BMC Health Services Research

RESEARCH

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Understanding community health workers' readiness to provide hyperlipidemia-related self-management support in rural Nepal: a biphasic mixed-methods evaluation

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Abstract

Background It is unknown whether Female Community Health Volunteers' (FCHVs) can counsel for hyperlipidemia in rural Nepal.

Methods Using the Health Belief Model, we evaluated FCHV's knowledge, self-efficacy, and barriers to counsel for hyperlipidemia in two phases eleven months apart among 28 FCHVs from rural mid-Western Nepal. In each phase, we conducted four Focused Group Discussions (FGDs), hyperlipidemia-related training and two similar surveys before and after the training. We used inductive and deductive codes for thematic analysis and descriptive statistics for quantitative analysis. We integrated the results for complementarity and convergence using concurrent embedded design (Qual + quan).

Results FCHVs' mean age was 48 years and 21 out of 28 had worked for > 10 years. We found four themes in FGDs. In Phase 1, despite having interest, FCHVs had limited knowledge and confidence in counseling for hyperlipidemia. However, with sufficient training, they believed they could counsel. In Phase 2, FCHVs conveyed improved knowledge and self-efficacy. They expressed community might be concerned about their expertise, which improved in Phase 2. Quantitatively, FCHVs' knowledge improved immediately after the initial training, which was stable in Phase 2. Inadequate training was identified less as a barrier in Phase 2, but inadequate time and incentive were identified more often, and community's perception of FCHVs' skills remained unchanged.

Conclusion FCHVs want to provide hyperlipidemia counseling. Despite our trainings and FCHV's perceived self-efficacy, knowledge gap persisted. FCHVs' workload, inadequate incentives and knowledge were important barriers. Balanced workload, regular trainings and adequate incentives are important to engage FCHVs in hyperlipidemia management.

Keywords Female community health volunteer, Community health worker, Hyperlipidemia, Mixed methods, NCD nepal study

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Background

As the leading cause of morbidity and mortality worldwide, cardiovascular disease (CVD) is more common in individuals with hyperlipidemia compared to those with normal cholesterol levels [1]. Over the past 30 years, CVD attributable deaths in low and middle-income countries (LMICs) have steadily risen, with a 20.8% increase from 2007 to 2017 attributed to elevated low-density lipoprotein cholesterol (LDL-C) alone [2]. Although a robust assessment of the burden of hyperlipidemia in Nepal is limited, a nationally representative data showed a prevalence of ~ 11% [3]. Hyperlipidemia, despite being largely addressable through lifestyle changes and relatively low-cost, off-patent medications [1, 4], continues to impose a major burden in LMICs like Nepal [5]. In rural Nepal, where healthcare access is limited, health literacy is low, and resources are scarce, managing hyperlipidemia is particularly challenging. The lack of community awareness about the condition often results in under treatment. A scalable community-based self-management approach for hyperlipidemia care can meet this unmet need.

Community health workers, known as Female Community Health Volunteers (FCHVs) in Nepal, have previously demonstrated their effectiveness in managing other non-communicable diseases (NCDs) like hypertension and diabetes [6, 7]. Their deep community ties, presence all over the country and respect for their work enable them to work as health promoters in rural Nepal [8]. While hyperlipidemia counseling is not formally included in the current national FCHVs' scope of work, the Nepal Ministry of Health recognizes FCHVs' role in health promotion and prevention, providing a policy foundation for expanding their responsibilities [8]. This policy context, combined with their prior success in NCD programs, motivates exploration of FCHVs' potential in hyperlipidemia management. In this study, we explored FCHVs' potential for providing self-management support for hyperlipidemia, including training needs, to understand the barriers and facilitators of such management approach.

Methods

Study setting and population

This study is part of the Non-Communicable Disease in Nepal Study (NCD Nepal Study) which aims to evaluate community-based interventions to manage NCDs in rural mid-western Nepal [9]. The study focuses on four wards in rural and marginalized communities within Ghorahi sub-metropolitan city. Each ward is a local administrative unit leveraging various community-level services. The four wards have ~ 31,840 residents and 45 FCHVs. We contacted all 45 FCHVs through phones and interpersonal connections and 28 agreed to participate.

Study design

We employed biphasic evaluations using both quantitative and qualitative methods [10]. We used Health Belief Model (HBM) to develop semi-structured interview guides and surveys (Fig. 1) [11, 12]. This model encompasses six constructs - perceived benefits, barriers, susceptibility, severity, cues to action, and self-efficacy [11, 12]. For this study, we concentrated on FCHVs'

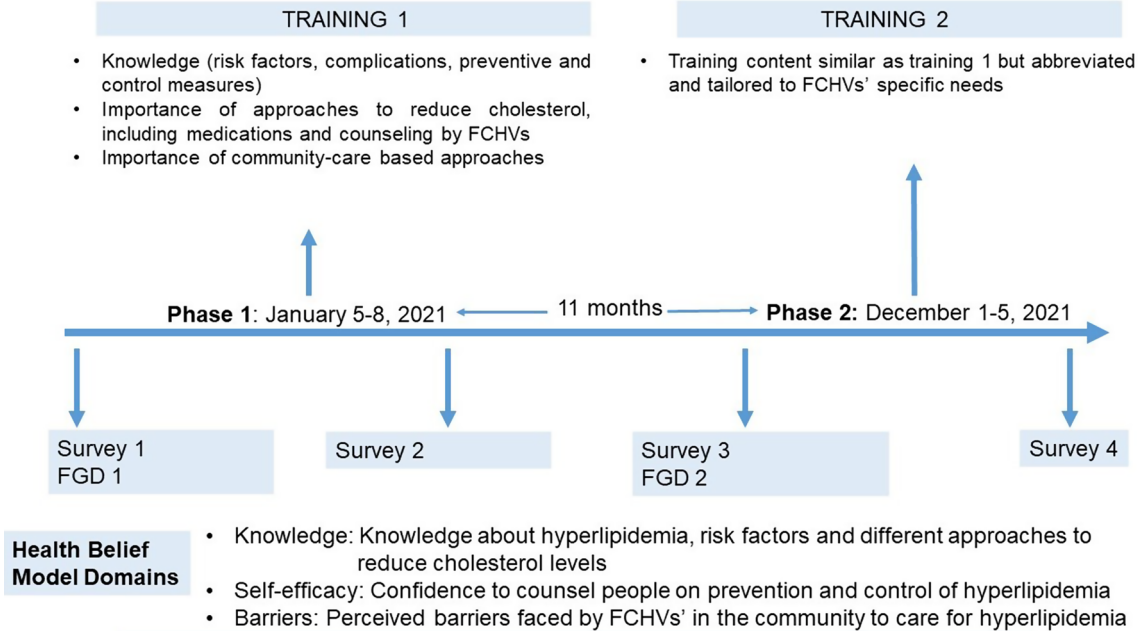

Fig. 1 Study timeline and relevant Health Belief Model domains. Legend: FCHV: Female Community Health Volunteer, FGD: Focused Group Discussion

knowledge, self-efficacy, and barriers in delivering hyperlipidemia counseling. These constructs inform assessment of FCHVs' own understanding of hyperlipidemia and perception about counseling, and how their beliefs about effectiveness and challenges of hyperlipidemia counseling shape their attitudes and approaches towards counseling. Although knowledge is not formally a core construct of the HBM, we included it because FCHVs' understanding of hyperlipidemia directly informs their self-efficacy and ability to act.

Each phase (1 and 2) included four focus group discussions (FGDs), a pre-training survey, a training session on hyperlipidemia counseling, and a post-training survey (Fig. 1). We prioritized information power when considering the numbers of FGDs. We evaluated FCHVs' knowledge, perceptions, and counseling practices related to multiple cardiovascular risk factors, including hypertension, diabetes and tobacco use. This manuscript is centered on hyperlipidemia. We provided light refreshments, a tote bag, and US$ 4 reimbursement per phase to participants, following local customs. We spent approximately 7–8 h per ward in a community hall during each phase.

We conducted and reported this study following the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines.

Study evaluations

A bachelor's degree–trained female research staff member (SB) served as the main facilitator, guiding each FGD session to seek insights on factors affecting FCHVs' roles in hyperlipidemia counseling. Other members of the research team (SS, PG) assisted in facilitating the sessions by managing logistics, taking notes, and ensuring the smooth flow of discussions. Similar questions were asked in surveys (see Additional file). We initially developed the study instruments in English and then two team members (SB, SS) independently translated the same instrument into Nepali language. Minor discrepancies in grammar and word choice were resolved through discussions (see Additional file). We pretested the instruments in a small sample resembling the target population to improve clarity and relevance.

Phase 1

Survey 1: This survey had six questions about knowledge, two about self-efficacy and one about barriers.

FGD 1: Before the initial training, we conducted one FGD per ward, involving seven FCHVs per group. Each FGD lasted ~ 45 min. Study staff (SB, PG, SS), some of whom had previously interacted with FCHVs conducted FGDs in local schools and health facilities.

Training 1: We provided a training to enhance FCHVs' knowledge and skills to deliver self-management support for hyperlipidemia. The training, which lasted about 4 h, covered various topics including implications of hyperlipidemia and counseling techniques using:

- Didactic sessions by physicians on hyperlipidemia risks, counseling methods, and community intervention strategies.
- Role-play demonstrating counseling skills using motivational interviewing and shared decision-making principles.
- Presentations, posters, pamphlets, and interactive activities.

Survey 2: Following the initial training, we conducted a second survey comprising seven questions to evaluate immediate changes in FCHVs' knowledge and skills (See Additional file).

Phase 2

Eleven months after Phase 1, we assessed retention of knowledge and skills, plus FCHVs' experiences and challenges in providing hyperlipidemia counseling. Like Phase 1, we started with Survey 3, a second round of FGDs, followed by a training and Survey 4. The refresher training was similar to Training 1 but focused on addressing the challenges FCHVs encountered in counseling since Phase 1 (Fig. 1).

Data analysis

Qualitative analysis

The research staff audio-recorded and transcribed the FGDs. One of the field staff also took field notes during the FGDs. They read each transcription line-by-line and cross-checked for accuracy. We utilized both inductive and deductive coding methodologies, to identify themes from the data [13]. Pre-established constructs from the Health Belief Model informed the deductive codes, while inductive coding allowed new themes to emerge from the data. Three trained staff (OJ, BC, SB) developed and iteratively refined the codes from two transcripts (one from each phase), reaching consensus through discussions and created a codebook. The coding team (OJ, BC, SB) then applied the codebook to all transcripts using Atlas.ti software and new codes that emerged from the data were continuously added to the existing codebook. We subsequently developed a code report and a code summary. We derived themes by analyzing patterns and relationships among the codes from the code summary [14, 15].

Quantitative analysis

We used R (version 4.0.2) to summarize data using descriptive statistics and to compare surveys using Fisher's exact test. We pre-specified comparisons between Surveys 1 vs. 2 to evaluate immediate changes in

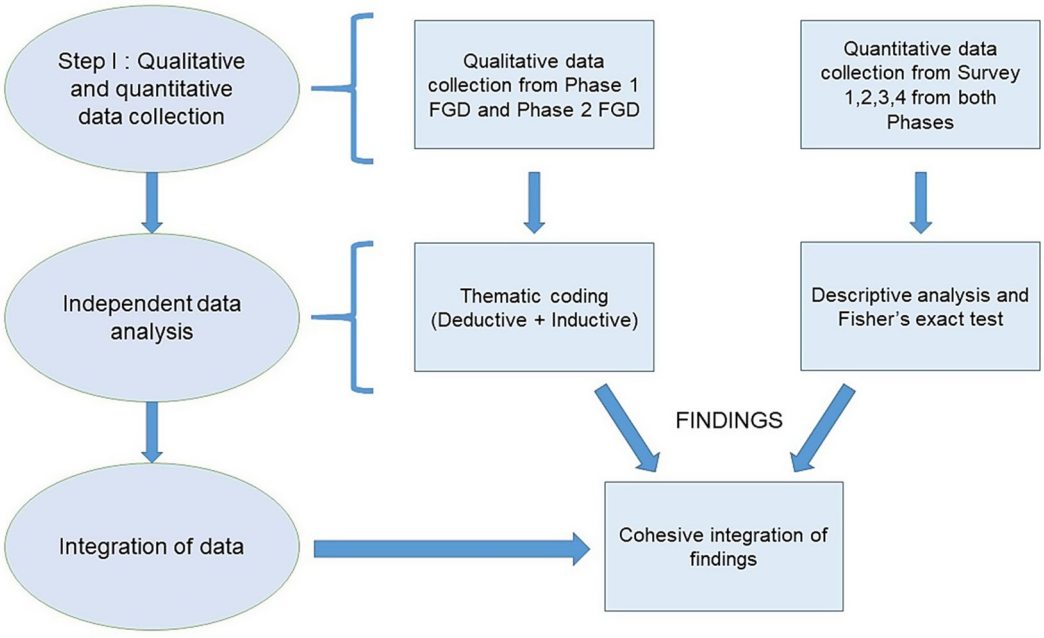

Fig. 2 Integration of qualitative and quantitative data. FGD: Focused Group Discussion

Table 1 Sociodemographic data

Characteristics	Number (*N* = 28)
Age, years	48 ± 6.79 (range: 29–66)
Women	28 (100%)
Education	
Literate	27 (96.5%)
Informal	1 (3.5%)
Primary	17 (60.7%)
Secondary	9 (32.1%)
Illiterate	1 (3.5%)
Occupation besides FCHV	5 (17.8%)
Agriculture	3 (10.7%)
Shopkeeper	1 (3.5%)
Member of ward council	1 (3.5%)
Years of engagement as FCHV	
≤ 10 years	7 (2%)
> 10 years	21 (75%)

FCHV = Female Community Health Volunteer

knowledge, Surveys 2 vs. 3 for short-term retention, and Surveys 1 vs. 4 for overall knowledge improvement. We considered a two-sided p-value < 0.05 as statistically significant and did not adjust for multiple comparisons.

Data integration

We embedded the quantitative evaluation within the larger qualitative inquiries (Qual + quan). We collected quantitative and qualitative data in parallel, analyzed them independently and integrated the findings for convergence and complementarity (Fig. 2).

Ethical consideration

The research activities for this study were carried out in accordance with the Declaration of Helsinki. This study is part of an ongoing NCD Nepal Study [9]. We obtained ethical approval from Nepal Health Research Council (Ref: 2483) and a written informed consent from each FCHV. Before obtaining consent, data collectors informed participants that their participation was voluntary, explained the purpose of the study and the interview, and discussed logistics, the use of audio recording, and de-identification procedures.

Results

Sociodemographic data

FCHVs' mean age was 48 ± 6.8 years, 1/3rd had secondary education and 3/4th had > 10 years of experience (Table 1).

Main findings

We found 4 themes in qualitative analysis.

Noticeable knowledge gains through training

Theme 1: FCHVs had limited understanding of high cholesterol in Phase 1, but their knowledge, particularly about cholesterol's role in atherosclerosis and cardiovascular health, improved noticeably following training.

In Phase 1, FCHVs demonstrated limited or incorrect understanding of high cholesterol. For some, cholesterol was equated with overall body fat and associated with weight gain. Only a few linked cholesterol to *something that gets deposited in the blood vessels*. One participant

described cholesterol as *the fat that gets deposited in the liver*. Another participant shared:

> *Quote 1: I don't fully understand what cholesterol means. I heard that someone got sick because they had too much cholesterol, but I wasn't familiar with the term before. – FGD 1, Ward 7, Phase 1*

Following the training, there was a notable shift in FCHVs' knowledge, particularly in Phase 2. They began describing cholesterol as *a substance that could accumulate in blood vessels*, contributing to atherosclerosis and cardiovascular issues. Participants increasingly recognized the relationship between cholesterol, blood flow, and health risks. One participant explained:

> *Quote 2: Cholesterol means the thing that gets deposited in blood vessels. We shouldn't eat fatty food and we shouldn't get overweight. If we get overweight, cholesterol gets deposited in our blood vessels and the blood flow becomes sluggish, and we suffer from various diseases. – FGD 2, Ward 6, Phase 2*

The training's impact was also evident in FCHVs' knowledge of health-related effects of high cholesterol. Initially, only a few participants were aware of the harmful consequences of high cholesterol. By Phase 2, nearly all participants could articulate at least one adverse health outcome. Discussions highlighted risks such as heart disease, stroke, and hypertension, and effects on the kidneys. A participant described these risks with notable detail:

> *Quote 3: Like the other sister has said, when your cholesterol increases, the blood flow in the vessels becomes sluggish. If cholesterol level increases, it can cause problems. It is also equally important to pay attention to your diet. If the vessels become clogged, there is a risk that they may suddenly rupture, which can lead to paralysis. It can also damage the kidneys and cause heart attacks. I have heard about these issues and have also seen them with my own eyes. – FGD 3, Ward 3, Phase 2*

Despite these improvements, knowledge gap persisted. Not all participants could retain the knowledge from the training, and inaccurate conceptions of cholesterol persisted. COVID-19 pandemic-related disruptions was partly attributed for their forgetfulness.

We noted similar results on serial surveys (Table 2). For example, 57.1% vs. 96.4% in Survey 1 vs. 4 recognized excess cholesterol could result in heart attack and stroke from arterial obstruction.

When integrating qualitative and quantitative data, the need for regular training became even more apparent (Table 3).

Table 2 Results from quantitative analysis

Domains	Questions	Phase 1 Surveys		Phase 2 Surveys		P values		
		1	2	3	4	1 vs. 2	2 vs. 3	1 vs. 4
		(% selecting "Correct" response)						
Knowledge	Have you heard about cholesterol?	42.9	NA	82.1	NA	-	-	-
	Cholesterol level is measured in blood.	35.7	96.4	75	100	< 0.001	0.051	< 0.001
	Excess level of bad cholesterol blocks arteries and cause heart attack and stroke.	57.1	92.9	89.3	96.4	0.004	1.000	0.001
	Bad cholesterol in blood can increase by eating food excessive in unhealthy fat.	78.6	100	92.9	100	0.023	0.491	0.023
	People can have high bad cholesterol despite excellent lifestyle.	64.3	92.9	85.7	100	0.020	0.669	0.001
	If lifestyle modification does not reduce bad cholesterol, medication should be taken to reduce risk of heart attacks and stroke.	75.0	96.4	78.6	100	0.051	0.101	0.010
Efficacy	Do FCHV have a role in cholesterol management?	64.3	100	96.4	96.4	0.001	1.000	0.005
	What is your skill level in counseling people to change lifestyle to reduce bad cholesterol? (% selecting "I can independently counsel "or "I can counsel, but only with some assistance" or both.)	60.7	89.3	82.1	71.4	0.029	0.705	0.573
Barriers	What are the factors that may hinder FCHVs from effectively engaging in activities related to high cholesterol management within their community?					**1 vs. 3**		
	Lack of training and orientation	82.1	NA	53.6	NA	0.044		
	Multiple engagement of FCHVs in different health programs	32.1	NA	50	NA	0.277		
	Incentives and motivation	25	NA	64.3	NA	0.007		
	Community belief and attitude towards FCHV skills	46.4	NA	39.3	NA	0.787		

FCHV = Female Community Health Volunteers, NA: Not applicable as the question was not asked during the survey

Table 3 Mixed-methods integration

Qualitative findings	Quantitative findings	Mixed method findings
Noticeable Knowledge Gains Through Training		
Participants in Phase 1 showed a lack of awareness about hyperlipidemia, with most being unaware of the concept. Some associated cholesterol with body fat or liver fat deposition. In Phase 2, although there was an overall increase in understanding and acknowledgement of the effects on heart, blood vessels, or stroke risk, a few FCHVs still struggled to understand the concept of cholesterol.	While there was a low awareness about hyperlipidemia at baseline, on serial surveys, FCHVs' awareness improved.	Findings from FGDs and surveys at baseline triangulated showing generally a lower understanding of hyperlipidemia. Quantitative data showed immediate improvement in knowledge following training 1, and stable short-term knowledge retention at eleven months. Compared with baseline, there was significant improvement in knowledge at the study conclusion. Like the surveys, FGD 2 showed that FCHVs knowledge although improved from baseline, they still needed further training. A few FCHVs forgot what they learned.
Growing Awareness about Cholesterol Management		
In both phases, FCHVs attributed high cholesterol levels to being overweight, unhealthy eating habits, and lack of exercise. There was a greater understanding of the importance of checking cholesterol levels and needing medications in Phase 2.	FCHVs had a good baseline agreement with statements regarding lifestyle's impact on cholesterol levels, which significantly improved after training. Similar change was noted for needing medication use.	Mixed-methods integration triangulated the findings about the importance of lifestyle measures, monitoring cholesterol and medication use. FGDs offered complementarity by offering nuanced findings like misconceptions about lifestyle measures and by surveys showing FCHVs awareness of the genetic nature of hyperlipidemia. In surveys, we noted significant changes overall and immediately after the initial training, with good short-term retention.
Rising Confidence in Supporting Cholesterol Management		
FCHVs showed varying confidence level in providing counseling for hyperlipidemia at baseline. While many felt confident, some expressed uncertainty, particularly regarding more specific topics. There was a notable increase in confidence post-training. In Phase 2, FCHVs also recognized positive outcomes of their counseling efforts.	Survey showed that FCHVs recognized their role in cholesterol management. Self-perceived skill in counseling significantly increased immediately after the initial training but without further change.	FGDs showed improvement in self-efficacy to counsel, which was triangulated by survey findings showing immediate improvement after the initial training. FGDs further complemented by showing needs, including ongoing training, expert guidance, and access to resources. Surveys complemented by showing no further improvement in self-efficacy. This underscores a need for ongoing comprehensive training.
Evolving Barriers and Support in Counseling about Cholesterol		
FCHVs reported various barriers in providing counseling, including lack of knowledge, community members' skepticism about FCHVs' expertise, time constraints, personal reasons, and inadequate incentives. While most barriers decreased in Phase 2, a new barrier from COVID pandemic emerged.	Survey showed barriers like inadequate training improved but inadequate incentives became more apparent, and community's attitudes and workload were similar in phase 2.	The FGD findings illustrated complex and multifaceted nature of barriers to complement the survey findings. There was also convergence about inadequate training and incentives.

FCHV = Female Community Health Volunteer, FGD = Focused Group Discussion

Growing awareness about cholesterol management

Theme 2: FCHVs consistently identified lifestyle changes, particularly dietary adjustments and exercise, as essential for controlling high cholesterol, which they emphasized even more in Phase 2 and further identified the importance of monitoring cholesterol and medications.

FCHVs consistently identified lifestyle modifications, particularly dietary adjustments and regular exercise, as *crucial for controlling high cholesterol*. Across Phases 1 and 2, FCHVs consistently identified importance of weight loss to reduce cholesterol, linking being overweight to elevated cholesterol levels. In Phase 1, discussions predominantly revolved around *reducing the intake of oily*, *greasy and unhealthy foods*, exercising, and managing weight. One FCHV noted:

> *Quote 4: First of all, do not eat oily food; instead, boil it before eating. If your cholesterol increases, it poses a danger. To not increase cholesterol, you need to eat less oily food, exercise, and walk regularly. Doing these things will also help reduce your weight. – FGD 2, Ward 6, Phase 1*

By Phase 2, participants expressed an even greater emphasis on lifestyle measures, with universal recognition of the importance of eating healthy, weight loss, and exercise. FCHVs described these changes as foundational to preventing and managing high cholesterol levels. They also highlighted the need for regularly seeing doctor, checking cholesterol level and adhering to medical advice. One participant articulated:

> *Quote 5: The most important thing is to pay attention to your diet: avoid eating anything oily or greasy*

or spicy. You need to exercise regularly and have routine check-ups rather than just sitting idle in your home. Following doctor's advice, you should exercise. – FGD 1, Ward 7, Phase 2

In addition to lifestyle changes, FCHVs discussed the use of medications to manage high cholesterol, which was more discussed during Phase 2. For instance, one participant shared:

Quote 6: I also provide counseling. When someone with high cholesterol comes to me complaining of chest pain, I advise them to get a check-up and do a blood test. If their cholesterol is found to be high, I suggest they take medication. If it is not elevated, (I advise them to) exercise and eat a healthy diet. – FGD 3, Ward 3, Phase 2

Survey data reinforced the qualitative findings (Table 2). For example, 75% vs. 100% in Survey 1 vs. 4 recognized the role of medication if lifestyle modification was not adequate to control cholesterol.

Mixed-methods interpretation showed convergence and complementarity of qualitative and quantitative inquiries on each other and further demonstrated the importance of regular education (Table 3).

Rising confidence in supporting cholesterol management

Theme 3: FCHVs initially had limited confidence in counseling about high cholesterol, but by Phase 2, their confidence improved, with a broader understanding of the topic.

In Phase 1, FCHVs exhibited varying levels of confidence in counseling about hyperlipidemia, often expressing uncertainty. Their knowledge was limited to dietary habits and exercise. One participant candidly shared:

Quote 7: I don't know much, but I counsel them to eat less fat and oily food. – FGD 3, Ward 3, Phase 1

By Phase 2, FCHVs' confidence in counseling improved markedly. In the intervening period, FCHVs not only counseled about dietary habits and exercise but also incorporated discussions about the health effects of high cholesterol, need for regular doctor visits and the role of medications. A majority noted they could confidently *provide guidance to their communities*. One FCHV described how she now approaches counseling:

Quote 8: Cholesterol is a condition in which fats and fatty substances accumulate and affect blood vessels. You should not eat oily food, exercise, and walk regularly. If your cholesterol is still high, you should take medications. This is the advice I give. – FGD 1, Ward 7, Phase 2

The impact of increased confidence was also evident in the positive outcomes shared by the FCHVs. They noted how their advice inspired community members to take actionable steps. One participant recounted a particularly meaningful interaction:

Quote 9: I counsel in my mother civic group and I also counsel others when we meet. One of the people I counseled shared with me that after our session, she decided to check her cholesterol and found that it was borderline high. She mentioned that, as a result, she plans to reduce her intake of fatty foods. She also expressed that it was because of our conversation that she took the step to get her cholesterol checked. – FGD 2, Ward 6, Phase 2

Nevertheless, FCHVs in both phases consistently emphasized the need for ongoing support and training to enhance their counseling skills. As one participant expressed:

Quote 10: First of all, we need training. When we go to village and counsel others, they need to understand and follow our advice. We need to have the necessary skills to improve others' understanding. – FGD 4, Ward 4, Phase 1

FCHVs also identified additional needs for counseling, including expert involvement and also highlighted *practical considerations, such as selecting suitable meeting locations like health posts and community halls* that are easily accessible to community members. Additionally, they emphasized the importance of providing supplementary resources, including *informational pamphlets to reinforce key messages.*

This sentiment continued into Phase 2, with participants recognizing gaps in retention and consistently emphasizing the importance of reinforcement and *regular, timely training*. For instance, one participant noted:

Quote 11: I forgot what I learned before, but I may remember if you explain it again today. After learning, I can counsel. – FGD 2, Ward 6, Phase 2

Surveys showed FCHVs identified having a role in cholesterol management. After the initial training, there was an immediate improvement in perceived self-efficacy to counsel independently or with some assistance, which did not change at study conclusion (Table 2).

Mixed-method interpretation showed both triangulation and complementarity of each method and

highlighted a dynamic shift in the FCHVs' ability and confidence to provide hyperlipidemia-related self-management support while underscoring the critical role of ongoing training and support in sustaining their efforts. (Table 3)

Evolving barriers and support in counseling about cholesterol

Theme 4: FCHVs in Phase 1 expressed barriers like lack of knowledge, community's skepticism about FCHVs' expertise in hyperlipidemia and time constraints. By Phase 2, FCHVs reported fewer barriers but some challenges persisted, including a new challenge about COVID-19 pandemic affecting their community activities.

FCHVs identified a range of barriers to effectively counsel about high cholesterol during Phase 1. Key challenges they mentioned included lack of knowledge, community skepticism, time constraints, and personal health issues. FCHVs emphasized that *without sufficient knowledge*, they felt incapable of providing effective counseling. One participant reflected:

> *Quote 12: First, we need to have knowledge. Only with knowledge, can we become capable of counseling and discussing it in our mothers' group. After learning from you, then maybe we can counsel in our mothers' group. – FGD 4, Ward 4, Phase 1*

In addition to knowledge gaps, FCHVs voiced concerns about the perceived community's skepticism regarding their expertise in cholesterol management. They shared frustrations about being dismissed as unqualified, particularly if the community felt their training was perceived as a mere incentive-driven effort. One FCHV expressed:

> *Quote 13: We do face difficulties. When we go to provide counseling, some people say that we received training just to earn the incentives. They claim they know more than us and we are there only to justify the incentives. – FGD 1, Ward 7, Phase 1*

Time constraints also posed a challenge, with difficulties in finding enough time to engage in counseling activities for high cholesterol due to FCHVs' *involvement in various other commitments.* Additionally, *personal health issues* further hindered their ability to offer effective counseling.

By Phase 2, many of these barriers had diminished. FCHVs reported *no major challenges in providing counseling*, thanks to their expanded knowledge and increased confidence. Challenges in counseling due to COVID-19 pandemic emerged as a new barrier. However, negative community responses persisted. One FCHV said:

> *Quote 14: I feel sad when they say something unkind. Hearing comments like we are there to counsel as if like a doctor worries me. – FGD 3, Ward 3, Phase 2*

Despite the lingering skepticism, FCHVs found their efforts more welcomed. One FCHV described:

> *Quote 15: I didn't have any trouble [to counsel]. There are many people in my mothers' group, and I share some of these things with them. I counsel them not to eat too much greasy food and to eat less fat from meat. Nowadays, children think that vegetables are tasty only if they put lots of oil in them, but they should not eat such fried foods. We counseled what we learned from the last training, and some have decreased their intake [of fried foods]. It is especially important to inform today's children, as they believe that eating oily food is good for them. I have given good advice, and I haven't encountered noticeable barriers. [After the refresher training], I am looking forward to giving fresh advice. – FGD 4, Ward 4, Phase 2*

In Phase 2, FCHVs also described receiving support for their counseling efforts. Many participants highlighted that the community had acknowledged their contributions, with some even expressing gratitude for the positive health changes they had experienced. One FCHV shared:

> *Quote 16: We do find facilitators. Some say that what we counsel is very good. They understand what we're saying, and there are people who even thank us for the counseling we provide. – FGD 2, Ward 6, Phase 2*

These expressions of gratitude reflect the positive impact of the FCHVs' counseling and the increasing recognition of their efforts, despite the barriers they faced earlier.

Quantitative data showed that while inadequate training was still an important barrier in Phase 2, it was pointed out less often than Phase 1 (Table 2). There were growing concerns about inadequate incentives, while concerns about workload and community's perception towards FCHVs' skills were unchanged.

In mixed-methods interpretation, we noted both convergence and complementarity (Table 3). Qualitative analysis expounded the complex nature of barriers not captured by surveys. Altogether, mixed-methods evaluation showed the potential and the inadequacies of our short and infrequent training.

Discussion

This study highlights the potential of FCHVs in rural Nepal to provide self-management support for hyperlipidemia. FCHVs are interested in such endeavors. We noted improvements in FCHVs' understanding of hyperlipidemia, from initial unfamiliarity regarding its health implications and management strategies. After receiving training, FCHVs expressed increased confidence in their counseling abilities and reported garnering community's support. Despite persistent barriers like high workload, inadequate training and incentives, the overall positive impact of the training underscores the potential of leveraging FCHVs for hyperlipidemia management.

Hyperlipidemia burden in LMIC like Nepal can be mitigated through lifestyle changes and affordable, off-patent medications [1, 4]. Our study showed that FCHV-led counseling is feasible, but there are notable barriers for effective implementation. Importantly, these barriers are addressable with better incentives, comprehensive and regular training, improving community's perception and careful workload assignment. Community's perception can be enhanced through general awareness raising campaigns, which can increase uptake of the services offered by FCHVs. If a future randomized trial shows clinical effectiveness of FCHV-led approach, such a community-based strategy can augment the fragile and overworked health systems in Nepal and can be a model for other LMICs.

While robust evidence is essential for shaping health policies and healthcare delivery, existing empirical data on hyperlipidemia management in LMICs is sparse and fragmented [16, 17]. Current research tends to focus on individual countries or specific subpopulations, often addressing limited healthcare indicators like access to essential medicines [18–20]. To our knowledge, this is the first published study to explore the role of CHWs in counseling for hyperlipidemia management, an ignored topic in the global setting. Although prior studies have demonstrated the effectiveness of FCHVs in managing other NCDs such as hypertension and diabetes [6, 7], our research addresses a significant gap by investigating their potential in hyperlipidemia management.

Our findings highlight the need of continuous education, ongoing training, supervision and support for FCHVs to sustain effective counseling interventions. Technology like text-messaging or telemedicine support may have a role in supporting FCHVs' skills after initial and comprehensive training [21]. Cultivating supportive community environments by raising awareness that facilitate behavior change and promote healthier lifestyles by changing community members' attitudes and receptivity towards FCHVs' counseling is important. Leveraging local civic groups for advocacy could be helpful in such endeavors [22].

To implement FCHV counseling for hyperlipidemia management requires integrating community-based interventions into Nepal's healthcare system. Policymakers should prioritize allocation of resources for comprehensive training programs. Benchmarks can be helpful to certify that FCHVs are ready for counseling. Establishing referral systems and addressing systemic barriers like inadequate incentives and availability of medications, will be important. Continuous professional development, regular feedback and periodic co-presence of more trained personnel with FCHVs can help overcome the identified challenges. Providing additional resources and support mechanisms will further empower FCHVs.

Our study boasts several strengths, including using a mixed methods approach and evaluation in two-phases after FCHVs had an opportunity to provide counseling services for ~11 months. We sampled diverse FCHVs from multiple regions. By integrating quantitative and qualitative data, we triangulated and complemented the findings and illuminated a nuanced understanding. Multiple surveys helped us to evaluate frequency and intensity of required trainings. However, our study also has limitations. Quantitative analyses should be carefully interpreted due to small sample size and concerns for multiple testing. We did not develop a standard benchmark to evaluate FCHVs' competency. Future work should consider such approach to evaluate knowledge and understanding of behavior change theories and principles relevant in lifestyle modifications.

Conclusion

We showed that FCHVs in rural Nepal are willing and probably capable of providing counseling for hyperlipidemia, especially if the identified barriers including inadequate knowledge, incentives and workload are addressed. Our training interventions enhanced FCHVs' understanding of hyperlipidemia, its health impacts, and lifestyle interventions, but was inadequate. FCHVs need ongoing comprehensive education. Building on our findings, future study with more developed and supportive program should evaluate the clinical effectiveness of counseling on hyperlipidemia by FCHVs.

Abbreviations

CHW	Community Health Worker
FCHV	Female Community Health Volunteer
FGD	Focused Group Discussion
HBM	Health Belief Model
LMIC	Low-middle Income Countries
LDL-C	Low density lipoprotein cholesterol

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-025-13834-y.

Supplementary Material 1

Acknowledgements
Not applicable.

Author contributions
Dr. Pokharel, Dr. Jha, Dr. Chaulagain and Ms. Bhusal 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. Concept and design: Bhusal, Sharma, Thapa, Gautam, Pokharel. Acquisition, analysis, or interpretation of data: All authors. Drafting of the manuscript: Jha, Chaulagain, Bhusal, Pokharel. Critical revision of the manuscript for important intellectual content: All authors. Obtained funding: Not applicable. Supervision: Pokharel.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The research activities for this study were carried out in accordance with the Declaration of Helsinki. This study is part of an ongoing NCD Nepal Study [9]. We obtained ethical approval from Nepal Health Research Council (Ref: 2483) and a written informed consent from each FCHV. Before obtaining consent, data collectors informed participants that their participation was voluntary, explained the purpose of the study and the interview, and discussed logistics, the use of audio recording, and de-identification procedures.

Consent for publication
Not applicable.

Competing interests
Y.P. is supported by the National Institutes of Health Awards K23HL171954, 1R01HL173523, and from the Patient-Centered Outcome Research Institute Award BPS-2023C1-31377. B.A. is supported by the National Institutes of Health Awards R01MH133231, R01AA029303, R01MH135376, and R01TW012682. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or Patient-Centered Outcome Research Institute. Other authors have nothing to disclose.

Received: 2 January 2025 / Accepted: 27 November 2025
Published online: 05 December 2025

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