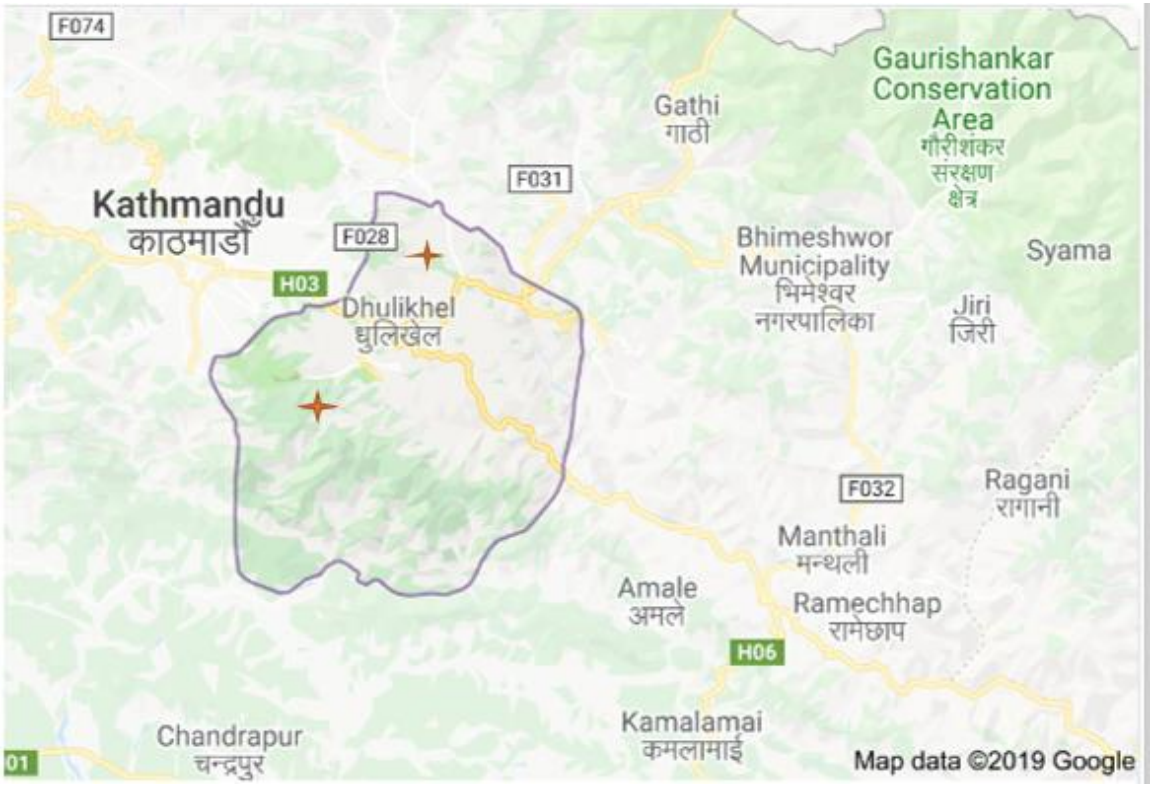

Figure 2 Study Sites: Dhunkharka & Panchkhal, Kavre District, Nepal

Table 2 Characteristics of Two Study Sites

Kavre District Area: 1,396 km² Population: 375,211 wards: 135	**Dhunkharka VDC** Population: 8,121 No. of FCHV: 9 Health facility: an outreach center (private) and a health post (public)
	Panchkhal VDC Population: 14,930 No. of FCHV: 18 Health facility: a primary health center (public)

2.2. Participants

Patients were recruited from the 168 individuals with hypertension who were identified by previous screening and completed quantitative survey questionnaires (these procedures were described in another paper). Prior to recruitment, we set a sampling quota to interview 3 patients and 3 female patients in age groups of 40-65 and 65+. We aimed to include an equal representation of duration of hypertension in each of these categories (less than 5 years, 5-10 years and more than 10 years). Additionally, we conducted a focus group discussion with 8 FCHVs to get a general idea of FHCV's role and responsibility and another 4 in-depth interviews with FCHVs to understand individual experiences. Patients and FCHVs were recruited using convenience sampling and sampling stopped when the themes reached saturation. All six health workers in the community health facilities (health post, outreach center, and primary health center) and four health officials in selected VDCs were interviewed.

2.3. Procedures

Based on the sampling quota, selected patients were called and invited to participate in a home-based interview. Health workers in the outreach center were invited via the co-investigator from Dhulikhel hospital. All FCHVs, health workers in government health facilities, and policy makers were approached with the approval letter from Kavre District Office. Interview times and location were scheduled at the

participant's convenience. Interviews with health workers and policy makers mainly happened in their office, while interviews with FCHVs were home-based.

All IDIs and the FGD were conducted in the local language (Nepali). To maintain consistency, one research assistant, a student with a bachelor's degree in Public Health and experience in hypertension programming, moderated all IDIs with patients and FCHVs. The other research assistant, a researcher with a bachelor's degree in Environmental Health and five years of research experience, led all IDIs with health workers and policy makers, and the FGD with FCHVs. The author worked as an observer throughout the qualitative data collection process. Both research assistants received a half-day qualitative research training taught by an experienced expert. Immediately after each interview, there was a debriefing session among all assistants and fieldwork members to summarize key information and limitations of the interview.

At the start of each IDI or FGD, research assistants provided an overview of the study and participants provided written informed consent process. It took approximately 20-30 minutes to complete each IDI, while the FGD lasted 1.5 hours. With participants' consents, all interviews were audio-recorded. Interviews followed different semi-structured interview guides (Appendix A-C) that developed by the researcher under the guidance of scholars from the Teaching Hospital (Nepal) and Duke University. All interview guides were first developed in English and then translated into Nepali. These guides consisted of opening questions and follow-up probes (Table 3).

Minor modifications to the interview guides were made during data collection based on feedback and emerging data.

Table 3 Interview Contents for Each Group of Participants

Interviewee category	Interview guide focus
Patients	· Disease history · Knowledge of hypertension · Hypertension treatment and non-pharmaceutical management · Treatment adherence · Challenges of disease management
FCHVs	· Current responsibility and role · Knowledge and experiences about hypertension management · Attitudes towards participating in hypertension management · Perceived challenges and solutions
Health workers & Health officials	· Available hypertension services in local community · Community awareness on hypertension · Interaction with FCHVs · Perception on FCHV mobilization · Suggestion for FCHV mobilization

2.4. Analysis

Demographic information and categorical results were summarized as means and frequencies. Audio-recordings were transcribed verbatim and simultaneously translated into English by two research assistants. Thematic analysis was used to identify and organize themes (25). The researchers read the transcripts several times to become familiar with the data. The codebook was developed in two phases. Firstly, the

author drew some candidate codes from the interview guides and research questions. Then, two independent coders pre-coded three transcripts to revise and refine the codebook (26). All transcripts were double coded through NVivo 12 software. Coding comparison queries were run to assess the consistency of nodes coded by two researchers. The average Kappa 0.704, indicating a relatively excellent inter-rater reliability. Any discrepancies were discussed in the group until consensus was reached. If a consensus could not be reached, decisions were made by the author.

2.5 Ethical consideration

All study procedures are approved by the Institutional Review Board of Duke University and Nepal Health Research Council. Written informed consents were obtain from all participants. Study objectives and confidentiality issues were discussed with participants before interviews.

3. Results

3.1 Description of the sample

A total of 23 IDIs and 1 FGD were conducted. Table 4 summarizes participants component. The demographic characteristics of all interviewees were presented in Table 5. The mean age of patients was 64.4 (±13.3) years. Six females were illiterate, while three males had received education ranging from primary to higher level. Hypertension durations of these participants were equally distributed in less than 5 years, 5-10 years, and more than 10 years, with mean duration was 6.4 (±4.4). None of them were insured, as national health insurance rate was only 5% in Nepal (19).

The mean age of 12 FCHVs was 47.6 (±8.9) years. More than 40% of them were totally illiterate. FCHVs' mean years of working was 20.3 (±8.7) years. Among the six health workers, four were from Dhunkharka VDC (one nursing midwife and one health assistant in the health post; one doctor and one health assistant in the outreach center) and two were from Panchkhal VDC (one doctor and one health assistant in the primary health center). Four health officials included a ward executive in Dhunkharka VDC, a senior auxiliary health worker in Panchkhal Municipality office, a FCHV focal person and a public health officer of Kavera District. All health workers and health providers were ranked by numbers under two categories in quotes (Table 6).

Table 4 Participants Overview

	Patient	FCHV	Health Worker	Health Official
Dhunkharkha VDC	6	8 (1 FGD)	4	1
Panchkhal VDC	3	4	2	3

Table 5 Participants and Codes

Code name	Original title
Health worker 01	Doctor (outreach center)
Health worker 02	Health assistant (outreach center)
Health worker 03	Health assistant (health post)
Health worker 04	Nursing midwife (health post)
Health worker 05	Doctor (primary health center)
Health worker 06	Health assistant (primary health center)
Health official 01	Ward executive
Health official 02	Senior auxiliary health worker
Health official 03	FCHV focal person
Health official 04	Public health officer

Table 6 Demographic Characteristics of all Participants

Characteristics (Mean±SD or %)	Patients (n=9)	FCHVs (n=12)	Health workers (n=6)	Health officials (n=4)
Age (years)	64.4±13.3	47.6±8.9	-	-
Female (%)	66.7	100.0	16.7	0
Comorbidities (%)	66.7			
HTN duration(years)	6.4±4.4	-		
Working (years)	-	20.3±8.7	-	-
Highest education level				
illiterate	66.7	41.7	-	-
Primary school	22.2	41.7	-	-
Secondary school	0	16.6	-	-

Higher	11.1	0	-	-
	4 farmers	-	1 nursing midwife	1 ward executive
Occupation	1teacher	-	2 doctors	1 senior auxiliary
	1 retired	-	3 health assistants	health worker
	3 None	-		1 FCHV focal person
				1 public health officer

Based on three domains: hypertension treatment and awareness, health system-related barriers and facilitators of hypertension care utilization, and feasibility of FCHV mobilization, table 7-9 summarizes key themes and findings by domain.

3.2 Hypertension awareness and treatment

Table 7 Hypertension Awareness and Treatment

Key themes	Major findings
Knowledge of hypertension	· Most patients could link hypertension to its causes, symptoms and complications. · Misconceptions and home remedies were prevalent among patients.
Hypertension treatment initiation	· There was a delay in treatment initiation. · Negligence, distance to health institutions and fear of lifelong medication taking were main barriers to treatment initiation.
Medication adherence	· Overall, patients adhered to medication. · Some patients occasionally stopped medication due to forgetfulness, negligence, laziness, and affordability issues
Regular checkups	· Loss to follow-up was common among patients with hypertension
Non-pharmaceutical management	· Patients complained it was hard to regulate their lifestyle · Family support was an important part of regulating a healthy lifestyle.

Theme 1: Knowledge of hypertension

Most health workers and officials at both sites believed that community members had some basic knowledge about hypertension. From their perspective, community members knew hypertension could cause headache, dizziness, faint or other negative outcomes, but they did not know much about risk factors and specific complications of hypertension. Health workers stated that hypertension awareness and treatment adherence were strongly correlated with education level.

> *"Most people in this community have not been able to connect these things (heart disease, stroke and hypertension). Since they do not know that hypertension can cause these things, they are not very afraid of hypertension." (health worker 05)*

Relatively, individuals with hypertension that were under treatment demonstrated better hypertension-related knowledge, attributable to individual experiences and recommendations from doctors. All of them knew that individuals with hypertension should reduce intake of salt and fat and exercise, and half of them linked stress with hypertension.

> *"Hypertension, before, I heard that alcoholics get it. That… when the blood pressure's high, head starts hurting and starts feeling dizzy. Something like that happens. No power…that happens. It affects the heart the most. Head also hurts. There are many*

diseases that this invites, according to the doctor. Paralysis happens. I forgot all the types, but there are many types that you can get with this." (male patient, 56, HTN 10 years)

Moreover, health workers described that there were confusions and misconceptions regarding hypertension among the community members, even among individuals with hypertension. For example, one health worker stated that *"Regarding work, some people have the belief that people with hypertension should rest and not work a lot, while others believe that if those patients work harder, then pressure would decrease". Many* patients and FCHVs often practice home remedies as ways to self-treat hypertension such as wearing acupressure slippers, walking on the grass, and eating bitter plants. The ward executive mentioned that witch doctors still practiced in Tamang communities.

Theme 2: Hypertension treatment initiation

Most health workers and health officials agreed that many individuals with hypertension were undiagnosed since there was no door-to-door screening program and patients didn't respond early signs and symptoms. They said people in rural areas rarely approached the health institutions until health problem became a hindrance in their daily life. The doctor in Dhunkharaka said "*Until people have symptomatic issues like headaches, weird sensation in their hands and legs, pain in the eyes, only then people feel it as a necessity to visit the health center".* One health worker further added that *"People do not*

come in late stages. They do not wait for hypertension to cause irreversible damage. Most people come on mid stage".

Health workers and health officials suggested that the fear of lifelong medicine use was the strongest reason behind this delay. The doctor in primary health center said that *"People have the fear of hypertension and diabetes. They know that things will get difficult when they have these diseases"*. Another obstacle was the long transportation distance from patient's home to the health institutions, which was partially due to the landscape geography in Nepal.

> *"People might have to walk for 2-6 hours to reach the health institution. Since the health institutions are far, people think why they should go to those health institutions for minor cases…Geography is a cause in itself for poor access to health services" (health official 04)*

Health workers and officials raised that affordability of long-term drug treatment was a challenge for people from low socio-economic condition, although the economic burden was not reported by interviewed patients as a pivotal issue. Two patients said they stop medication occasionally since they had no money to refill it in time, but they also managed to *"buy the medicines regularly"*.

Theme 3: Medication adherence

When we asked patients about treatment adherence, many said they were taking Amlodipine 2.5mg or Amlodipine 5mg, which they took regularly at night. Most patients had no difficulty following their medication regimen. They simply said that *"It's already a habit"*. Five patients reported that they had ever occasionally stopped taking medication due to forgetfulness, negligence, laziness, and affordability issues. Two patients reported medication cessation when they felt better, but when the blood pressure rose again then they realized the importance to take medication daily. One of them said *"I stopped taking medicine for 1year. And again I felt ill and had to continue medicine" (female patient, 59, HTN 5 years)*. Overall, patients with hypertension adhere to the medication once they start it.

> *"When they come for follow-ups, at most they would have lessen the dosages but almost all of them continue their medication." (health worker 04)*

Theme 4: Regular check ups

Regarding regular blood pressure monitoring, one health worker in Panchkhal stated *"They take their medication but do not come for follow-up"*. The nurse in HP said there were only around ten individuals with hypertension having weekly check-ups in the catchment. When we asked patients about routine blood pressure measurement, they simply said *"blood pressure is fine, why should I go"*. The underlying reasons included

negligence of regular check-ups and distance barriers. Individuals with hypertension generally went to secondary or above level hospitals for medication or treatment. It was difficult for them, especially aged patients, to reach these hospitals weekly for check-ups.

Theme 5: Non-pharmaceutical management

Patients learned to self-manage hypertension through various channels such as social media, word of mouth and information from local health institutions and FCHVs. Reducing salt and oil intake, alcohol consumption, and quitting smoking were common actions that patients took to control their blood pressure. All patients said it was hard for them to strictly regulate their lifestyle. The major disruption of their health behaviors included burdens of a busy lifestyle, oily and salty dietary habits, and comorbidities such as asthma and COPD that prevented them from being physically active. Alcohol abuse was commonly observed among the Newar group, increasing the difficulty for them to self-manage their blood pressure. Several patients also were frustrated with little subjective improvement despite long-term efforts. One patient said that*"even though I did that much …I don't know ...I didn't feel better" (male patient, 85, HTN 1.5 years).*

Family support was observed as an important piece in regulation of a healthy lifestyle. Most patients said that they didn't have separate food cooked for them, but the manner in which the food was cooked and use of ingredients was changed to suit a

hypertensive person's diet. Family support was especially necessary for older patients. For example, if the older patients need to go to aa health center or a hospital, the adult children often need accompany them or provide transportation. Family members also helped purchase medicine and reminded patients to take medicine on time. Some patients experienced a lack of family support, which interfered with their ability to exercise and cook healthier foods. Stressing the importance of family support, one health worker stated:

"If there is a hypertensive patient in a family, the whole family has to alert about the diet. It is crucial that everyone in the family knows about the disease. As the next generation might too be hypertensive in the future. Like, if the father is hypertensive then there is a probability that the son will also have hypertension." (health worker 03)

3.3 Barriers and facilitators of hypertension care utilization

Table 8 Health System-related Barriers and Facilitators of Hypertension Care

Key themes	Major findings
Health system-related barriers	· underutilization of primary healthcare institutions, communication gap and lack of grass-roots level educational campaigns were main challenges.
Health system-related facilitators	· Community pharmacies and health camps increase hypertension care accessibility · Recent NCDs-related actions were favorable for hypertension management improvement.

Theme 1: Health system related barriers

There was an inconsistency with regards to reported accessibility to hypertension care between health providers and patients. Most health workers and health officials in Dhunkharkha believed people had *"very easy access"* to primary health institutions, and *"not very far to reach"* secondary and above level hospitals. Regarding the available services, the doctor in the Dhunkharkha said:

> *"We have enough equipment for primary diagnosis. Not just primary diagnosis, we also have facility for primary treatment of hypertension patients. But when patients go into complications, then we do not have the required equipment" (health worker 02)*

However, nearly all patients reported they only went to hospitals for treatment or checkup. One patient is Dhunkharha complained:

> *"There aren't any physician doctors or consultants. I need to go outside for them. There is only the normal, measuring pressure. Special or particular services aren't here" (male patient, 42, HTN 2 years).*

Also, according to the ***"Free essential health services"***, all drugs provided in HPs or PHCs should be free of charge to all individuals, which was confirmed by health workers, *"All of the medications available here are free of cost ... For hypertension, we have here beta-blockers (propanol), furosemide, calcium channel blockers (lacidipine, amlodipine").* Yet

none of patients reported that he/she had gotten any free hypertensive drug from the PHC.

Conversations with health workers and patients demonstrated some communication gaps. One FCHV suggested a few patients were unaware of ***"Free essential health services"***.

> *"If they ask us where we can take medicine then we take them to PHC, they said it take charge…and we told them it didn't take any charge. and we gave them that suggestion and then they come here" (FCHV, 51, working 30 years)*

When one health official advocated *"we are regularly organizing health camps and spreading information"*, several patients didn't think they had been informed such activities.

Hence, health workers felt grass-roots level informational awareness campaigns stressing the consequences and complications of hypertension as well as services offered by local health institutions were desperately needed in Nepali communities. One executive believed the most effective awareness interventions would educate women and children above grade 5 about hypertension, noting:

"If we were to spread awareness about anything, then women and children studying in grade 5 or above would be the best path towards it. If we were to include children from grade 5-10 then we could inform many people. These children will absorb the information quickly." (health official 01)

One health worker offered the idea that educational programming should specifically target high risk populations 40 years of age and those who had a family history of hypertension. Multiple health workers recommended residential message boards, dramas, radio and TV programming were effective ways to convey health education.

Theme 2: Health system-related facilitators

Community pharmacies, run by non-pharmacist professionals with basic orientation training on pharmacology and drug dispensing, were mentioned by six interviewees as another place to seek health services in both sites. Some of these community pharmacies also provided blood pressure measurement services. One patient said:

"It takes 5 minutes on foot to reach the "Khaba medical store". It takes about 2 hours on bus to reach hospital from home." (female patient, 59, HTN 5 years)

Monthly mobile health camps, which aim to provide healthcare to communities lacking medical resources, facilitated hypertension diagnosis in remote areas. Some health workers mentioned hypertension-related knowledge had been spread in recent health camps.

Conversations with health workers and health officials indicated NCDs management was receiving more attention and resources. Several NCDs-related programs had been piloted in other districts. The most important one was the "package of essential noncommunicable diseases (PEN)", which aimed to provide free preventive measures, consultations and referrals for NCDs (for which hypertension is an important risk factor). This program was expected to be scaled up across the country in the coming years.

3.4 Feasibility of FCHV mobilization

Table 9 Feasibility of FCHV Mobilization

Key themes	Major findings
Readiness of FCHV-based hypertension educational, screening and referral campaigns	· FCHVs' responsibility had been expanding to lifestyle education and counselling gradually · All stakeholders had a positive attitude to FCHV mobilization
Prerequisites of FCHV-based hypertension educational, screening and referral campaigns	· Systematic training, appropriate incentives and adequate access to equipment and medical resource were prerequisites of effective FCHV mobilization

Theme 1: Readiness for FCHV-based hypertension educational and screening campaigns

Although FCHVs' responsibilities had traditionally focused on maternal and child health, their work had been gradually expanded to some forms of hypertension management. FCHVs had begun to receive basic hypertension-related information at meetings and trainings and spread it to the community as they used to. One FCHV said *"we have heard it little bit from sir in PHC during training, but we have not heard about it detailly"*. Two FCHVs mentioned they had regularly checked in with TB patients to ensure that they were taking medication daily. These procedures shared similarities with the reminder-work that would be required in future work for hypertension management.

All health workers and health officials had confidence in FCHVs' potential to take the responsibility of community-level hypertension management. They considered FCHV mobilization for hypertension could be *"fruitful endeavor"*.

> *"Yes, I think they can do it. They are in regular contact with the people of their area. If they identify someone with high BP, they can go to their house and measure their BP for 4-5 days, even if the patients themselves are physically incapable of doing so." (health worker 06)*

FCHVs also showed a positive attitude to participating in hypertension management. They felt self-fulfillment and were motivated to *"know about the new things"* and "*give more suggestions to the community people"*.

Theme 2: Prerequisites of FCHV FCHV-based hypertension educational and screening campaigns

Adequate training was frequently talked about by most interviewees as the cornerstone of the success of a FCHV-based hypertension management program. FCHVs said *"we cannot consult blood pressure patients, we need training then we can do that"*. Health workers also emphasized *"If we were to leave them at their current knowledge level then it would be difficult to implement the program. There is a high possibility of error without training"*.

Training courses ought to be appropriately designed, given one third of the FCHVs were senior citizens and half could not read or write. One health official stated that previous FCHVs' reporting format was based on markings. *"For example, if they have provided ORS, there is a picture of the ORS on the report. They just mark on the picture."*

All health workers and health officials suggested that proper motivation would be a significant prerequisite of future FCHV mobilization. As volunteers, FCHVs didn't receive regular salaries, but small bonuses from the government. Although promised to

be givenRs.1000 (USD 8.93) per month from 2018, one FCHV revealed *we didn't get till now I don't know they will give or not".* She hoped that the government would establish the role of FCHV as a permanent job to with a regular salary and pension after retirement. During the FGD, one FCHV complained:

> *In a month, for 15 days we walk around in service… we do everything but office workers take the praise. Let's not talk about money (it's of no use), we're sitting here saying we're doing service. According to the service, I still haven't received money, which isn't good. Until now I'm content, but as our work load increases maybe I'll become less content who know? After that, the ward and area office need to also see this. (FCHV,46, working 15 years)*

Additionally, FCHVs felt the government did not provide them with the necessary equipment for their work. One FCHV said *"We have to walk to far places even in heavy rainfall but umbrella is not provided to us. We also have to walk in evening but there is no any organization that has provided us a torch light"*. A lack of sufficient basic medicines and health facilities were also mentioned as challenges for FCHVs' work.

4. Discussion

This study explored barriers and facilitators in hypertension treatment and control from patients, healthcare providers and policy makers perceptive, as well as provided a comprehensive hypertension management scenario in Nepal. It also assessed readiness and feasibility of FCHV-based hypertension management program. Study findings suggested hypertension awareness was low. Delay in treatment initiation and loss to follow up were common patterns despite compliance with medication. Underutilization of primary healthcare institutions, communication gap and lack of grass-roots level educational campaigns were identified as major health system-related barriers. Community pharmacies, monthly health camps and increasing governmental attention to NCDs were favorable for hypertension management. This study also showed that FCHVs had the potential to promote hypertension education, screening and referral in their catchments, with adequate training and proper motivation.

This study revealed that there was a delay in treatment initiation among individuals with hypertension. Patients lacked awareness of prevention and barely sought healthcare at an early stage when no or only minor symptoms occur. This finding was similar to studies in Nepal, Nigeria and Malaysia (27-30). Studies in America suggested that individual healthcare utilization had a positive association with health literacy (31, 32). Patients unable to connect elevated blood pressure with specific negative outcomes showed more negligence to hypertension, and consequently were

less likely to start treatment immediately. Additionally, the patients in this study reported they were reluctant to start pharmaceutical treatment due to the fears associated with the long-term nature of hypertension medication, which is congruent with Sachita et al's research (28). Drug tolerance, drug dependency, and side effects were major concerns synthesized by a meta-analysis (33). Few of patients raised financial hardships as obstacles for treatment decision. One possible explanation is that patients who completely cannot afford the treatment were excluded by the criteria "under medication". Overall, this delay demonstrated the necessity to promote community-based hypertension education and screening.

Patients self-reported a high medication compliance, despite occasional cessations because of forgetfulness, negligence, laziness, and affordability issues. These reasons were widely cited in other studies (34). Health providers in our study had a more accurate evaluation that patients generally adhered to the medication although they reduced dose. Patients tended to adjust the dosage of medication when they felt better or worse, which usually led to bad health outcomes. Similar practice was also found by Marshall's review (35). Also, blood pressure control was interfered by traditional medicines, home remedies and misconceptions like wearing slipper, adding water to yogurt and salty food, and trust in witch doctors, which is echoed by other studies (28, 36, 37).

Lost to follow-up was another challenge identified in our study, which also widely cited in other researches (28). Negligence of checkup was a serious issue needed to be addressed. More importantly, individuals with hypertension were often aged and suffered from comorbidities, which required more comprehensive checkup and consultation that were not available in primary health institutions in resources constrained countries like Nepal. However, distance to hospitals and transportation barriers deterred patients from regular checkups. A study from Africa found similar distance barriers for hypertension management (38). On the other hand, the capacity of primary health institutions in hypertension management was not fully functional. Health workers in primary health institutions complained that they normally lost the track of patients after referral (patients rarely went back to primary health centers for follow-ups). Thus, it seems likely that an effective downward referral system would act to target this lost to checkups.

Our study found insufficient communication and lack of transparency between the patients and the health providers, which led to the underutilization of primary health institutions. As supported by previous studies, patient-doctor communication is integral to ensure trust and proper management of health (39, 40). This emphasized healthcare providers need to increase their awareness of the need in their community and more efforts need to make the community aware about the prevalent services. The aforementioned community-based education campaigns should also take the

responsibilities to spread the information of available health services in primary health institutions. Interview with patients showed community pharmacies were popular places for anti-hypertension drug purchase, given the convenience and accessibility compared to health centers or hospitals that are further and have longer waiting time (12). There are approximate 20,500 officially registered pharmacies across the Nepal in both urban and rural areas (19). Community pharmacies are normally operated by some "lay persons" who receive training that ranges from a few weeks to 3 months (41). If further NCD-related training and steady drug supply are provided to the pharmacy operators, there can be an improved quality of service for people who frequently visit pharmacies for basic consultation. Despite the ongoing ***"Free Essential Health Services"*** stipulates typical antihypertensive drugs should be freely available in primary health institutions (42), none of patients received free medication from there. Insufficient supply of essential medications contributes to the gap between reality and policy in Nepal (43).

Findings suggested there is a high potential in designing FCHV-based educational, screening and referral programs for hypertension implemented at the grassroots level. FCHVs were identified to be effective candidates in delivering hypertension care because of their trustworthiness among community members, health workers, and health officials (44), confirmed by other studies in Iran Malaysia and South Africa (45-47). Our study found that FCHVs had limited knowledge of hypertension, but

some familiarity with "reminder work" that would be required for HTN management such as reminding patients to take medication. Experience from India sets a template on designing a training curriculum and effective supervision mechanism for CHWs with little formal education in hypertension screening and management (48).Similar to the findings of Neupane *et al.*, despite having very limited knowledge about hypertension, FCHVs were enthusiastic about learning more and confident in their ability to manage HTN in the community with proper training (49). While FCHVs were eager to learn more about HTN management, FCHVs expressed the importance of external motivators and compensation in order to sustain a community-based hypertension intervention. Singh et al.'s study also suggests well-trained community health workers who receive regular payment are more likely to engage the community in grass-roots health-related empowerment (50). A justifiable salary system should be developed for FCHV mobilization to define payer and payment mechanism. Having access to basic equipment such as digital blood pressure monitors and antihypertensive drugs would also improve FCHVs' performance.

FCHVs empowerment should also be considered as an indispensable component for extension of PEN program. The PEN program was introduced by the government of Nepal to promote health service equity and reduce NCDs burden. This program is designed to shift basic NCDs-related healthcare to the primary healthcare level. It consists of a set of cost-effectiveness interventions, such as lifestyle modifications, early

detection, and low-technology diagnosis, timely referral and affordable medicines, that can be delivered at primary health centers. Although the providers of PEN program in Nepal has been limited to primary health staffs (such as nursing midwives and health assistants), FCHVs has great potential to take some simple works like health promotion, lifestyle counselling, blood pressure measurement, suspected patients referral and diagnosed patients follow-up.

This was the first qualitative study in Nepal involving a range of stakeholders to gather multidimensional insights in hypertension management, whereas previous similar studies solely involved patients or health providers. Although a qualitative design often limits its generalizability of the study findings due to small sample size, we intentionally selected two sites with different economic and geographic characteristics to cover a wide range of the patient characteristics. Furthermore, we included all health providers, health officials and two thirds of FCHVs from the study sites and used a sampling quota to reduce selection bias.

5. Conclusion

Lack of awareness, delay in treatment initiation and loss to follow ups are major challenges in hypertension treatment and control in rural Nepal. Grassroot level hypertension screening and education campaigns can be effective strategies to increase timely healthcare utilization. Community pharmacies have a great potential to function as reliable health resources in hypertension management. FCHVs are promising health

cadres for the promotion of hypertension education, screening and referral in their catchment areas, once they have been empowered with appropriate training and motivated by proper incentives.

Appendix A

Focus Groups Discussion Guide

(Female Community Health Volunteers)

Aim: To explore the readiness and acceptability of involving FCHVs into the FPB program in Nepal.

Interview will last for 1 to 1.5 hours and recorded if consent is provided. Participant is completely voluntary and their rights to withdraw participation during or after the interview are assured.

Step 1: Give a presentation about FPB program framework

Step 2: Read out relevant sections in Consent Form to interview participants

Step 3: Consenting participants to sign the Consent Form

Step 4: Casually chat with the participants to establish rapport

Hint: Let FCHVs introduce themselves, including name, age and ethnicity, the community they serve, working years as FCHVs

Step 5: Ask the questions below:

1. What are your current responsibilities as a FCHV?

2. Do you know some hypertension cases in your community? What is your perception on hypertension in your community?

3. How do you think about availability of health care for hypertension?

4. How do you think about common health care practices for hypertension?

5. What are your reactions to the FCHV-based hypertension intervention?

Probe: What do you like about the intervention? What don't you like?

4. What is your attitude towards participating in this intervention?

5. What factors motivate you to participant in hypertension intervention?

6. What kind of role you think you can play in this intervention?

7. What would you need to take on this role (mentioned in last question)?

Probe: What kind of training would you need?

8. What do you think will be the difficulties or challenged in making this work?

Probe: What is the potential impact on your workload?

What do you think about incentives for you to undertake this work?

How many hypertensivess you perceive is reasonable for FCHV to manage?

9. What ideas do you have to make this work? (suggestions)

Probe: Who can provide training to you?

Which stakeholder has potential to fund this program?

10. How confident are you that you could carry out this role?"

Probe: Do you see yourself filling this role?

Step 5: Thank the interviewee for their participation. Give compensation to the participants.

Keep track of time!

Interview time:

Interviewer:

Record keeper:

Interviewee:

Appendix B

In-depth Interview Guide

(Female Community Health Volunteers)

Aim: To explore the readiness and acceptability of involving FCHVs into the FPB program in Nepal.

Interview will last for 20 to 30 minutes and recorded if consent is provided. Participant is completely voluntary and their rights to withdraw participation during or after the interview are assured.

Step 1: Give a presentation about FPB program framework

Step 2: Read out relevant sections in Consent Form to interview participants

Step 3: Consenting participants to sign the Consent Form

Step 4: Casually chat with the participants to establish rapport

Hint: Let FCHVs introduce themselves, including name, age and ethnicity, the community they serve, working years as FCHVs

Step 5: Ask the questions below:

1. What's your monthly life?

    Probe: how many days work as a FCHV?

    Probe: What's the regular responsibilities as a FCHV?

Probe: how often do you do (whatever she explained her responsibilities to be)?

2. How many households are you in charge of?

Probe: How long does it take you to reach patients' house? (closet, farthest,bulk)

3. Regarding the farthest house, can you give more detailed description?

Probe: how do you get there?

how long it takes?

how often do you visit?

what would you do if that patient required frequent follow-up etc?

4. What difficulties have you met as a FCHV?

Hint: related to some more specific responsibilities within her job that she outlined that you feel are relevant to your research (i.e. referrals)

5. What's the work connection between you and local health facility (PHC)?

Probe: What's the health facility (PHC) expect you to do? (work content/ frequency)

What are you actually do?

Why there is a gap (if gap exists)

6. What's the work connection between you and other FCHVs?

Probe: what's the similarities and differences between your and other FCHV's work?

Do you have some joint assignments? What is it?

7. Have you heard of hypertension (pressure) in your community?

Follow-up: what do you know about it? (if yes for Q7)

Probe: how people manage their pressure?

8. What do you think the availability of care for the hypertensive patients in your communities?

Step 5: Thank the interviewee for their participation. Give compensation to the participants.

Keep track of time!

Interview time:

Interviewer:

Record keeper:

Interviewee:

Appendix C

Patient In-depth Interview Guide

Aim: To understand hypertension care coordination, access and adherence barriers, and other relevant issues to the digital solution.

The interview will last for about 30 min and will be recorded if consent is provided.

Participant is completely voluntary and their rights to withdraw participation during or after the interview are assured.

Step 1: Read out and explain Consent Form to interview participants and answer their questions.

Step 2: Consenting participants to sign the Consent Form.

Step 3: Casually chat with the participants to establish rapport.

Hint: Name, age, occupation, living status (alone/with family), BP level

Step 4: Ask the questions below:

1. Can you recall and describe the first time you were diagnosed with hypertension/pressure?

Hint: Which hospital? Why did you go there for check? (some symptom occurs/for other disease)

Probe: To your knowledge, do you have other chronic diseases?

2. What kind of health service for hypertension you are receiving?

Eg. (medication) How often/when do you should take it?

How many (dose) medication do you take per day?

Have you ever met some difficulties to take medication? What is it?

3. Can you tell us the process of the last time you went to get (health service patients mentioned)

Hint: Where (health facility) did you go to get (health service patients mentioned)?

How far is it (health facility)? How long did it take you to reach there? (by car/bus/walk)

How long did it take you to wait in hospital for check?

How long did you have to consult doctor/health staff (health service patients mentioned)?

Is there someone help you? (who/how)

How often do you need to do that?

Did you met some difficulties to get (health service patients mentioned)? What is it?

4. How do you think about your adherence to hypertension treatment?

Hint: How frequently are you supposed to take check-ups/take your medication?

How frequently do you check up/take your medication?

Why don't you do as doctors prescribed? (if gaps exist)

5. Besides medication/check-up, what else do you do to manage your disease? Have you ever felt some difficulties?

6. How do your family members contribute to your hypertension management?

OR: what kind of things you family have done for your hypertension management?

7. What do you think about the support get from the family members?

8. What kind of support have you received from the community or local government in managing your hypertension?

Step 5: Thank the interviewee for their participation. Give compensation to the participants.

Keep track of time!

Interview time:

Interviewer:

Record keeper:

Interviewee:

Appendix D

In-depth Interview Guide

(Health workers & Health officials)

Aim: To understand hypertension care coordination, access and adherence barriers, and other relevant issues to the digital solution.

The interview will last for about 30 min and will be recorded if consent is provided. Participant is completely voluntary and their rights to withdraw participation during or after the interview are assured.

Step 1: Read out and explain Consent Form to interview participants and answer their questions.

Step 2: Consenting participants to sign the Consent Form.

Step 3: Casually chat with the participants to establish rapport.

Step 4: Ask the questions below:

1 What kinds of hypertension health care are provided in this area? How patients can get access to these services?

Probe: Diagnostic/ treatment/ management.

2 What's the hypertensive patients flow in health facility?

Probe: At what stage patient visit health facility?

3 What do you think about the access to hypertension healthcare? Any barriers?

4 Do you have suggestion on improving the access to hypertension healthcare?

5 What do you think about patients' adherence to hypertension healthcare? Any barriers?

6 Do you have any suggestion on improving patients' adherence hypertension healthcare?

7 What's the referral mechanism for hypertension cases in different level health institution?

8 What's the role of FCHV in hypertension care provision?

9 What do you think about the possibility to mobilize FCHV for hypertension identification and referral?

Step 5: Thank the interviewee for their participation. Give compensation to the participants.

Keep track of time!

Interview time:

Interviewer:

Record keeper:

Interviewee:

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