

STRENGTHENING COMMUNITY HEALTH WORKERS' CAPACITY FOR NON-COMMUNICABLE DISEASE PREVENTION AND CONTROL IN RURAL SETTINGS: A PARTICIPATORY ACTION RESEARCH PROTOCOL

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ABSTRACT

Non-communicable diseases (NCDs) are a leading cause of mortality and morbidity worldwide. Strengthening the capacity Community Health Workers (CHWs) is a key strategy for improving NCD prevention and control. However, its implementation remains suboptimal, particularly in rural settings. This study aims to co-design, implement, and refine a CHW capacity-building intervention for NCD prevention and control in rural settings using a Participatory Action Research (PAR) approach. This protocol describes a qualitative PAR study with process evaluation from August 2024 to June 2026 at Kaliwates Public Health Center (PHC), Jember, Indonesia. The completed pre-PAR phase involved 20 participants (CHWs and healthcare providers) to identify baseline needs and intervention development, while the subsequent PAR phase will involve 15 purposively selected CHWs. The post-PAR phase will explore participants' experiences, perceived benefits, feasibility, and sustainability of the co-developed intervention through observations, in-depth interviews, the Delphi method, and focus group discussions (FGDs). Data from the completed pre-PAR phase were analyzed using thematic analysis and Multiple-Perspective Interviews (MPI), supported by ATLAS.ti software, whereas data from the PAR and post-PAR phase will be analyzed upon completion. Ethical approval was obtained before the commencement of the pre-PAR phase. Preliminary findings from the pre-PAR needs assessment identified three overarching themes: systemic barriers to CHW role fulfilment; capacity gaps in training and skill development; and the need for participatory, culturally embedded training approaches. These findings provide an empirical foundation for the co-design, implementation, and evaluation of a contextually relevant CHW capacity-building intervention for NCD prevention and control in rural settings.

Keywords: *Non-communicable diseases; participation action research; prevention and control; protocol research; rural area*



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BACKGROUND

Non-communicable diseases (NCDs) are persistent and significant public health challenges, causing substantial mortality and disability worldwide. According to the Global Burden of Disease Study 2021, NCDs account for approximately 74% of all deaths globally and remain the leading cause of premature mortality worldwide.

Cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes contribute substantially to this burden, particularly in Low- And Middle-Income Countries (LMIC). NCDs constitute a global issue, particularly in developing nations. (Murray, 2024; Institute for Health Metrics and Evaluation, 2024).

NCDs have become a strategic priority for achieving the Sustainable Development Goals (SDGs) by 2030 and required prioritization across all countries (Babaita et al., 2024; Bennett et al., 2020). Indonesia is confronting a dual burden of infectious diseases and NCDs. Result from the 2018 Basic Health Research (RISKESDAS) indicated increases in hypertension, diabetes, and cancer incidence from 25.8% to 34.1%, 6.9% to 10.9%, and 1.4 to 1.8 per thousand population, respectively (Ministry of Health, 2022). The policy for the prevention and control of NCDs has been extensively implemented.

In rural primary healthcare settings, key NCD-related functions remain inadequately implemented, including community-based risk screening, health education, referral follow-up, lifestyle counseling, and routine monitoring of individuals at risk. Limited healthcare personnel and geographical barriers further constrain service coverage, creating opportunities for CHWs to strengthen community-level NCD prevention and control activities (Musoke, Atusingwize, Ndejjo, et al., 2021).

Community Health Workers (CHWs) have a pivotal role in NCD prevention and control. In several Ministry of Health of Indonesia programs, CHWs are involved in health promotion, prevention, surveillance initiatives, and community empowerment activities (Ministry of Health, 2019). However, the implementation of CHW roles has not been fully optimized and requires further strengthening (Fadillah & Alvianti Akbar, 2018; Prihanti et al., 2022). This challenge is particularly evident in rural areas across LMIC, including Indonesia, where strengthening CHW capacity is essential for effective NCD management given the unique health behaviors and contextual demands of these communities (Musoke, Atusingwize, Ikhile, et al., 2021; Rawal et al., 2020, 2021; Tsolekile et al., 2018).

In response, several Indonesian studies have explored CHW empowerment, primarily through health education interventions, demonstrating positive impacts on CHW knowledge and attitudes toward NCDs in regions such as North Kalimantan and Yogyakarta (Haris et al., 2022; Lestari et al., 2020). Despite these gains, critical implementation gaps persist. Key barriers include the absence of competency-based training tailored to local needs, limited and unsupportive supervision, unclear and evolving role expectations, and inadequate monitoring and feedback systems. These systemic weaknesses may contribute to inconsistent service quality and undermine the effectiveness of community-based NCD prevention efforts. Theory-informed self-management education has likewise improved blood pressure and quality of life in uncontrolled hypertension (Mahyuvu et al., 2026).

A significant gap in current research is the limited involvement of CHWs themselves in formulating and designing optimization strategies. Existing initiatives are often researcher-driven and may not fully incorporate the experiential knowledge and practical insights of CHWs regarding their own capacity needs and work realities. Consequently, empowerment efforts may not be aligned with actual community and CHW requirements, limiting their sustainability and impact (Malatji et al., 2024). This gap highlights the need for PAR approaches that actively engage CHWs as co-creators of interventions, ensuring that capacity-building strategies are contextually relevant and demand-driven. Contextually grounded health promotion is also supported by Indonesian evidence on local wisdom and health-worker support (Wilujeng et al., 2026).

In the nursing context, nurses play a crucial role in delivering training programs for CHWs and enhancing their knowledge and competencies across various health domains. Community Health Nursing-led training programs have enhanced CHWs' knowledge and confidence related to NCD prevention and control. Competent nursing supervision is essential to support effective CHW performance (Wu et al., 2024). Nurses also provide continuous support, guidance, and feedback, enabling CHWs to perform their responsibilities more effectively, particularly in rural settings (Anstey Watkins et al., 2021; Malatji et al., 2022).

Accordingly, this study proposes a nursing-led capacity-building approach consisting of nurse-facilitated PAR cycles, supportive supervision, and collaborative development of competency-based training strategies. Through iterative planning, action, observation, and reflection, nurses and CHWs will jointly identify local needs, design contextually appropriate interventions, and refine implementation strategies to strengthen CHWs' competencies in NCDs prevention and control within rural communities.

Participatory Action Research (PAR) is an appropriate methodological approach for exploring the complex role of CHWs in NCD prevention and control because it is transformative rather than merely informative (Omodan & Dastile, 2023). PAR operates through iterative cycles of plan–act–observe–reflect, enabling continuous co-decision between researchers and CHWs to refine interventions responsively (Mallory, 2024).

This collaborative process directly addresses identified empowerment gaps by positioning CHWs as active agents in identifying barriers, co-designing solutions, and evaluating program relevance, thereby ensuring that capacity-building efforts are contextually grounded and demand-driven (Tsolekile et al., 2018). PAR facilitates the development of collaborative and participatory processes within specific community contexts, ultimately supporting sustainable solutions for strengthening CHW capacity and implementing NCD prevention and control strategies. Therefore, this study aims to: (1) co-design a contextually relevant CHW capacity-building intervention for NCD prevention and control in rural settings through PAR; and (2) develop an implementation evaluation framework to assess feasibility, acceptability, and perceived impact, informing future effectiveness studies.

METHOD

Research design

This study employs a qualitative Participatory Action Research (PAR) design with process evaluation, guided by Kemmis and McTaggart's cyclical framework (Mallory, 2024). PAR was selected because of its collaborative and iterative nature, which enables the co-development of contextually relevant interventions through the active involvement of CHWs throughout the research process. This approach differs from conventional qualitative and mixed-method designs by emphasizing shared decision-making, collective reflection, and continuous adaptation to local contexts (Vaughn, 2024).

The study will be conducted in two PAR cycles. Key evaluation domains, including acceptability, feasibility, perceived usefulness, and competency enhancement, will be explored qualitatively through observations, in-depth interviews, focus group discussions (FGDs), and reflective documentation. The transition criteria and expected outputs described below and summarized in Table 1

Table 1. Explanation of Act–Observe–Reflect–Plan cycles in Action research

Cycle	Explanation
Act	Implement the established actions on the change. This study examines programs to optimize the capacity of CHWs for NCD prevention and control in rural areas.
Observe	Observing occurrences and gathering data to obtain evidence of changes and their impacts.
Reflect	Use the collected data to evaluate the change and explain the change process.
Plan	Additional actions based on the data obtained

Study setting and participants

This study will be conducted at Kaliwates Public Health Centre (PHC), Jember, Indonesia, involving Community Health Workers (CHWs) within its administrative catchment area. The study site was selected because of its strong commitment to NCD prevention and control programs, facilitating collaboration with local stakeholders throughout the research process.

Kaliwates PHC serves a predominantly semi-rural population characterized by agricultural livelihoods, varying access to healthcare services, and community-based healthcare delivery through Posyandu. The study area also represents diverse sociocultural backgrounds, providing a rich context for exploring CHWs' experiences and the implementation of community-based NCD prevention and control programs.

This study protocol describes a PAR project conducted from April 2024 to June 2026. The present manuscript reports the completed pre-PAR phase (August 2024–January 2025). The intervention (PAR) and post-PAR evaluation phases will be conducted subsequently and reported in separate publications. The overall study timeline is presented in Table 2.

Table 2. Timeline of the research process

Task	Duration	Date (Month, year)
Ethical protocol preparation	1 month	April-May 2024
Data collection preparation	2 months	June-July 2024
Observation	3 months	August-October 2024
Pre-PAR data collection	4 months	October 2024-January 2025
Pre-PAR data analysis	3 months	February 2025-April 2025
Delphi method analysis	2 months	May-June 2025
PAR process	6 months	July-December 2025
PAR analysis	2 months	January-February 2026
Post-PAR data collection	2 months	March-April 2026
Post-PAR data analysis	2 months	April-May 2026
dissemination	1 month	June 2026

PAR Process

The PAR process will involve two iterative cycles guided by the principles of collaborative inquiry, reflection, and action. Approximately 52 CHWs are registered within the catchment

area of Kaliwates PHC. Of these, 20 CHWs participated in the pre-PAR needs assessment, while 15 CHWs will be purposively recruited to participate in the PAR cycles. This sample size is intended to facilitate active participation and manageable group discussions while ensuring representation across different Posyandu (integrated service post) areas. Eligible participants must have served as CHWs for at least two years and have been actively involved in NCD prevention and control programs.

Three healthcare professionals responsible for the NCD prevention and control program will participate in the PAR process. In addition, a facilitator with expertise in community empowerment will support the PAR group throughout the study. Decision-making will follow a shared governance approach in which CHWs, healthcare professionals, facilitators, and researchers collaboratively review findings and determine intervention priorities through consensus discussions. Although facilitators will guide discussions, they will not have decision-making authority. To minimize power imbalances, all participants will be encouraged to contribute equally, anonymous feedback mechanisms will be provided when appropriate, and modifications to the intervention will require agreement from the majority of participating CHWs.

The PAR group will conduct two Act–Observe–Reflect–Plan cycles. Although Kemmis and McTaggart originally described the PAR cycle as Plan-Act-Observe-Reflect, this study presents the operational process as Act-Observe-Reflect-Plan because planning for each cycle is informed by reflection from the preceding cycle.

Cycle 1 will begin with the Act phase, during which a co-designed baseline capacity-building workshop on NCD prevention and control tailored to rural settings will be implemented. During the Observe phase, researchers will conduct non-participant observations of CHWs' field activities, complemented by in-depth interviews and FGDs to identify implementation barriers and contextual challenges. The Reflect phase will involve thematic analysis of the findings, followed by participatory feedback sessions with CHWs and healthcare professionals to identify training gaps and contextual facilitators. During the Plan phase, these findings will be translated into a revised intervention package incorporating enhanced supervisory tools, simplified reporting instruments, and culturally appropriate communication materials.

Transition to Cycle 2 will occur when reflective findings consistently demonstrate: (1) at least three recurring implementation barriers across participant groups, and (2) a clear need expressed by CHWs for additional skill development.

Cycle 2 will implement the refined intervention package, incorporating supervised field practice, peer mentoring, and on-the-job coaching. The Observe phase will assess implementation fidelity, CHWs' confidence, and community engagement through repeated observations and follow-up interviews. During the Reflect phase, participants will evaluate whether the revised intervention modifications addressed previously identified challenges by examining changes in perceived competency, role clarity, and program usefulness. Finally, the Plan phase will consolidate lessons learned into a scalable framework for strengthening CHW capacity in rural NCD prevention and control.

The PAR process will conclude once thematic saturation has been achieved and participants reach consensus that the

intervention is acceptable, feasible, and useful, eliminating the needs for additional PAR cycles.

Before the PAR process begins, the research team will provide preliminary training for the PAR facilitator. A follow-up meeting will be conducted one month later to provide ongoing support and supervision regarding data collection procedures and the implementation of PAR activities.

Data collection process

Data collection will be conducted across three sequential phases: Pre-PAR, PAR, and post-PAR (Mallory, 2024). The completed pre-PAR phase explored CHWs' perceptions, challenges, and capacity-building needs for NCD prevention and control. The subsequent PAR phase will focus on the co-design and implementation of the CHW capacity-building intervention, while the post-PAR phase will evaluate participants' experiences, perceived benefits, feasibility, and sustainability of the intervention.

Data will be collected through observations, in-depth interviews, focus group discussions (FGD)s, and the Delphi method. Interview and FGD guides were developed through a systematic multistage process involving expert consultation. The expert panel comprised all authors, the NCD program manager at the PHC, and one senior CHW coordinator. The draft instruments were pilot-tested with two CHWs from a non-participating rural PHC to assess clarity, flow, and feasibility before being finalized.

The interview and FGD guides explore four key domains:

1. CHWs' understanding of their roles in NCD prevention and control;
2. Perception of their responsibilities;
3. Barriers encountered during program implementation; and
4. Strategies to strengthen CHW capacity for NCD prevention and control.

Additional questions in the post-PAR phase will explore participants' experiences with the intervention, perceived usefulness, feasibility, sustainability, and recommendations for future implementation.

Figure 1 summarizes the expected outputs of each study phase.

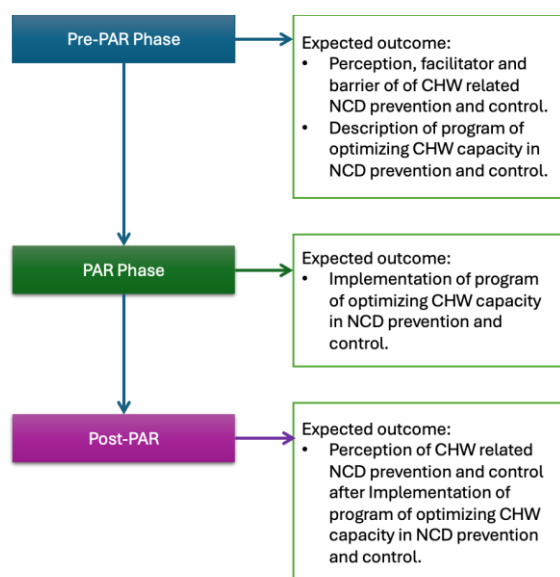


Figure 1. Expected outcome in every phase of the study

Community nurses at Kaliwates Public Health Center will serve as gatekeepers to facilitate initial access to CHW participants. Gatekeepers facilitate access to participants and help bridge communication between researchers and participants throughout the research process (Aaltonen & Kivijärvi, 2019). To minimize potential coercion and selection bias, the gatekeepers will use standardized recruitment scripts emphasizing that participation is entirely voluntary and that declining participant will not affect participants' professional relationships or responsibilities. Written informed consent will be obtained privately by an independent researcher in a confidential setting before data collection begins.

Pre-PAR data collection

Pre-PAR data collection was conducted to explore CHWs' perceptions, challenges, and capacity-building needs before implementation of the PAR intervention. This phase included non-participant observations of routine Posyandu activities over a two-month period to establish baseline understanding of CHW practices and contextual factors influencing NCD prevention and control (Busetto et al., 2020).

Observation focused on three key domains: (1) CHWs' implementation of NCD screening activities, (2) counseling interactions with community members, and (3) data recording and reporting procedures. Observation sessions were conducted twice weekly, with each session lasting approximately two hours to capture the complete service delivery process from preparation to completion. Researchers used structured observation checklists to document CHW practices, communication patterns, and implementation challenges, complementary by detailed field notes to capture contextual information.

Participants were purposively recruited using a maximum variation sampling strategy to capture diverse perspectives across different Posyandu locations and levels of experience. Inclusion criteria include active CHW status, involvement in NCD prevention and control programs, and a minimum of two years of service. A total of 20 participants were included in the pre-PAR phase to represent variation in Posyandu settings and years of experience. Sampling continued until thematic saturation was achieved, defined as the point at which no new codes or themes emerged during iterative data analysis.

The Delphi method was used to achieve expert consensus regarding priorities for the CHW capacity-building program (Naisola-Ruiter, 2022). Its iterative and anonymous process enabled equitable participation while minimizing potential power imbalances among stakeholders. Findings from the qualitative analysis informed the needs assessment and served as the empirical foundation for developing the subsequent PAR intervention.

PAR data collection

The PAR phase will involve 15 CHWs from the Kaliwates area who meet the study inclusion criteria. Participants will be selected using purposive sampling to ensure representation across different Posyandu areas, with one CHW recruited from each Posyandu. Data collection will occur continuously throughout each PAR cycle to support the iterative process of action, observation, reflection, and planning.

Independent observations will be conducted during every second PAR meeting in addition to facilitator reports. Observation domains will include participant engagement, leadership emergence, decision-making processes,

counseling practices, data reporting activities, and implementation challenges. Field notes will be triangulated with facilitator reports and participants' reflections to enhance the credibility of the findings.

Following each PAR meeting, the facilitator will submit a concise written report to the research team summarizing the activities conducted, the level of CHW participation, and the progress of the PAR cycle. These reports will support ongoing reflection and inform planning for subsequent PAR cycles.

Post-PAR data collection

Following completion of the PAR cycles, in-depth interviews and FGDs will be conducted with CHWs and healthcare professionals who participated in the intervention. Additional questions will explore participants' experiences, perceived benefits, feasibility, sustainability, and recommendation of CHW capacity-building intervention.

Participants will be invited to reflect on how the intervention influenced CHW roles, competencies, and practices related to NCD prevention and control. To capture diverse potentially contradictory experiences, the sampling strategy will intentionally include CHWs with varying levels of engagement, including those who demonstrate limited participation or withdraw from program activities, as well as those who complete the intervention. This approach will enable examination of negative cases and strengthen the credibility and transferability of the findings.

Data analysis

Data from the pre-PAR phase were analyzed using thematic analysis and Multiple Perspective Interviews (MPI), whereas data from the PAR and post-PAR phases will be analyzed using the same analytical approach (Braun & Clarke, 2019; Vogl et al., 2019). Furthermore, the ATLAS.ti software will be used to support data management and the coding process. The process of data analysis, particularly thematic analysis, is fundamental to the philosophy of critical realism (Braun & Clarke, 2019). This research will follow the six phases of thematic analysis proposed by Braun & Clarke.

All in-depth interview, FGD, and field note transcripts from the pre-PAR phase were transcribed verbatim and reviewed repeatedly to achieve data familiarization. During this stage, MZ and RO independently read and re-read the transcripts while documenting initial analytic reflections and observations.

Subsequently, MZ and RO independently generated initial codes using an inductive coding approach grounded in participants' experiences and perspectives. A preliminary coding framework was developed from recurring concepts identified across the data sources. Coding discrepancies were discussed and resolved through consensus meetings.

The themes were subsequently reviewed and refined to ensure coherence between coded extracts and thematic interpretations. MZ, RO, RK, and PS independently reviewed the preliminary themes and provided methodological feedback regarding their consistency, relevance, and distinctiveness. The final themes were then integrated into a comprehensive analytical narrative explaining CHW capacity development, community participation, and NCD prevention and control within the pre-PAR process. The findings were interpreted in relation to the study objectives, existing literature, and the broader theoretical framework guiding the intervention.

MPI is a qualitative data analysis approach that examines a phenomenon from multiple stakeholder perspectives. In this study, the role of CHWs in NCD prevention and control was analyzed from multiple perspectives. Data from different participant groups were integrated and analyzed using a common coding framework and thematic structure. The findings were categorized into three types: convergent (findings from different groups conveying similar meaning), complementary (findings from different groups providing complementary insights), and divergent (findings from different groups presenting contrasting perspective). MPI was applied to the pre-PAR data to explore perceptions, barriers, and contextual factors related to CHW optimization interventions. During the post-PAR phase, MPI will be used alongside thematic analysis to evaluate the implementation and outcomes of the CHW optimization intervention.

The Delphi method will be used to establish expert consensus regarding training priorities and intervention components (Drumm et al., 2022). Delphi method will be analyzed descriptively using measures of central tendency and percentage agreement. Consensus criteria will be established a priori. Findings from the Delphi process will be used to refine and prioritize intervention components before their implementation during the PAR cycles.

Trustworthiness

Credibility, transferability, dependability, and confirmability strategies were applied throughout the research process to maintain the rigor and trustworthiness of the study (Ahmed, 2024).

For credibility, triangulation was applied by incorporating multiple data sources, investigators, and data collection methods. Triangulation consists of three types: data triangulation, investigator triangulation, and methodological triangulation (Korstjens & Moser, 2018). Data triangulation was achieved by collecting data through observations conducted at different time points and incorporating perspectives from healthcare providers in addition to CHW. Investigator triangulation was applied by involving two researchers, MZ and RO, in the coding and analysis process. Methodological triangulation was achieved through the use of in-depth interviews, observations, and FGDs.

Credibility will also be strengthened through member checking with at least eight participants, who will be contacted confirm the interpretation of themes once the research process is completed.

Thick description is considered an appropriate approach to enhance transferability in PAR research (Sankofa, 2023). Detailed descriptions of the rural setting, Posyandu operations, CHW roles, and community dynamics are provided to contextualize the findings and enable readers to assess the applicability of the findings to other settings.

An audit trail provides a transparent description of the research process, from project initiation to the development and reporting of findings (Ahmed, 2024). The audit trail includes raw data, transcripts, field notes, observation checklists, reflective journals, and records of participatory feedback sessions. These records ensure transparency and allow external reviewers to trace the research trajectory and assess the consistency between data collection, analysis, and interpretation.

Ethical consideration

This research received ethical approval from the Ethics

Council of the Faculty of Dentistry, University of Jember, under approval number 2573/UN25.8/KEPK/DL/2024 on May 22, 2024. The ethical requirements outlined in the Declaration of Helsinki were followed.

All participants were informed about their right to withdraw from the research at any time and their rights regarding the uses of the information collected. Following the informed consent process, each participant was assigned a unique code, to link research data while maintaining confidentiality and enabling appropriate analysis.

Participant confidentiality was maintained throughout the research process. All participant data were stored securely, and findings were reported in de-identified or aggregated forms to protect individual privacy while ensuring transparent scientific dissemination.

RESULT

Participant characteristics

A total of 20 participants participated in the pre-PAR needs assessment through observations, in-depth interviews, and FGDs. Among them, nine CHWs and two healthcare providers, including nurses and physicians from rural primary healthcare settings, participated in the in-depth interviews and observation activities. Two FGD groups were conducted, involving five CHWs and four healthcare providers. Participants represented multiple Posyandu locations within the Kaliwates District.

Pre-PAR phase

The pre-PAR phase identified three overarching themes describing the challenges experienced by CHWs and the capacity-building requirements needed to strengthen NCD prevention and control in rural settings: (1) systemic barriers to CHW role fulfillment, (2) capacity gaps in CHW training and skill development, and (3) demand for participatory and culturally embedded training.

Theme 1. Systemic barriers to CHW role fulfillment

This theme describes the structural, sociocultural, and organizational barriers that hindered CHWs from effectively delivering NCD prevention and control services in rural settings. Three subthemes emerged: community resistance and cultural stigma, resource scarcity and logistical constraints, and role ambiguity.

Community resistance and cultural stigma

Participants reported that community members frequently avoided screening activities and concealed their health conditions due to fear of social judgment and stigma. Hypertension and diabetes were often perceived as indicators of personal weakness, resulting in delayed health-seeking behaviors and reduced participation in Posyandu activities. These perceptions limit opportunities for early detection and continuous monitoring of NCDs.

A CHW explained:

"Sometimes the community is embarrassed to explain their illness because they are afraid of telling others. They worry people will talk about them, so they prefer to stay silent until symptoms become severe." (CHW, female, 46 years)

Similarly, a community nurse stated:

"Cultural stigma is a huge barrier here. People think high blood pressure means you're weak or lazy, so they avoid checking until they're really sick." (Community nurse, female, 39 years)

Resource scarcity and logistical constraints

Participants consistently identified shortages of screening equipment and limited operational resources as barriers to service delivery. In several Posyandu sites, CHWs reported difficulties in conducting routine measurements due to unavailable or malfunctioning equipment.

As described by one nurse:

"The level of difficulty is related to the screening tools, which are still lacking in the Posyandu. We often have to borrow equipment from neighboring villages or postpone screenings entirely." (Community nurse, male, 51 years)

A CHW similarly noted:

"Sometimes we don't even have a proper weighing scale or blood pressure monitor. How can we screen properly if we don't have basic equipment?" (CHW, female, 55 years)

Role ambiguity and unclear expectations

Several CHWs expressed uncertainty regarding the scope of their responsibilities, particularly regarding counseling, referral follow-up, and data reporting. Participants indicated that insufficient orientation and limited guidance contributed to inconsistent implementation of NCD-related activities and reduced confidence in performing their roles.

One participant explained:

"Sometimes I'm not sure what I'm supposed to do beyond measuring blood pressure and recording. Are we supposed to do counseling? Follow up on referrals? I don't have clear guidance." (CHW, female, 39 years)

Theme 2. Capacity gaps in CHW training and skill development

This theme highlights shortcomings in the existing training systems that limited CHWs' ability to perform their roles effectively. Participants described gaps in foundational knowledge, inconsistencies in training opportunities, and limited attention to motivational and affective development.

Insufficient foundational knowledge and skills

Many participants reported inadequate understanding of NCD risk factors, disease management, interpretation of screening results, and referral procedures. These knowledge gaps reduced CHWs' confidence when interacting with community members and responding to health-related inquiries.

A CHW stated:

"Many cadres do not know, hence must be truly understood regarding the interpretation of that tension, so basic training is needed. We need to understand what these numbers mean to explain them properly to the community." (CHW, female, 56 years)

Another participant explained:

"I feel embarrassed when people ask me questions, I can't answer. If I don't understand the disease properly, how can I educate others?" (CHW, female, 31 years)

Inconsistent training frequency and coverage

Training opportunities were perceived as infrequent and unevenly distributed across Posyandu locations. Participants from peripheral villages reported limited access to capacity-building activities, resulting in unequal knowledge and skill development among CHWs.

A physician noted:

"If there is training we hope all cadres are involved, not just those from the main Posyandu. The ones in rural areas need it the most but they're often left out." (Doctor, female, 38 years)

Similarly, a CHW reported:

"We rarely get training, maybe once a year if we're lucky. By the time the next training comes, we've already forgotten what we learned." (CHW, female, 44 years)

Absence of motivational and affective development

Participants emphasized that existing training programs predominantly focused on technical competencies while neglecting motivational, leadership, and advocacy skills. This limitation contributes to declining enthusiasm and feelings of insufficient recognition among CHWs.

A nurse stated:

"It's not just about skills, it's about wanting to do this work." (Community nurse, female, 32 years)

A CHW further explained:

"We are volunteers, but sometimes we feel forgotten. A little appreciation or encouragement would keep us going." (CHW, female, 48 years)

Theme 3. Demand for participatory and culturally embedded training

This theme reflects participants' preference for training approaches that were culturally relevant and actively involved CHWs in program design and implementation.

Need for contextually relevant training

Participants emphasized that training should reflect local cultural values, health beliefs, and community characteristics. Generic approaches developed for urban settings were perceived as insufficient to address rural realities and community-specific challenges.

One CHW stated:

"We need qualified training so that when we go directly to the community we are not awkward. We need to know how to approach people in a way they understand and accept." (CHW, female, 27 years)

Another participant noted:

"The training should consider our culture and community characteristics. What works in the city won't work here in the village." (CHW, male, 42 years)

Preference for participatory learning and co-design

Participants highlighted the importance of recognizing CHWs' experiential knowledge and involving them in the development of training content. They preferred interactive approaches, such as peer learning, role-playing, and case-based discussions that address real-world community situations.

As one CHW explained:

"We have been working in this community for years. We know what the problems are. The training should start from what we know and build from there." (CHW, female, 53 years)

This finding suggests that participatory and co-designed training approaches may enhance relevance, ownership, and sustainability of CHW capacity-building interventions for NCD prevention and control.

PAR and post-PAR phase implementation plan

The findings from the pre-PAR needs assessment informed the development of the subsequent PAR phase. Based on the identified barriers, capacity gaps, and training preferences, a contextually relevant CHW capacity-building intervention for NCDs prevention and control will be co-designed collaboratively with CHWs and healthcare providers.

The PAR phase is scheduled to be conducted from June 2025 to June 2026 and will consist of iterative cycles. The findings from the PAR and post-PAR phases will be reported in subsequent publications upon completion of the study.

DISCUSSION

Interpretation of Pre-PAR Findings and Implications for Intervention Design

This pre-PAR needs assessment identified three interconnected challenges affecting CHW roles in NCD prevention and control in rural settings: systemic barriers to role fulfillment, capacity gaps in training and skill development, and the need for participatory and culturally embedded learning approaches. These findings provide an empirical foundation for the subsequent PAR phase and directly inform the design of the capacity-building intervention.

In the first theme, community resistance and cultural stigma emerged as important barriers to NCD screening and early detection. Participants described reluctance among community members to disclose health conditions due to fear of social judgment and negative perceptions associated with chronic diseases. Similar findings have been reported in rural Low-and Middle-Income Countries (LMIC) settings, where stigma and misconceptions reduce participation in preventive health programs (Doresha et al., 2024). These findings suggest that future intervention components should extend beyond technical training by incorporating culturally sensitive communication strategies, community engagement activities, and locally relevant health promotion approaches.

The second theme identified resource scarcity and logistical constraints as persistent challenges. Participants highlighted shortages of screening equipment, limited infrastructure, and difficulties maintaining routine Posyandu activities. These findings are consistent with previous studies demonstrating that inadequate resources constrain CHW performance and reduce the effectiveness of community-based NCD programs (Ahmed et al., 2022). Consequently, the PAR process will explore feasible strategies to improve access to essential screening tools and strengthen local operational support mechanisms.

The third theme indicated that role ambiguity and insufficient training limited CHWs' confidence in delivering NCD-related services. Participants reported uncertainty regarding counseling, referral follow-up, and reporting responsibilities, alongside inadequate knowledge of NCD prevention and management. Similar evidence from South Africa and India indicates that strengthening CHW competencies through structured and continuous training can improve service delivery and community engagement (Onagbiye et al., 2020; Zaman et al., 2024). Therefore, the intervention will prioritize clarification of CHW roles, foundational NCD knowledge, communication skills, and referral procedures.

An important finding was participants' preference for participatory and culturally contextualized training. Rather than receiving externally developed content, CHWs

expressed a desire to contribute their experiential knowledge and local understanding to intervention development. This finding aligns with evidence suggesting that co-designed interventions are more acceptable, contextually appropriate, and sustainable than top-down approaches (Springett et al., 2023). Consequently, CHWs will be actively involved in prioritizing training needs, adapting educational materials, and evaluating intervention feasibility throughout the PAR cycles.

Participatory Action Research Approach

The findings from the pre-PAR phase support the use of Participatory Action Research (PAR) as an appropriate methodology for intervention development. PAR emphasizes collaboration between researchers and community stakeholders in identifying problems, developing solutions, implementing actions, and reflecting on outcomes (Cornish et al., 2023).

In the present study, CHWs, healthcare providers, and researchers will participate in iterative cycles of planning, action, observation, and reflection. Decision-making processes will be shared through facilitated discussions, co-design workshops, and regular feedback sessions. This approach aims to minimize traditional researcher-participant power imbalances by positioning CHWs as active contributors rather than passive recipients of training. The intervention will therefore be developed not only for CHWs but also with CHWs, ensuring that implementation strategies remain responsive to local realities and priorities.

The study is informed by a pragmatic postmodern perspective that recognizes multiple forms of knowledge and values participants' lived experiences in understanding health challenges (Turcotte et al., 2023). Consistent with PAR principles, this perspective supports the co-construction of contextually relevant solutions rather than the application of universally prescribed interventions.

Comparison with Previous Studies

The present findings are consistent with previous research demonstrating the importance of strengthening CHW capacity for NCD prevention and control. Studies conducted in South Africa have reported insufficient NCD knowledge among CHWs and highlighted the need for ongoing education and supportive supervision (Doresha et al., 2024; Onagbiye et al., 2020). Similarly, research in rural India demonstrated that structured training programs improved CHWs' ability to identify individuals at risk of NCDs and support community-based prevention efforts (Zaman et al., 2024).

However, most previous interventions have primarily focused on knowledge transfer and skill acquisition. In contrast, the current study identified broader challenges, including role ambiguity, motivational concerns, cultural barriers, and limited participation in program design. These findings suggest that effective capacity-building initiatives should address organizational and sociocultural determinants in addition to technical competencies.

Furthermore, while the Delphi method has been widely used to refine intervention content and establish expert agreement, consensus alone does not establish intervention effectiveness or scalability (Drumm et al., 2022). In this study, the Delphi method is intended to support content validity and stakeholder agreement regarding intervention components. The feasibility, acceptability, and scalability of the intervention

will require further evaluation during the PAR implementation and post-PAR phases.

Policy and Practice Implications

The findings highlight several practical implications for strengthening community-based NCD services in rural areas. The identified role ambiguity suggests the need for clearer CHW role descriptions and strengthened supervision systems. Reported resource limitations indicate the importance of ensuring access to essential screening equipment and strengthening operational support. Additionally, participants' concerns regarding insufficient training and motivation suggest that capacity-building programs should incorporate ongoing mentorship, peer support, and recognition mechanisms alongside technical training components.

Rather than supporting broad claims regarding policy neglect, these findings specifically indicate opportunities for strengthening CHW integration within existing primary healthcare systems and improving support structures for NCD prevention and control.

Several limitations should be considered when interpreting the findings. First, the study was conducted in a single rural district, which may limit the transferability of the findings to other settings with different healthcare systems and sociocultural contexts. Second, as participants were recruited through existing healthcare networks, the possibility of gatekeeper influence and social desirability bias during data collection cannot be excluded. Third, the findings represent only the pre-PAR phase and therefore reflect perceived needs rather than outcomes of the intervention.

CONCLUSION AND RECOMMENDATION

This protocol study identified key barriers and capacity-building needs for strengthening CHW involvement in NCD prevention and control in rural settings. The pre-PAR needs assessment revealed three interconnected themes: systemic barriers to CHW role fulfillment, capacity gaps in training and skill development, and the need for participatory and culturally embedded training approaches. These findings highlight that effective CHW engagement in NCD prevention is influenced by sociocultural, organizational, and resource-related factors in addition to individual competencies.

The findings provide an empirical foundation for the subsequent Participatory Action Research (PAR) phase and will guide the co-design of a contextually relevant CHW capacity-building intervention. The upcoming PAR and post-PAR phases will focus on collaboratively developing, implementing, and refining the intervention, while evaluating its feasibility, acceptability, and potential contribution to improving CHW competence, screening activities, and referral practices. Further research will be required to assess the transferability and scalability of the intervention across diverse rural settings.

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