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Addressing Priority Gaps in Access and Quality of NCD Services in Primary Care Settings in Rural Kenya: A Participatory Approach to Intervention Development

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Abstract

Background: Non-communicable diseases (NCDs), particularly diabetes mellitus (DM) and hypertension (HTN), are projected to surpass communicable diseases as the leading causes of mortality in Africa by 2030. Kenya remains off track to achieving the 25x25 global targets for reducing premature NCD mortality, underscoring the need to strengthen prevention, early detection, and management at the primary healthcare (PHC) level. This study aimed to: (i) conduct a joint analysis of facility-level baseline data to identify gaps in PHC service delivery for DM and HTN, and (ii) collaboratively identify and co-design tailored improvement interventions to enhance access to quality DM and HTN services.
Methods: A participatory research (PAR) approach was applied using a five-step procedures: (1) situation analysis; (2) stakeholder engagement to identify service delivery gaps; (3) prioritization of interventions; (4) implementation planning informed by contextual factors; and (5) monitoring and evaluation. Two multi-stakeholder workshops were conducted involving health management teams, PHC workers, community health promoters, patients, and researchers. Stakeholders were identified using purposive and snowball sampling. Data analysis included quantitative scoring in Excel and qualitative synthesis in Dedoose software.
Results: Key gaps identified included limited pre-service training on DM and HTN, insufficient disease-specific knowledge among PHC workers, suboptimal patient care pathways characterized by long waiting times and weak follow-up, and the absence of standardized care packages. Priority interventions co-designed through the participatory approach included targeted PHC worker training, improved access to clinical guidelines, structured mentorship and supervision, strengthened community outreach, and improved availability of diagnostic tools and essential medicines.

Conclusion: Participatory approaches to intervention development (PAID) facilitate stakeholder ownership and contextually appropriate solutions, offering a pragmatic pathway to strengthening DM and HTN care at the PHC level.

INTRODUCTION

Low- and middle-income countries (LMICs) account for 78% of all NCD related deaths worldwide with 85% being premature. However, most countries, including Kenya, are not on track to meeting the 25x25 global target for reducing premature mortality[1]. By 2022, approximately 828 million adults aged 18 and older were diagnosed with diabetes, marking an increase of 630 million since 1990[2]. Of these, around 445 million adults aged 30 years or older with diabetes did not receive treatment, representing a 3.5 fold increase since 1990[2]. The increasing burden of diabetes is most significant in LMICs where health care systems are fragile and overburdened. Diabetes is associated with increased risk for amputations, vision loss, renal failure, cardiovascular conditions as well as dementia, cancers and infections. The combined presence of diabetes and hypertension (HTN) or other comorbidities significantly increases the risk of poor complications in a patient.

In sub-Saharan Africa, the burden of NCDs is projected to surpass that of communicable, maternal, neonatal, and nutritional diseases combined as the leading cause of morbidity and mortality by 2030[3, 4]. Most people at increased risk of or already suffering from NCDs, including diabetes and hypertension, remain unaware, under-diagnosed, or lack access to life-saving interventions. This issue is particularly acute among rural populations, where implementation of and access to recommended services is quite constrained [5].

The prevalence of diabetes mellitus (DM) in Kenya is estimated at 2-6.6%, with more than half of people over 40 years old having HTN yet, only less than a third of individuals affected are aware of their status with approximately 10% being on treatment[6-8]. Effective implementation and coordination of primary healthcare (PHC) strategies are essential to significantly halt and reverse the increasing burden of NCD at the population level. Further, NCDs in Kenya account for over 50% of inpatient hospital admissions and approximately 39% of annual deaths[9, 10], with diabetes alone causing around 10,000 deaths[11]. The rising burden of these conditions places a significant strain on the healthcare system, which is also dealing with infectious disease demands[12]. In addition to severe constraints on the health systems performance, NCDs cause multiple individual-level challenges, including increased risk of death from infections, delayed diagnosis and treatment initiation, behavioral risk factors, and catastrophic expenditures on care.

Diabetes mellitus and hypertension are important public health concerns because they jointly contribute significantly to cardiovascular diseases, which are responsible for over 40% of the NCD burden. These conditions

are often linked to risk factors that can be modified, making interventions to alter these factors crucial for the prevention and management of NCDs.

To enhance disease prevention, control services, and access to quality primary healthcare, Kenya launched the Primary Health Care Networks (PCNs) in 2021[13]. This initiative created a coordinated network of health facilities to improve patient referrals, disease diagnosis and care, aiming for Universal Health Coverage (UHC) and efficient resource use. The PCNs guideline addresses the issues of DM and HTN by promoting early detection, appropriate referral, and treatment. Furthermore, in 2024, the national clinical guidelines for managing DM[5] and HTN were introduced to guide health systems improvement strategies for strengthening delivery and access to basic screening and diagnostic services, integrated care, and community participation through task-shifting[14]. They equip healthcare workers with skills to assess, diagnose, manage, and refer patients according to protocols[15, 16].

Implementation of strategic PHC activities across Kenya's counties varies significantly and faces numerous challenges[17]. Improving efficiency and effectiveness at the PHC level is essential to make health systems resilient and adaptable to expanding epidemiologic difficulties. Improvement interventions could include training healthcare workers on NCD detection and management, integrating care pathways, enhancing data use at service points, engaging communities, promoting risk reduction, and efficient resource allocation to ensure equitable access to affordable, and quality healthcare services[15, 16]. While PHC strategies are specific and action-oriented, the World Health Organization (WHO) health System building blocks provide a holistic view of health system strengthening, making their relationship pivotal. This interaction is crucial for understanding why current interventions for DM and HTN are not performing as expected. Therefore, aligning the critical elements of the health system with specific PHC strategies may help address systemic weaknesses, thus improving the overall functionality of the PHC system in preventing and controlling NCDs in Kenya[18].

Deficits in PHC delivery pathways affect the many initiatives designed to improve management of DM and HTN. Efforts such as the national PCNs strategies aimed to create a more integrated and effective PHC system in Kenya have shown promise in improving NCD outcomes. Other interventions, such as scaled-up training on non-physicians and paramedical clinical as well as non-clinical staff to provide primary clinical care, support patient self-care at home[19, 20] , and educate the public on risk factors for diabetes, signs and symptoms of the condition, could accelerate universal healthcare for NCDs [21, 22]. However, scaling up and sustaining these initiatives remains a challenge[23]. There is a need for interventions that are designed and implemented at the local level, considering the realities of

the district and involving local stakeholders and communities. These interventions should account for limited resources and consider context-specific factors[24]. This approach can lead to interventions that are locally relevant and feasible, thereby improving local accountability and leadership[25].

Participatory research (PAR) involves stakeholders, especially end users, actively participating as partners in research design and evaluation. This method enhances understanding, addresses felt needs, and anticipates future requirements to meet the contextual needs[26]. It enables communities to identify critical strategic needs, fostering the creation of culturally relevant and sustainable solutions that are more likely to be adopted at scale, ultimately improving health outcomes[27]. It produces evidence useful for stakeholders, including policymakers, thus contributing to efficient community health outcomes. Evidence in the literature suggests that participatory approaches to planning community-directed interventions cannot only improve access to essential community services[28], but also, are an effective means of implementing equitable policies[29], such as PHC quality improvement strategies[26, 30, 31].

Therefore, this study utilized a PAR approach to identify health services delivery needs and develop implementation intervention solutions for improving the delivery of PHC services for DM and HTN in Kisumu County, Kenya. Specific study objectives were:

i. To perform a joint analysis of facility-level data from a baseline survey of PHC settings to identify gaps in implementing service delivery packages for DM and HTN care in Kisumu County, Kenya.
ii. To identify and co-design tailored improvement interventions to address key barriers to satisfactory implementation of solutions to enhance access to quality services for DM and HTN in Kisumu County, Kenya.

METHODS

Study design

This study adopted a participatory research (PAR) approach following a five-step approach adapted from Cornish, et, al, 2023[32]. Step 1) Situation analysis; Step 2) stakeholder consensus on priority gaps; Step 3) co-design and prioritization of interventions; Step 4) implementation planning informed by local determinants; and Step 5) monitoring and evaluation (M&E) framework development. For more details, see Table 1.

Table 1: Five-Step PAID for DM and HTN Management in PHC settings

	Step 1	Step 2*	Step 3*	Step 4	Ste

Description	Situation analysis	Stakeholder consensus on priority gaps	Co-design and prioritization of interventions	Implementation planning informed by local determinants	Mon and Eva
Period	October 2023-December 2023	Feb- May 2024	May -June 2024	October 2024-October 2025	Jan Oct 202
Methods of data collection	Meetings and consultations with county and sub county officials to introduce the study and its objectives, methods, conduct semi-structured FGDs with patients living with DM and/or HTN, facility visitations to observe facility status and eligibility, Interviews with PHC workers	Workshops, Closed ended questionnaires & Consensus approach discussions (Delphi method), PowerPoint presentations, real-time note-taking on whiteboards, sticky notes, and observations	Participatory workshops, Group discussions, synthesis of qualitative data, case scenarios	Regular meetings, Ongoing program monitoring and evaluation	Sem stru FGI pati livi DM HTI faci visi to c faci stat Inte wit wor pati Obs pro dur ser deli usi che
Participants	Patients, PHC workers, CHMT/SCHMT members	Representatives from NGOs, CHMTs, Academicians, CHPs, PHC workers, Patients, Master Trainer and Core Research Team members	Representatives from NGOs, CHMTs, Academicians, CHPs, PHC workers, Patients, Master Trainer and Core Research Team members	Core research team members and stakeholders including patients, PHC workers, CHMT and SCHMT members	Cor rese tea mer and stak

Note: **Steps where workshops were conducted. NGOs- Non-governmental organizations implementing NCD services in the region, CHPs- Community Health Promoters, SC/CHMTs refers to Sub/county health management team members.*

Stakeholders and their roles

All key health system decision makers relevant to DM and HTN service delivery at the county, sub-county, facility, and community levels were invited and actively engaged in the workshops and consensus-building process. Representation included senior county and sub-county managers with authority over planning and resource allocation, facility-level managers responsible for implementation, and frontline providers and community actors directly involved in service delivery. Implementing partners supporting NCD programming also participated to ensure alignment with ongoing initiatives. No major gaps in decision-making representation were identified; however, participation from non-health sectors were limited, as the process focused primarily on health system level priorities within PHC. The stakeholders included:

1. County Health Management Team (CHMT): County-level health leadership (e.g., Director of Medical Services, Public Health, Pharmacists, Records Officer, Finance) responsible for strategic planning, oversight, resource allocation, and performance monitoring.
2. Sub-County Health Management Team (SCHMT): Sub-county leadership coordinating supervision and implementation of service delivery across facilities.
3. Health facility in-charges: Facility managers accountable for day-to-day operations and clinical quality at each PHC facility.
4. PHC workers: Frontline clinical staff providing routine services (e.g., nurses, clinical officers, nutritionists, pharmacists, laboratory staff).
5. Community Health Promoters (CHPs, formerly CHWs): Community-level health workforce linking households with facilities, supporting follow-up, adherence, outreach, and health education.
6. Patients: Adults receiving DM and/or HTN services in the selected facilities.
7. Implementing partners/NGOs: Organizations supporting NCD programming in the region through technical assistance, commodities, and training.
8. Core research team: Study investigators including primary author, university researchers, facilitated the participatory process, data collection and analysis, and documentation.
9. Master trainer: Technical facilitator supporting workshop design, moderation, and training-related components.

Study setting

The study was conducted in Seme sub-county, Kisumu County, Kenya, and was nested within a broader institutional capacity-building programme at Jaramogi Oginga Odinga University of Science and Technology, supported by VLIR-UOS Institutional University Cooperation programme (study number: 001; clinical trial number: not applicable). Kisumu County is recognized as a leader in PHC and UHC indicators[33]. Seme sub-county is one of the seven sub-counties in Kisumu County and is predominantly rural.

Located on the northern shores of Lake Victoria (Fig. 1), it has a population of 121,667 and includes PHC facilities across Ministry of Health (MoH) levels 2–4, as well as Community Health Units.

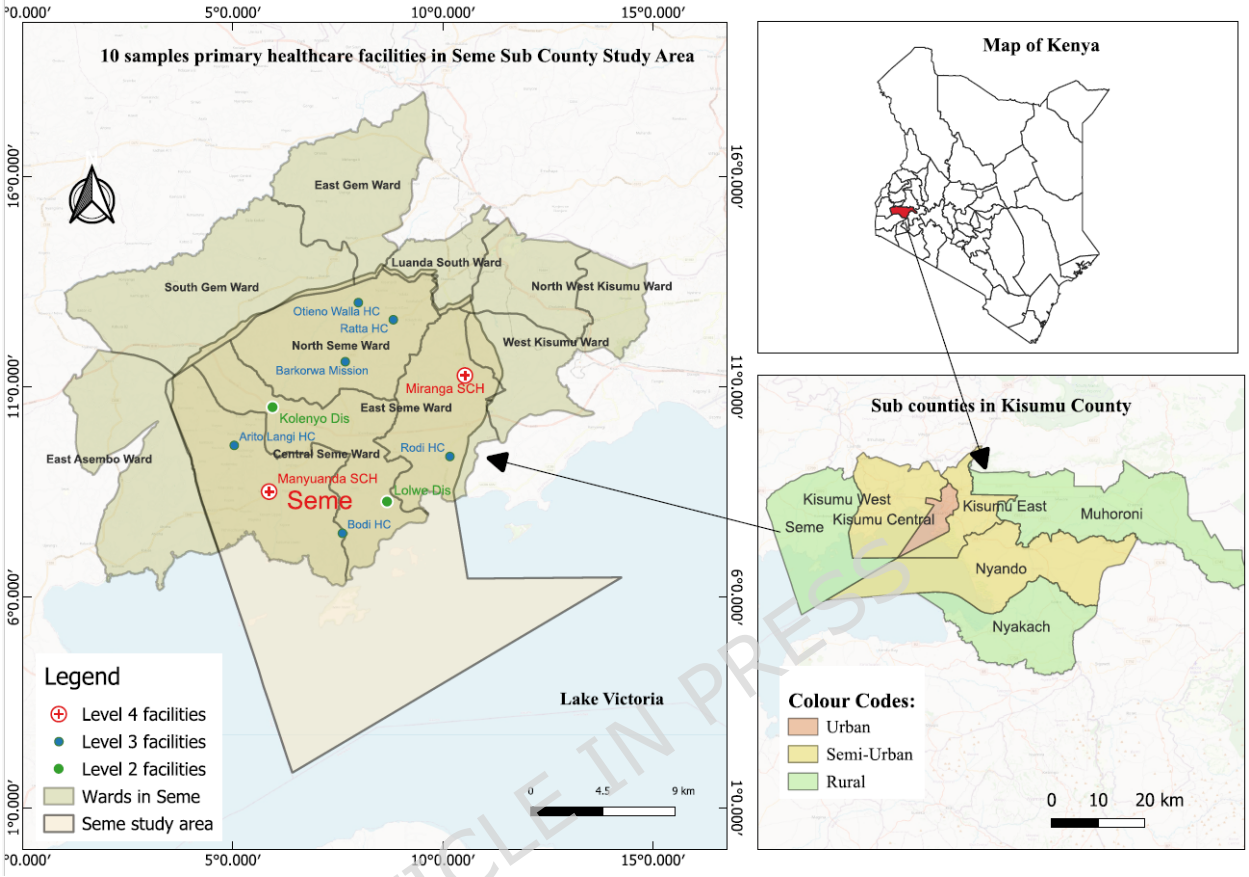

Figure 1: Seme sub- county study area map

Sampling and recruitment

Purposive sampling was used to ensure inclusion of PHC facilities and stakeholders directly involved in DM and HTN service delivery, planning, and governance. Snowball sampling was subsequently applied to identify additional relevant decision-makers and representatives from organizations implementing NCD programs. These approaches were considered appropriate given the study's objective of obtaining information-rich perspectives from stakeholders with operational responsibility for DM and HTN care at the PHC level.

Participant recruitment and sample size varied by participatory research step. During the situation analysis (Step 1), the study included 10 purposively selected PHC facilities, 24 PHC workers, and 18 patients living with DM and/or HTN. The co-designing workshop (Workshop 2, Step 3) engaged a total of 104 stakeholders, who were organized into five groups based on their roles to facilitate balanced participation and minimize power differentials. Group sizes ranged from 11 to 40 participants, with approximately one-third of participants being PHC workers. The remaining

participants included patients living with DM and/or HTN, CHPs, health facility in-charges, CHMTs/SCHMTs, and representatives from organizations implementing NCD programs.

Eligibility criteria for patients and staff followed the approved study protocol and included adults aged 18 years or older who provided informed consent and were receiving routine DM and/or HTN care; critically ill patients were excluded. Further details on participant categories and numbers across workshops are provided in Table 2.

Table 2: Characteristics of PHC facilities and stakeholder participation across PAR workshops

Steps	**Category**	**Number of participants:**
	County	Kisumu
	Sub County	Seme (Rural)
	Number of PHC facilities	10
Workshop 1 part 1 (Step 2)		**53**
Workshop 1 part 2 (Step 2)		**47**
Workshop 2 (Step 3)	Group 1: Health facility in charges	**11**
	Group 2: CHMTs/SCHMTs, representatives from organizations implementing NCDs programs	**13**
	Group 3: CHPs	**18**
	Group 4: PHC workers	**40**
	Group 5: Patients living with DM and/or HTN	**22**
	Total	**104**

An overview of participants, sampling procedures, data collection methods, and analytical approaches across each participatory research step is provided in Table 3.

Table 3: Summary of each step participants, sample, data collection and analysis

PAR Steps	Participants	Sample and sampling procedure	Inclusion and exclusion criteria	Data collection methods	Data analysis
Step 1: Situation analysis	• PHC facilities • Patients living with DM and/or HTN • PHC workers	Purposive sampling: • 10 PHC facilities • 24 PHC workers • 18 patients	**Inclusion criteria:** **PHC facilities:** • Provided NCD services, including DM and HTN management • CHMTs assessed feasibility, indicating PHC workers unlikely to be transferred within a year **PHC Workers:** • PHC workers consented to participate in the study **Patients:** Inclusion criteria: • Patients aged 18 and above • Able to provide informed consent • Living with DM and/or HTN • Residing in the Lake Victoria Basin for at least the past six months • Seeking routine care at the clinic,	• Surveys • FGDs • Observations	• Descriptive statistics using means, medians, counts and proportions • Thematic analysis

PAR Steps	Participants	Sample and sampling procedure	Inclusion and exclusion criteria	Data collection methods	Data analysis
			including regular visits Exclusion criteria: • Critically ill patients • Patients not meeting the inclusion criteria		
Step 2: Stakeholder consensus on priority gaps	• CHMTs • Facility in-charges • Representatives from organizations implementing NCD programs • Both junior and senior researchers • PHC workers • CHPs • Patients with DM and/or HTN	Purposive and snowballing sampling: • 17 PHC workers • 8 representatives from the Seme SCHMTs • 3 representatives from the CHMTs • 5 CHPs • 3 patients living with DM and/or HTN • 14 junior and senior researchers from universities • 2 representatives from NCD implementing partners • 1 member of a research institution	Inclusion criteria: • Relevant experience in the general health system Exclusion criteria: • Individuals without relevant experience in NCD focus areas • Patients not residing in the study area	• Formal PowerPoint presentations • Online surveys. • Real-time note-taking on whiteboards • Sticky notes • Observations • Consensus building procedures	• Descriptive statistical analysis in Excel, calculating medians • Thematic analysis

PAR Steps	Participants	Sample and sampling procedure	Inclusion and exclusion criteria	Data collection methods	Data analysis
Step 3: Co-design and prioritization of interventions	• Facility in-charges • CHMTs • Representatives from organizations implementing NCD programs • CHPs • PHC workers • Patients living with DM and/or HTN	Purposive and snowballing sampling:	Same as inclusion and exclusion criteria in step 2 above.	• Real-time note-taking on whiteboards • Sticky notes • Observations • Consensus building procedures	Thematic analysis
Step 4: Implementation planning informed by local determinants	• CHMT particularly NCD coordinator, NCD screening coordinators, Director Medical health and public health of Kisumu County, Ministry of Health Sub County director • PHC workers	Purposive sampling: • 24 PHC workers • 9 members of the CHMTs/SCHMTs	**Inclusion criteria:** **PHC Workers:** • PHC workers consented to participate in the study	• Pre- and post-training assessments of PHC worker knowledge.	• Descriptive statistics using means, counts and proportions • McNemar's test to examine changes in correct responses to individual NCD management knowledge items. • Compare the mean NCD knowledge scores between pre and post tests using

PAR Steps	Participants	Sample and sampling procedure	Inclusion and exclusion criteria	Data collection methods	Data analysis
					the Wilcoxon signed-rank test.

Data sources and collection procedures (by PAR steps)

Step 1: Situation analysis (baseline assessment)

We drew on results from a formative facility assessment of health system capacity, service readiness, and care processes for DM and HTN in Ministry of Health (MoH) level 2–4 facilities, which are reported in detail in a separate publication[34]. Data collection for this assessment included facility surveys and structured observations of service availability and readiness using tools adapted from the WHO Package of Essential Noncommunicable Disease Interventions (WHO-PEN)[35, 36] and the WHO Innovative Care for Chronic Conditions (ICCC) framework[37-39]. In addition, semi-structured focus group discussions (FGDs) were conducted with patients living with DM and/or HTN to explore care experiences, follow-up pathways, and barriers to care. Interviews were also held with PHC workers to assess training exposure, access and use of clinical guidelines, routine service delivery processes, documentation and referral practices. Finally, meetings and consultations with CHMT/SCHMT were conducted to introduce the study objectives and to align on facility selection, staff engagement, and implementation feasibility.

Step 2: Workshop 1 (consensus on priority gaps)

The aim of the first consensus-building workshop was to identify and prioritize the most relevant and feasible health system gaps affecting the delivery of DM and HTN services at the PHC level. To facilitate inclusive participation and effective coordination across administrative wards, the county and sub-county NCD prevention and control coordinators were designated as primary contact persons. A master trainer, working with the core research team, developed the workshop agenda, defined facilitator roles, and clarified stakeholder engagement objectives. Structured prompts (Table 4 in the Webannex section) were used to guide discussions, and a closed-ended questionnaire (Table 5 in the Webannex section) was administered to assess the relevance and feasibility of identified service delivery gaps.

Consensus-building procedures informed by the Delphi method[40] were employed to manage differences in perspectives, minimize dominance, and refine priorities, alongside facilitated group discussions. Real-time documentation was conducted using flipcharts, whiteboards, sticky notes, and facilitator notes, with ongoing coordination maintained through a dedicated WhatsApp group to support follow-up and continued engagement.

Prior to the workshop, the core research team synthesized findings from the situational analysis and organized 46 identified gaps and challenges according to the WHO health system building blocks. Participants independently scored each gap using an online questionnaire, assigning scores from 0 to 10 for both relevance (0 = not relevant at all; 10 = highly

relevant) and feasibility (0 = not feasible at all; 10 = highly feasible). Descriptive statistics, including median scores and rankings for relevance and feasibility, were calculated in Excel to guide prioritization.

Qualitative data on proposed strategies to address the identified gaps were also collected through facilitated group discussions, allowing open dialogue among stakeholders. These data were analyzed thematically using a priori codes aligned with the WHO Health System Building Blocks framework, encompassing service delivery, health workforce, financing, health information systems, leadership and governance, and medical products, vaccines, and technologies. Gaps that were rated as neither relevant nor feasible were excluded from further consideration.

Refined findings were subsequently shared with participants through a second survey and plenary discussions. Out of the 46 initially identified gaps, 34 were retained for further review, and 19 were shortlisted for final prioritization based on combined relevance and feasibility scores. Through a final consensus exercise, stakeholders identified four priority gaps affecting PHC service delivery for DM and HTN, which were presented and deliberated further during the subsequent co-design workshop to inform the development of tailored interventions. Consensus was reached through iterative individual scoring of gaps for relevance and feasibility, followed by facilitated group discussions and agreement on priorities based on combined median scores.

Step 3: Workshop 2 (co-design and prioritization of interventions)

Building on the four priority gaps identified during Workshop 1, a second two-day participatory workshop was conducted to co-design and prioritize interventions aimed at strengthening PHC service delivery for DM and HTN. To promote inclusive participation and minimize power imbalances, stakeholders were disaggregated into five groups based on their roles and responsibilities: (i) health facility in-charges; (ii) CHMTs/SCHMTs and representatives from organizations implementing NCD programs; (iii) CHPs; (iv) PHC workers; and (v) patients living with DM and/or HTN. Guided by structured discussion tools and case scenarios, each group collaboratively identified potential interventions, proposed implementers, and discussed key implementation requirements and contextual considerations. Group outputs were documented using flip charts, whiteboards, sticky notes, and facilitator notes, and subsequently presented in plenary sessions. The core research team synthesized the proposed interventions and facilitated a final prioritization and grouping process through consensus discussions informed by the Delphi method. The interventions most frequently identified across stakeholder groups and

supported through plenary consensus were prioritized as the co-designed intervention package to be advanced to implementation planning.

Step 4: Implementation Planning and Determinants Assessment

Outputs from the co-design workshop (Step 3) were translated into a structured implementation plan detailing the objectives, activities, timelines, responsible parties, and expected outcomes for each of the five categories of priority interventions. The implementation planning process also incorporated stakeholder feedback on local contextual factors likely to influence execution, including staffing constraints, infrastructure and commodity availability, documentation and health information systems, and the functionality of mentorship and supportive supervision structures. These factors were systematically reviewed to identify feasible recommendations that could enhance implementation within the selected PHC facilities. The project core team developed Table 6 outlining the linkage between priority interventions with distinct implementation strategies. In addition, Table 6a in the Webannex section indicate a broader category of these implementation activities based on ERIC framework[41].

Table 6: Implementation plan for the identified interventions

Priority Interventions	Objective	Implementation Activities	Timeline	Responsibility	Project Monitoring/ Evaluation	Expected outcomes
Training PHC workers on DM and HTN management	Equip the PHC workers with necessary skills and knowledge in managing DM and HTN	1. **Customize Training Resources**: Adapt training materials from the DM, HTN, and WHO protocols to fit the local context. 2. **Comprehensive Training for PHC Workers**: Provide training for PHC workers through both on-the-job training (OJT) and workshop setups to enhance their ability to manage DM and HTN conditions effectively.	July 2024-July 2025	• CHMTs particularly NCD coordinators and NCD screening coordinators • Project core team members	• Pre- and post-training assessments of PHC worker knowledge. • Quarterly refresher sessions on DM and HTN management • Surveys measuring acceptability by the PHC workers focusing on their satisfaction and involvement before and after interventions	• Early detection, diagnosis, and management of DM and HTN • Improved quality of care • Increased knowledge, perception and practices of PHC workers on DM and HTN management • Equity in staff training attendance
Continuous Mentorship and Supportive Supervision	• Equip the PHC workers with necessary skills and knowledge in managing DM and HTN	1. **Mentorship Programs**: Revive and implement mentorship programs by pairing experienced PHC workers with less experienced staff to facilitate knowledge transfer and skill development	October 2024-October 2025	• CHMTs particularly Health records officers, NCD coordinators, NCD screening coordinators	• Monthly Continuous Medical Education (CME) sessions • Quarterly Joint/integrated support supervision for routine monitoring of	• Improved accurate data collected and reported • Improved documentation and timely reporting for NCDs into Kenya Health Information System (KHIS)

Priority Interventions	Objective	Implementation Activities	Timeline	Responsibility	Project Monitoring/ Evaluation	Expected outcomes
	• Improve collection of patient data and reporting	2. Train facility staff on data collection and reporting tools. 3. Dispatch MoH NCD data collection registers		• PHC workers • Project core team members	the adherence to guidelines • Quarterly data review meetings to discuss NCD performance across facilities (in-person or online)	
Access to DM and HTN Treatment Guidelines and Protocols	• To assist the PHC workers have access to DM and HTN treatment guidelines for ease of reference	1. Distribute hard and e-copies of DM, HTN, and WHO PEN protocols 2. Print and distribute standardized Information, Education, and Communication (IEC) materials 3. Print summary algorithm e.g management protocol for HTN and pin on the facility walls for quick references by PHC workers	October-November 2024	• Project core team members	• Quarterly Joint/integrated support supervision for routine monitoring of the adherence to guidelines by PHC workers • Surveys measuring acceptability by the PHC workers focusing on their satisfaction and involvement	• Improved quality of care • Increased knowledge, perception and practices of PHC workers on DM and HTN management • Improved use of these guidelines by the PHC workers • Availability of the visual aid materials like algorithms on the facility walls
Community Outreach and Advocacy	To improve stakeholders particularly patient and general population's	1. **Distribute IEC Materials**: Print and distribute IEC materials for patients about DM and HTN, focusing	February-March 2025	• Community health promoters • Patient representatives	• Surveys measuring acceptability by the stakeholders focusing on	• Increased awareness of symptoms, treatment, and self-management for DM and HTN

Priority Interventions	Objective	Implementation Activities	Timeline	Responsibility	Project Monitoring/ Evaluation	Expected outcomes
	participation in their own prevention, care and management.	on risk factors, the importance of early detection, treatment options, and symptoms. 2. **Community Health Campaigns**: Organize and conduct community health campaigns to raise awareness about DM and HTN. 3. **Support Group Sensitization**: Educate community members on the importance of creating or joining support groups for patients living with DM and HTN.		• Project core team members • CHMTs particularly Health records officers, NCD coordinators, NCD screening coordinators • PHC workers	their satisfaction and involvement	• Improved community involvement in NCD prevention initiatives
Resource Availability	To ensure availability of adequate resources including funding for management of DM and HTN	1. Procure basic screening equipment like blood pressure devices, glucometers, weighing scales and medications 2. Advocate for increased budget allocation for NCD services at the county level.	Ongoing since May 2024	• CHMTs • Health finance experts • Health facility In-charges	• Financial reports and resource allocation audits.	Improved resource mobilization and created partnership with other NGOs

Step 5: Monitoring and evaluation framework development

To assess the effectiveness of the co-designed interventions for DM and HTN management at the PHC level, the research team developed a comprehensive M&E framework. The framework specifies data sources, indicators, analytical approaches, and dissemination mechanisms to track early and intermediate outcomes of the interventions, generate actionable insights, and support continuous learning. The M&E framework also outlines mechanisms for sharing findings with stakeholders to inform adaptive implementation and decision-making. Summary details of the data sources, participants, tools, analysis, and dissemination processes are presented in Table 7.

Table 7: Summary of data sources, participants, analysis, and dissemination across PAR steps

PAR steps	Data sources	Participants (n)	Tools and materials	Analysis
Step 1: Situation analysis	Facility assessment data; stakeholder insights	Facilities (10); PHC workers (24); patients (18)	WHO-PEN and WHO-ICCC–adapted tools; standardized assessment tools	Descriptive statistics; thematic analysis
Step 2: Prioritizing gaps (Workshop 1)	Workshop plenaries and group discussions; relevance/feasibility scoring survey	53 (Part 1); 47 (Part 2)	Structured presentations; relevance and feasibility scoring tool (0–10 scale); flipcharts; whiteboards; Delphi-informed facilitation	Median scoring and ranking (Excel); thematic synthesis
Step 3: Co-designing interventions (Workshop 2)	Group discussions; plenary consensus outputs	104 stakeholders	Structured discussion guides; case scenarios; flipcharts; Delphi-informed consensus tools	Thematic synthesis (Dedoose); grouping and prioritization of interventions
Step 4: Implementation planning and determinants assessment	Stakeholder feedback; planning meetings	Core research team; managers; PHC workers	Implementation matrices; ERIC-informed strategy mapping	Determinant mapping; iterative refinement

Step 5: Monitoring and evaluation framework	Routine monitoring data; stakeholder reflections	Core team; stakeholders	Indicator matrix; data review templates; reporting frameworks	Descriptive trend analysis; thematic synthesis for process evaluation

Measures and instruments

Relevance and feasibility of identified service delivery gaps were assessed using a structured, closed-ended scoring questionnaire in which participants rated each gap on a scale of 0 to 10, with higher scores indicating greater relevance or feasibility (0 = not relevant/feasible at all; 10 = highly relevant/feasible). To guide the participatory process and ensure consistent engagement across study phases, structured discussion prompts were developed and applied in line with the PAR steps and aligned to the WHO health system building blocks and chronic care pathways. These instruments provided a standardized framework for stakeholder reflection, prioritization, and consensus-building throughout the study (guiding prompts in Table 4 and scoring tools in Table 5 are provided in the Webannex).

Data analysis

Quantitative analysis

Relevance and feasibility scores for identified health system gaps were summarized using medians and ranked accordingly using Microsoft Excel. To classify gaps according to relevance and feasibility, items were categorized into relevance–feasibility quadrants using the median score across all items as the cut-off to distinguish between “high” and “low” relevance and feasibility. This categorization was subsequently reviewed and refined through plenary consensus discussions with stakeholders to ensure interpretive validity and agreement.

Qualitative analysis

Qualitative data generated through the participatory process were analyzed using thematic analysis, combining both deductive and inductive approaches. Analysis began with data familiarization and cleaning of workshop notes and transcripts. An initial codebook was developed using a priori codes informed by the WHO health system building blocks, complemented by inductively generated codes that emerged from the data. Coding was conducted using Dedoose qualitative data analysis software, with codes iteratively refined through analytic reflection and team discussion.

Themes were generated by organizing related codes into higher-order patterns and subsequently mapped to domains related to service delivery,

health system function, and implementation determinants. To enhance analytic rigor, coded excerpts and theme definitions were reviewed by a second member of the research team to assess consistency, coherence, and completeness. Discrepancies were discussed and resolved through consensus.

Data saturation was assessed during the analytic process and was considered reached when no new themes or substantive insights emerged from successive data sources and later workshop discussions. Credibility of findings was further strengthened through triangulation across stakeholder groups and validation of emerging interpretations during stakeholder feedback sessions.

RESULTS

Given that a participatory approach is an iterative process, the results sections are described sequentially, as indicated in the methods section above.

Step 1: Situation analysis

Ten PHC facilities were assessed to evaluate baseline readiness and care processes for DM and HTN. Quantitative assessment revealed substantial gaps in service readiness and care processes. Only 1 of 10 facilities (10%) had essential medicines for HTN management and 2 of 10 (20%) had essential DM medications. While all facilities possessed basic diagnostic tools such as glucometers and blood pressure devices, functionality and completeness were limited: only 2 of 10 facilities (20%) had appropriately sized manual sphygmomanometers, 6 (60%) had adequate lancets and test strips, and none had HbA1c testing capacity, retinal screening equipment, or foot-care tools as recommended by national guidelines. Written clinical guidelines and management algorithms for DM and HTN were available in only 6 of 10 facilities (60%), and counselling and health education materials were lacking in 8 facilities (80%).

Health workforce capacity was also constrained. Although 70% of facilities reported having at least one staff member trained in DM and/or HTN diagnosis and treatment, most PHC workers had not received recent in-service training, reflected in a low mean knowledge score of 2.2 out of 4 and a practice score of 3.0 out of 6. As a result of these combined structural and capacity gaps, 80% of facilities routinely referred patients with DM or HTN to higher-level facilities, most commonly due to poor disease control (50%), severe complications (30%), or lack of diagnostic capacity (20%).

Care pathway weaknesses were further reflected in poor patient follow-up and counselling systems. The mean facility counselling and follow-up score was 2.9 out of 6, and fewer than one-third of facilities had functional patient reminder or defaulter-tracking systems. Register review indicated

inconsistent documentation, limiting continuity of care and constraining use of routine data for service planning and forecasting.

Qualitative findings from patients and PHC workers contextualized these quantitative gaps. Patients consistently described inadequate and inconsistent counselling, limited practical guidance on diet and physical activity, language and time constraints during consultations, and frustration arising from frequent medication stock-outs and referrals. These experiences undermined trust in PHC services and contributed to missed follow-up visits and delayed care-seeking. Together, the quantitative and qualitative findings demonstrate systemic weaknesses in PHC readiness and care pathways for DM and HTN, providing a strong empirical rationale for prioritizing targeted capacity-building, standardization of care, and improved service organization.

Note: Detailed quantitative results, facility-level data, workforce characteristics, and extended qualitative analyses from the situation analysis are reported in a separate publication[34], and are summarized here to avoid duplication.

Step 2: Stakeholder prioritization of PHC service gaps (Workshop 1)

Participation and stakeholder coverage

Workshop 1 included county and sub-county decision-makers, facility in-charges, PHC workers, CHPs, patients, researchers, and implementing partners. Participation was high. For Workshop 1 (Step 2), which focused on prioritizing service delivery gaps, 53 of 55 invited stakeholders (96%) participated in Part 1, and 47 of 55 stakeholders (85%) participated in Part 2, indicating broad engagement across key stakeholder categories. Decision-makers responsible for NCD programming and PHC governance were represented, enabling actionable prioritization.

Quantitative prioritization: relevance and feasibility scoring

From 46 initially identified gaps mapped to WHO health system building blocks, 34 were retained after relevance/feasibility scoring and screening, and 19 were shortlisted for final prioritization. Using median-based ranking and plenary consensus, stakeholders identified four priority gaps as both highly relevant and feasible (Table 8).

Table 8: Final prioritized gaps with scores

Priority gap	Domain	Relevance (0–10)	Feasibility (0–10)
Lack of trained and competent staff on DM/HTN management	Health workforce	9.2	7.1
DM and HTN knowledge gap	Health workforce	8.9	6.8

Inadequate patient care (long waits; insufficient follow-up)	Service delivery	8.5	6.4
Unstandardized package of care	Service delivery	8.1	6.5

Overall, relevance scores ranged from approximately 6.4 to 9.2, while feasibility scores ranged from 3.6 to 7.1 across identified gaps (see Table 9 in the Webannex section for more details). Consistent with the prioritization exercise, gaps related to health workforce capacity and service delivery recorded higher combined relevance and feasibility, while many health financing and infrastructure-dependent gaps were rated highly relevant but less feasible in the short term. The four highest-priority gaps retained for intervention co-design maintained their original relevance and feasibility scores as reported in Table 8.

Qualitative synthesis: what stakeholders said about these gaps

Across discussions, stakeholder narratives converged on: insufficient need-based training, weak supervision/mentorship, inconsistent guideline access and use, and documentation challenges that limited continuity of care and planning for commodities and staffing.

Step 3: Co-designed interventions to address priority gaps (Workshop 2)

Stakeholders generated and refined interventions through group work and plenary consensus, resulting in five co-designed intervention categories:

1. Training PHC workers on DM and HTN management
2. Continuous mentorship and supportive supervision
3. Improved access to treatment guidelines and protocols
4. Community outreach and advocacy
5. Resource availability (diagnostics, medicines, supplies)

Figure 2 illustrates the priority interventions identified during the co-designing workshop aimed at addressing the core problem of inadequate care for DM and HTN within the PHC setting. These interventions were explicitly aligned to Kenya's existing policy and guideline environment (PCNs and national clinical guidance), as emphasized by participants. These were the primary goals of the PCNs:

(1) **Enhancing access to quality PHC services**: Training PHC workers on DM and HTN management, along with providing adequate access to treatment guidelines and protocols, is likely to equip them with the necessary skills, knowledge, and resources to improve NCD care. This training is expected to enhance the quality of care delivered to patients and the general population in the community.

(2) **Enhancing PHC service coordination and integration**: Well-organized and continuous mentorship and support supervision structures are likely to improve coordination among PHC workers. This ensures that these interventions are well integrated into the broader PHC system, which is crucial for improving the management of these chronic conditions.

(3) **Enhancing community engagement and participation in PHC**: To raise awareness and encourage community involvement in DM and HTN prevention and management, outreach and advocacy initiatives become critical. Advocating for the availability of resources supports these efforts by ensuring that the necessary tools and support for community engagement are available.

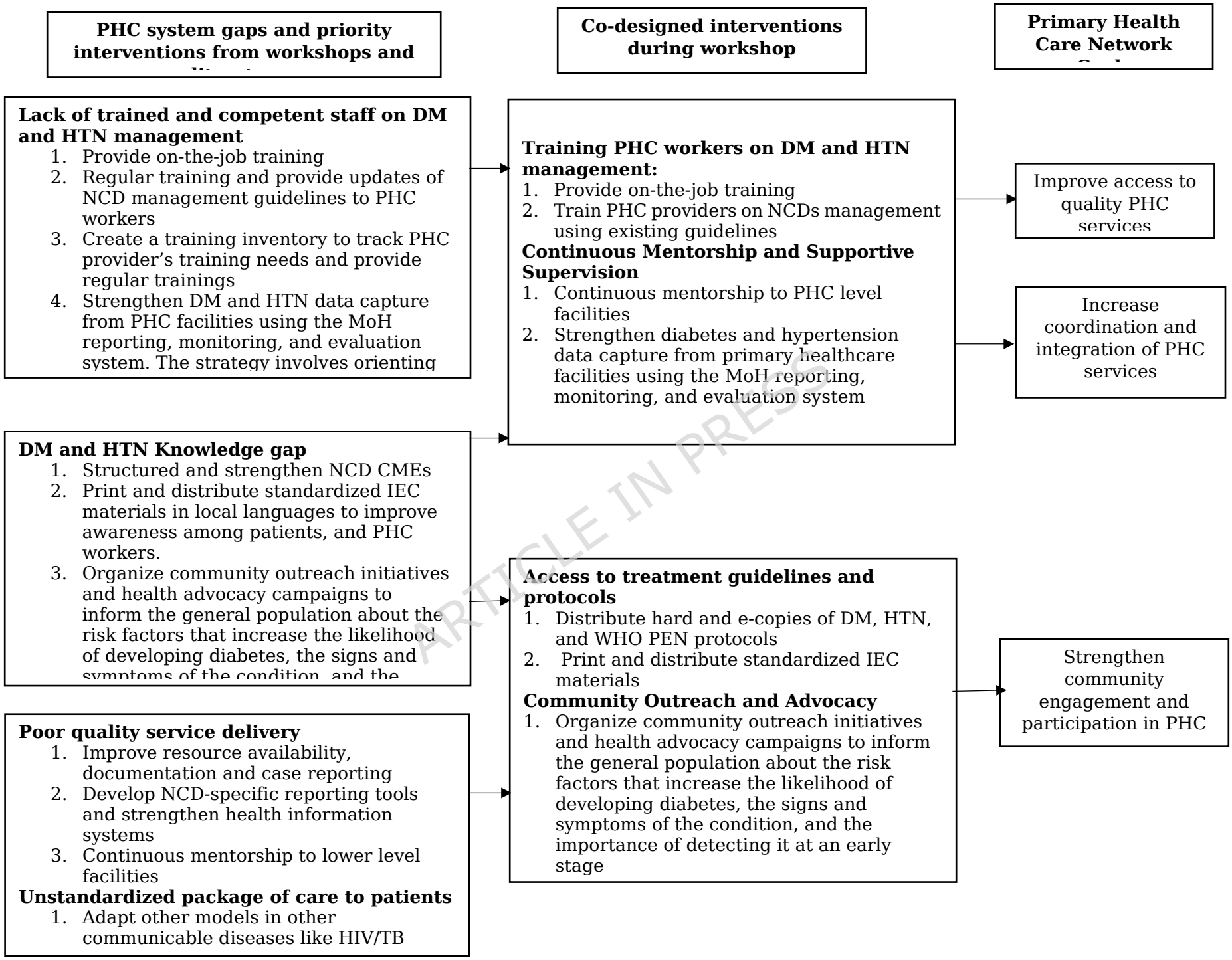

Figure 2: Identification of priority interventions during the co-

Qualitative themes underpinning intervention choices

1. Workforce capacity

Stakeholders consistently emphasized gaps in need-based training, refresher learning, and application of knowledge into routine practice, particularly for DM and HTN management.

"Most of us rely on the basic training we received in college many years ago. We rarely get refresher training, yet patients' needs keep changing." — PHC provider, Level 3 facility

"The problem is not just training, but putting that training into practice. Without mentorship, skills gained from workshops are easily lost." — County Public Health Officer

"In Kenya, there are so many NCD guidelines to the extent that PHC providers do not know which one to follow. This is why there is a need to train providers on the latest guidelines in order to improve access to quality services, especially when providers need to adhere to these guidelines." ..... NCD Implementing Partner Representative, Kisumu County

As a key intervention, almost all of the stakeholders suggested a need to capacity build the skills of PHC workers. However, in some Level 2 PHC facilities, stakeholders held the opinion that there was a need to train CHPs as alternative providers to support PHC workers in educating the public on the risks and symptoms of NCDs, especially DM and/or HTN. These CHPs will take on an active role in supporting patients at home and act as a link between the PHC facility and the community. CHPs can follow up with patients and remind them to attend scheduled appointments without missing them, reducing complications and late referrals. Nevertheless, the primary emphasis was on the training of other cadres, including nurses, clinicians, nutritionist, and physicians, rather than CHPs, who are at the lowest level (Level 1). These other cadres were preferred for training due to their advanced medical knowledge and capacity to provide comprehensive care, which are critical to the effective management of NCDs. The objective was to improve the quality of care and assure improved patient outcomes by providing these healthcare professionals with the necessary skills.

2. Service delivery organization

Service organization challenges included long waiting times, inadequate follow-up, and lack of standardized care packages for DM and HTN patients.

"When you come to the clinic, you wait for a very long time, and sometimes you are told to come back another day without proper follow-up." — Patient living with HTN, Level 4 facility

"We do not have a standard way of managing DM and HTN patients here. Different providers do things differently." — Facility in-charge, Level 3 facility

*"I am aware that Kenya has several guidelines for managing and preventing NCDs, including DM and HTN, under discussion. However, my foremost concern lies in ensuring that all healthcare providers, especially those in our recently established PCNs, have access to and understand these guidelines. The Governor's Council currently values these PCNs documents as a reference in all of their discussions on health matters led by Kisumu County Governor Prof." .....*County Director of Public Health, Kisumu County.

"Some of the advice we receive from hospitals during clinic visits, such as reducing salt intake and exercising, lacks clarity regarding the extent of these recommendations." Patient living with HTN, Seme Sub County.

With the launch of the PCNs guidelines, the county's MoH has adopted a ward-based health service delivery governance structure. This was consistent with the functional arrangements of the health facilities within the PCNs, where the better-equipped facilities within the Ward serve as the referral hub for the networked lower- level facilities (hereby referred to spokes). In regards to this context, additional prioritized interventions prioritized included the establishment of '*NCD clinics*' in most hubs (level 3s or 4s), which could be supervised by facility in- charges, to increase PHC service coverage and quality within Kisumu County.

3. Health information systems

Several stakeholders noted that inadequate documentation and reporting significantly constrained care planning and commodity forecasting. These include inconsistent use of NCD registers, and weak reporting systems limited care continuity and planning.

"Documentation is a major challenge. Some providers are not confident using the NCD registers, so data is missing or incomplete." — Sub-County Health Records Officer

"*Poor documentation is a widespread issue in our public facilities. To address this, we must first provide training to healthcare workers and health records and information officers on the proper use of MoH registers for documentation and reporting*."..... Sub County Health Records Officer.

To strengthen DM and/or HTN documentation and reporting, stakeholder recognized the need for orienting health records officers to their tasks and

providing them with the necessary reporting tools as a key element in increasing access to quality PHC services.....Sub County Health Records and Information Officer

*"The majority of PHC facilities face challenges in documenting and reporting NCD data, particularly DM and HTN, which complicates care planning and budgeting for drugs and supplies. To address this issue, we must provide training to PHC workers on how to use MoH registers for documentation and reporting." .....*Sub County Health Records Officer.

"Without proper registers and trained staff to use them, NCD data remains incomplete, making it difficult to plan for drugs and supplies." — Sub-County Health Records Officer

4. Medical products, vaccines, and technologies
Participants highlighted inconsistent availability and maintenance of diagnostic tools and essential medicines as major barriers to effective care.

"Even when we diagnose patients, we lack drugs and proper equipment. This discourages both providers and patients." — Pharmacist, Level 4 facility

*"Most of the BP machines are manual and difficult to use, and even the new ones sometimes lack batteries, which affects service delivery to clients."....*PHC Worker, Seme, Level 2 facility

5. Leadership and governance
Stakeholders noted weak supervision, limited feedback loops, and low provider motivation related to NCD service performance.

"Support supervision for NCDs is not regular, and feedback on performance is rarely shared with facilities." — Sub-County NCD Coordinator

6. Community engagement
Community awareness, outreach, and patient support were seen as critical but under-developed components of NCD care.

"Many people in the community only find out they have hypertension when complications have already started." — Community Health Promoter

"We need education materials in local language so people can understand what these diseases mean." — NCD Coordinator, sub-county level

"The community needs to be involved through outreach programs and sensitization awareness on NCDs so that the population can learn about the risk factors for DM and HTN, symptoms, and the benefits of early

*screenings, among others. This will reduce multiple complications that may later arise. " .....*Community Health Promoter.

Step 4: Implementation determinants and locally feasible recommendations

Stakeholder consultations during the co-design and planning phases identified several contextual determinants likely to influence successful implementation of the proposed interventions. These determinants were broadly categorized as modifiable or less-modifiable within the short to medium term.

Modifiable determinants included non-need-based allocation of training opportunities, inconsistent mentorship and supportive supervision, weak documentation and reporting practices, and limited availability of NCD-specific IEC materials. Stakeholders viewed these barriers as addressable through improved coordination, standardized processes, and modest investments. For example, participants repeatedly emphasized the absence of a structured training inventory to guide equitable training deployment and track PHC worker competencies over time.

"Some providers attend several trainings while others are never trained at all, which points to the need for a training inventory to guide who should be trained and when." — Hospital administrator

Less-modifiable determinants included shortages of essential diagnostic equipment and medicines, limited facility infrastructure, and high staff turnover driven by frequent, unplanned transfers. These challenges were considered to require longer-term health system financing, workforce planning, and procurement reforms beyond the scope of short-term facility-level interventions.

Additional constraints highlighted by stakeholders included inadequate staffing levels, which limited the ability of facilities to release staff for training without disrupting service delivery, and weak alignment between facility-level implementation efforts and broader county health priorities. Drawing on these insights, stakeholders proposed a set of locally feasible recommendations to support implementation. Key recommendations included:

i. Establishing a PHC provider training inventory to track training exposure by cadre, year, and skill level;
ii. Reducing unplanned and frequent staff transfers to preserve institutional memory and continuity of care;
iii. Strengthening mentorship and supportive supervision by adhering to established supervision rosters and using standardized checklists for NCD services;

iv. Procuring and distributing standardized NCD registers to improve documentation and reporting for DM and HTN;
v. Developing and disseminating NCD-specific IEC materials, particularly in local languages; and
vi. Improving access to functional diagnostic tools and essential medicines through strengthened supply chain and maintenance systems.

Step 5: Monitoring and evaluation framework

As a final output of the participatory process, stakeholders and the research team jointly developed a M&E framework to track implementation progress and assess early and intermediate outcomes of the co-designed interventions. The framework specifies data sources, indicators, analytical approaches, and feedback mechanisms to support iterative learning and adaptive implementation.

Early outcomes to be monitored include PHC worker knowledge and skills, use of DM and HTN clinical guidelines, completeness and accuracy of documentation, and availability of essential diagnostic tools and medicines. Intermediate outcomes include screening uptake, patient follow-up and referral patterns, and continuity of care for patients living with DM and HTN.

The M&E framework also incorporates routine stakeholder review meetings to ensure that findings are shared with county, sub-county, and facility-level actors, thereby supporting continuous quality improvement. Detailed descriptions of data sources, analytical methods, and dissemination strategies are provided in Table 7 and the implementation plan table in Table 6 under Methods section.

DISCUSSION

This study demonstrates the value of a participatory approach to strengthening PHC delivery for NCDs, specifically DM and HTN, in a resource-constrained county setting in Kenya. By actively engaging stakeholders across multiple health system levels, the study generated contextually grounded evidence on critical service delivery gaps and co-designed feasible interventions to address them. The findings contribute to the growing body of implementation research showing that participatory approaches can enhance relevance, ownership, and feasibility of PHC strengthening efforts for chronic NCD care in LMICs.

Consistent with evidence from Kenya and comparable LMIC settings, the study highlights persistent weaknesses in PHC capacity for DM and HTN care, particularly related to workforce competence, organization of care, and availability of standardized care processes. The four priority gaps identified include limited training and competence among PHC workers, knowledge gaps in NCD management, inadequate patient care

characterized by long waiting times and insufficient follow-up, and the absence of standardized care packages—mirror findings from studies conducted in Botswana, Ghana, South Africa, Ethiopia, and Uganda, where PHC systems remain predominantly oriented toward acute and communicable conditions[42-45]. Similar to prior studies, inadequate and non-need-based training for frontline providers emerged as a major constraint to effective NCD management, reinforcing evidence that pre-service training alone is insufficient to support the complex and longitudinal care required for DM and HTN[46-48].

The lack of simplified, accessible clinical guidelines and variability in their application across facilities further undermines quality of care. This finding aligns with research from South Africa and other LMIC contexts showing that primary care providers often struggle to operationalize national NCD guidelines in routine practice due to complexity, limited dissemination, and inadequate mentorship[49, 50]. The absence of standardized care packages for patients living with DM and HTN—also observed in similar PHC settings[47, 51].—contributes to fragmented care, inconsistent counselling, and weak follow-up systems, which ultimately compromise patient outcomes. Together, these findings underscore that gaps in DM and HTN care at the PHC level are not isolated technical failures but manifestations of broader systemic weaknesses.

A key contribution of this study lies in moving beyond gap identification to the co-design of locally feasible implementation strategies, grounded in stakeholder experience. Capacity building, mentorship, supportive supervision, strengthened documentation and reporting, community outreach, and improved resource availability emerged as priority actions. Importantly, the study distinguishes these actions as implementation strategies—mechanisms through which interventions are delivered—rather than interventions themselves. This distinction is critical, as evidence from implementation science emphasizes that strategies such as training-of-trainers, mentorship, and supervision structures are essential for translating evidence-based interventions into routine practice, especially in decentralized PHC systems.

The implementation barriers identified—such as inadequate staffing, limited diagnostic equipment, high staff turnover, non-need-based deployment, and weak alignment with county health priorities—are consistent with findings from Tanzania, Cameroon, Ethiopia, South Africa, and Nigeria, where health system constraints continue to impede the scale-up of NCD services[43, 44, 52-55]. These commonalities suggest that while the specific configuration of challenges may vary, the underlying determinants of poor PHC performance for NCDs are broadly shared across LMICs. By engaging decision-makers, providers, and community actors in identifying both modifiable and less-modifiable determinants, this study reinforces the

importance of tailoring implementation strategies to system realities rather than relying on externally designed, one-size-fits-all models.

The application of the ERIC framework[41] to classify implementation activities further strengthens the translational value of the findings. By mapping co-designed interventions to evidence-informed implementation strategies such as educational outreach, ongoing training, mentorship, development of educational materials, patient engagement, and optimization of physical infrastructure—this study provides a structured pathway for integrating DM and HTN care into routine PHC practice. Similar participatory NCD interventions in LMICs have shown that such structured approaches enhance feasibility and sustainability when embedded within existing governance and service delivery arrangements (e.g., PHC networks or ward-based systems) [56].

From a scalability and sustainability perspective, the alignment of proposed interventions with Kenya's PCN framework is particularly important. By situating DM and HTN services within a hub-and-spoke PHC model and proposing the establishment of NCD clinics in better-equipped hub facilities, the study illustrates how participatory findings can be operationalized within ongoing health system reforms. This alignment increases the likelihood that interventions can be sustained beyond the study period and adapted in other counties with similar PHC configurations. Moreover, the emphasis on documentation, routine data use, and supportive supervision strengthens the foundation for continuous learning and quality improvement, which are essential for long-term NCD care.

Overall, this study adds to global evidence that participatory approaches are not merely consultative but can function as powerful implementation mechanisms for strengthening PHC delivery of DM and HTN services in LMICs. By integrating stakeholder priorities with implementation science frameworks and existing health system structures, the study offers actionable insights for policymakers and practitioners seeking to scale and sustain NCD care within PHC systems.

Strengths and limitations

The strength of this study lies in its participatory development approach with people of all levels in the local health system. This approach incorporates the perspectives of various stakeholders, including PHC workers and individuals living with these conditions. This approach allows for local context adaptation, particularly as some facilities have already initiated NCD clinics while others are still in the planning stages, enhancing the relevance, feasibility and scalability of the proposed interventions. The participatory method as how we operationalized it was flexible in delivery, output, and stakeholder engagement, making it suitable for a wide range of

health issues[57]. Adopting a structured facilitation was crucial for achieving outcomes and guaranteeing inclusive representation.

This study is relevant to the local context, as it aligns with the goals of Kenya's PCN. Specifically, the PCNs aims to strengthen service coordination and integration, as well as improve the quality of care in PHC settings. The co-designed interventions support these goals by providing continuous mentorship and support supervision to PHC workers. Additionally, there is a focus on training these workers in DM and HTN management to equip them with the necessary skills and knowledge for effective NCD management. This approach not only addresses immediate service delivery shortages but also establishes a sustainable framework for better health outcomes, thereby advancing the overarching objectives of UHC in Kenya.

This study acknowledges several limitations. First, the use of purposive and snowball sampling prioritized relevance and depth of insight over statistical representativeness; therefore, the findings are most transferable to similar PHC contexts rather than generalizable at the national level. To strengthen coverage and credibility, stakeholder recruitment intentionally targeted all key health system levels including county, sub-county, facility, community, patient, and implementing partner representatives with deliberate efforts to balance voices and reduce the influence of professional hierarchies. Second, reliance on self-reported data may have introduced reporting or recall bias. However, the use of multiple data sources and methods, including surveys and facilitated group discussions, enabled triangulation of findings, enhanced internal validity, and helped mitigate potential bias.

Implication of the findings

The findings of our study comprise a number of suggestions for health care practitioners and decision-makers at various levels in the health system. First, the study emphasizes the need for human resource capacity building and ongoing training and mentorship. In Kenya, the county government currently organizes training sessions on critical areas such as emergency obstetric and newborn care (eMOC), post-abortion care, nutrition, tuberculosis, HIV, reproductive, maternal, newborn, child, and adolescent health (RMNCAH), as well as NCDs like cervical cancer, diabetes, and hypertension. These trainings are typically held annually or biennially and are conducted by Trainers of Trainers (ToTs), who also serve as mentors within the counties.

The training targets healthcare workers at each facility, but the number of participants is limited, often ranging from 1 to 2 per facility, leaving many PHC workers untrained despite the aim to eventually cover all staff across various health facilities. Therefore, at the local level, the training capacity can be increased by targeting more healthcare workers in each session to

ensure more comprehensive coverage of staff within facilities. Furthermore, strengthening ongoing mentorship programs where trained staff can support their peers will help build a culture of continuous learning and improvement. At the national level, there is a need to standardize training guidelines across counties to ensure uniformity in skill development. Additionally, adopting technology, including e-learning modules, to supplement in-person training can make the trainings more accessible to a wider group of healthcare workers.

Secondly, the results emphasize the need for an improved data management system that can monitor patient outcomes. Currently, Kisumu County is rolling out a computerized patient data management system in Kenya. All patient data are recorded in daily MoH registers and enter monthly summaries to the KHIS. Unfortunately, not all facilities have these registers, and some patients lack booklet records, resulting in data gaps. Locally, healthcare workers need to be trained on digital systems, and patient booklets should be available at all facilities. Nationally, infrastructure to support digital data entry and a standardized data documentation protocol must be continuously invested in.

Furthermore, the study reveals significant gaps in resource allocation for managing NCDs. It highlights the urgent need to increase funding and support for NCD initiatives at both local and national levels. To achieve this, efforts should be expanded to engage political leaders and decision-makers in advocating for increased resource allocation for NCD management. Additionally, awareness campaigns should be created to educate leaders on the burden of NCDs and their impact on public health, fostering a common understanding and sense of urgency. Where possible, champions for NCDs can be established to lead advocacy campaigns for NCD prevention and control, including resource allocation and influencing policy discussions within political space. This aligns with WHO and national health strategies aimed at improving NCD management.

Finally, the study underscores the importance of community engagement initiatives. It reveals a need to strengthen community outreach programs to raise awareness about NCDs, including risk factors, symptoms, and management. This proactive approach will support continuous management of DM and HTN among populations, ultimately leading to better health outcomes.

Conclusion

This study demonstrates that engaging stakeholders through a participatory process can generate clear, contextually grounded priorities for strengthening PHC delivery for DM and HTN in resource-constrained settings. The findings highlight persistent and interrelated gaps in PHC

systems particularly in workforce capacity, organization of care, availability and use of clinical guidelines, continuity of patient follow-up, and access to essential diagnostics and medicines that continue to limit effective DM and HTN management. Importantly, the study shows that these gaps are not only widely recognized by frontline providers and patients but can also be collectively prioritized and addressed when stakeholders are meaningfully involved.

A key contribution of this work is the identification of a coherent package of priority actions including capacity building of PHC workers, strengthened mentorship and supportive supervision, standardized care pathways, improved documentation and reporting, community outreach, and enhanced resource availability that are both locally feasible and aligned with existing health system reforms, such as Kenya's PCNs. By linking these priorities to implementation strategies, the study provides practical guidance for translating policy commitments on NCDs into routine PHC practice.

Beyond the immediate context, this study contributes to the growing evidence that participatory approaches can serve as effective implementation enablers for NCD care in low- and middle-income countries, fostering ownership, feasibility, and sustainability. The insights generated can inform future implementation research, guide county-level planning and resource allocation, and support the scale-up of integrated DM and HTN services within PHC systems. Ultimately, embedding stakeholder-driven solutions into routine service delivery offers a promising pathway to improving the quality, continuity, and equity of NCD care at the PHC level.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Ethics Research Committee (ERC) of Jaramogi Oginga Odinga University of Science and Technology (JOOUST) and the National Commission for Science, Technology and Innovation (NACOSTI), Kenya (ERC approval number: ERC 43/5/24-06; NACOSTI license number: NACOSTI/P/23/25192). Permissions to conduct the study were granted by the Kisumu County and Sub-County Health Management Teams. All participants provided written informed consent prior to participation, in accordance with the Declaration of Helsinki. Confidentiality and anonymity of participants were strictly maintained throughout the study.

Consent for publication

Not applicable

Availability of data and materials

Data is accessible and available upon reasonable request to the corresponding author, Ogol Japheth Ouma, to ensure that the use of data is in line with the terms of ethics approvals and principles.

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Contributors

OJO led the study's conceptualization, while NWA, DO, EM, EO, and JvO contributed to its conception. GA, DO, JO, and JvO provided technical guidance and critical suggestions for the study protocol. OJO, NWA, EO, SO, IA, EM, DO, and JO provided general coordination including facilitation of the workshops and management of data collection. OJO led data cleaning, analysis and developed the first draft of the manuscript, which was verified by NWA, who had access to the raw data. GA, DO, JO, JB, and JvO made critical suggestions and edits to the draft. All authors read and approved the paper submission.

Competing interests

The authors declare no competing interests.

List of Abbreviations

CME – Continuous Medical Education
CHMT – County Health Management Team
CHPs – Community Health Promoters
CRiHSP – Centre for Research in Health System Performance
DFM – Department of Family Medicine
DM – Diabetes mellitus
FAMPOP – Department of Family Medicine & Population Health
FGDs – Focus group discussions
HTN – Hypertension
ICCC – Innovative Care for Chronic Conditions
IEC – Information, Education, and Communication
JOOUST – Jaramogi Oginga Odinga University of Science and Technology
KHIS – Kenya Health Information System
LMICs – Low- and middle-income countries
M&E – Monitoring and evaluation

MoH – Ministry of Health
NACOSTI – National Commission for Science, Technology and Innovation
NCDs – Non-communicable diseases
NGOs – Non-governmental organizations
OJT – On-the-job training
PAID – Participatory Approach to Intervention Development
PAR – Participatory research
PCNs – Primary Health Care Networks
PHC – Primary healthcare
SCHMT – Sub-County Health Management Team
UHC – Universal Health Coverage
WHO – World Health Organization
WHO PEN – WHO Package of Essential Noncommunicable Disease Interventions

Webannex

Table 4: Guidance for facilitating a PAR process activity

Aims	Guiding Prompts	Objectives
Step 1: Situation analysis	**Service Delivery** • Do the facilities have designated NCD clinics to provide care? • How can we improve the quality of service delivery to reduce complications and mortality from NCDs? **Health Workforce** • Are there sufficient trained and competent staff to manage DM and HTN effectively? • What steps can be taken to address the knowledge gaps and improve the application of training in practice? **Health Financing** • Is there adequate resource allocation for NCD management to ensure consistent service delivery? • How can we reduce the dependency on donor funding and ensure timely release of funds? **Medical Products, Vaccines, Technologies** • Do we have a reliable supply chain for essential medical commodities for NCD management? • Do the facilities have adequate diagnostic equipment such as blood pressure machines? **Health Information System** • Are NCD registers and reporting tools consistently used and accurately maintained in all facilities? • How can we improve supply of reporting tools to enhance data management? **Leadership and Governance** • Is there a culture of feedback and continuous improvement in NCD management within the facility? • How can we ensure consistent support supervision and increase motivation among healthcare providers?	Assess the capacity of PHC facilities to provide NCD care services by evaluating service delivery, workforce competency, financing, medical supplies, health information systems, and leadership and governance structures.

Aims	Guiding Prompts	Objectives
Step 2: Stakeholder consensus on priority gaps	• What are the available resources for the project (staff capacity and funding)? • How will stakeholder meetings be organized, structured, facilitated and prepared for? • Who are the key contact persons for each stakeholder category? • How do we own, use and share the findings? • How will we handle stakeholder differences, tensions or power relations within the team? • What are the priority gaps and challenges in primary healthcare (PHC) service delivery for managing DM and HTN in the region? • Can we agree on a common statement of the priority gaps and challenges?	Facilitate the development of a focused project change objective through stakeholder consensus building on the priority gaps and challenges in PHC service delivery for DM and HTN.
Step 3: Co-design and prioritization of interventions	**1. Selection of the interventions** • What are the priority interventions needed to strengthen PHC service delivery for DM and HTN management? **2. Factors influencing implementation** • What factors influence the local implementation of these interventions, and how do we address these factors?	Identified and agreed-upon priority interventions for DM and HTN management. Documented factors influencing the local implementation of these interventions.
Step 4: Implementation planning informed by local determinants	• What specific changes do we expect to achieve through the implementation of the selected interventions? • Who will be responsible for each concrete action that will bring about these changes? • How will we evaluate the selected interventions' results to determine their early effects on managing DM and HTN?	Successfully plan and implement priority interventions for managing DM and HTN by identifying expected changes, assigning responsibilities, and establishing evaluation metrics to assess their early effects.

Aims	Guiding Prompts	Objectives
Step 5: Monitoring and Evaluation	• What specific data (e.g., patient outcomes, availability of diagnostic equipment, drugs, PHC worker's knowledge, perceptions and practices) will we collect to assess the effectiveness of the selected interventions? • What materials and resources do we need to prepare to support effective data collection? • How do we record, store, and analyze our data to ensure accuracy and accessibility? • What are the key gaps in the specific data collected on patient outcomes, facility availability of equipment for NCD care, and providers' knowledge, perceptions, and practices? • What communication channels should we use to disseminate the findings for key stakeholders' action? • How will we tailor our messages into an action plan for different audiences? • How will the team incorporate reflection and iteration throughout the intervention implementation process?	Tools collectively generated and prepared for data collection use. Agreed-upon key findings based on collective data analysis. Develop clear and tailored messages for different stakeholder audiences. Agreed-upon reflection and iteration platforms. Identified early effects of the implemented interventions.

Table 5: NCD care gaps and challenges relevance and feasibility assessment tool

WHO health system Block	**Identified gap to address the core problem of inadequate care for HTN and DM in PHC**	**Relevance score (0-10)** **Instructions for** Relevance: "Enter a score between 0 and 10 for each gap, where 0 means 'not relevant at all' and 10 means 'highly relevant.' Rate each gap based on how relevant you perceive it to be in addressing the core problem of inadequate care for	**Feasibility Assessment (0-10)** **Instructions for Feasibility:** "Enter a score between 0 and 10 for each gap, where 0 means 'not feasible at all' and 10 means 'highly feasible.' Rate each gap based on how feasible you perceive it to be in addressing the core problem of inadequate care for HTN and DM in PHC in Kisumu County."

		HTN and DM in PHC in Kisumu County."	
Service Delivery	Limited knowledge on NCDs		
	Poor history taking by healthcare workers		
	Inadequate patient care, characterized by long wait times and insufficient follow-up		
	Unstandardized package of care to patients		
	Poor counselling services		
	High rate of defaulters and lost to follow up		
	Lack of IEC Materials		
	Increased mortality		
	Multiple complications		
	Low community screening		
	Lack of awareness and asymptomatic nature of the condition		
	Missed diagnosis		
	Lack of designated NCD social support interventions		
	Lack of ideal NCD Clinic		
Health Workforce	Lack of trained and competent staff on DM and HTN management		
	DM and HTN Knowledge gap		
	Negative perception and practice gaps		

	Lack of training inventory leading to non-accountability		
	Low application of training knowledge into practice		
	Prioritization of communicable diseases over NCDs		
Health Financing	Inadequate resource allocation for NCDs management		
	Inconsistency and delay in release of funds		
	Delay in reimbursement of funds like Linda mama, NHIF now SHIF		
	Pilferages and misappropriation of resources		
	Over dependence on donor funding		
	Accumulation of debts		
	No service chatter		
Medical Products, Vaccines, Technologies	Lack of diagnostic equipment		
	Poor maintenance of products and technologies		
	Lack of drug monitoring system leading to stock-out of essential medical commodities for NCD		
	Lack of DM and HTN drugs, supplies and guidelines		
	Erratic supply of the commodities		
	Lack of technical personnel on maintenance		
Health Information System	Irregular/inadequate supply of reporting tools		
	Poor documentation, entry, collation of data from source documents and reporting		

	Knowledge gap in filling NCD registers and NCD indicators		
	Limited access to internet services in various areas		
	No specific NCD register in some facilities		
	Staff shortage		
	Some indicator missing in the electronic medical health information system		
	Inconsistent use of NCD reporting tools		
Leadership and Governance	Organization culture where no feedback on NCDs management is routinely shared		
	Inconsistency in support supervision		
	Glaring gaps in the statement “HALT AND REVERSE” on NCDs		
	Lack of motivation and satisfaction among providers		
	Insufficient training opportunities for NCDs		

Table 6a: Categorizing specific implementation activities based on ERIC strategy Framework[41]

ERIC's strategy	ERIC's definition	Implementation Activities
Conduct educational meetings	Hold meetings targeted toward different stakeholder groups (e.g., providers, administrators, other organizational stakeholders, and community, patient/consumer, and family stakeholders) to teach them about the clinical innovation	1. **Customize Training Resources**: Adapt training materials from the DM, HTN, and WHO protocols to fit the local context. 2. **Comprehensive Training for PHC Workers**: Provide training for PHC workers through workshop setups to enhance their ability to manage DM and HTN conditions effectively.
Conduct ongoing training	Plan for and conduct training in the clinical innovation in an ongoing way	3. **Comprehensive Training for PHC Workers**: Provide training for PHC workers through OJT to enhance their ability to manage DM and HTN conditions effectively.
Identify and prepare champions	Identify and prepare individuals who dedicate themselves to supporting, marketing, and driving through an implementation, overcoming indifference or resistance that the intervention may provoke in an organization	4. **Mentorship Programs**: Revive and implement mentorship programs by pairing experienced PHC workers with less experienced staff to facilitate knowledge transfer and skill development
Conduct educational outreach visits	Have a trained person meet with providers in their practice settings to educate providers about the clinical innovation with the intent of changing the provider's practice	5. Train facility staff on data collection and reporting tools.
Distribute educational materials	Distribute educational materials (including guidelines, manuals, and toolkits) in person, by mail, and/or electronically	6. Distribute hard and e-copies of DM, HTN, and WHO PEN protocols including MoH NCD data collection registers and summary algorithm e.g management protocol for HTN and pin on the facility walls for quick references by PHC workers

ERIC's strategy	ERIC's definition	Implementation Activities
Develop educational materials	Develop and format manuals, toolkits, and other supporting materials in ways that make it easier for stakeholders to learn about the innovation and for clinicians to learn how to deliver the clinical innovation	7. **Distribute IEC Materials**: Print and distribute IEC materials for patients about DM and HTN, focusing on risk factors, the importance of early detection, treatment options, and symptoms.
Increase demand	Attempt to influence the market for the clinical innovation to increase competition intensity and to increase the maturity of the market for the clinical innovation	8. **Community Health Campaigns**: Organize and conduct community health campaigns to raise awareness about DM and HTN.
Involve patients/consumers and family members	Engage or include patients/consumers and families in the implementation effort	9. **Support Group Sensitization**: Educate community members on the importance of creating or joining support groups for patients living with DM and HTN.
Change physical structure and equipment	Evaluate current configurations and adapt, as needed, the physical structure and/or equipment (e.g., changing the layout of a room, adding equipment) to best accommodate the targeted innovation	10. Procure basic screening equipment like blood pressure devices, glucometers, weighing scales and medications
Alter incentive/allowance structures	Work to incentivize the adoption and implementation of the clinical innovation	11. Advocate for increased budget allocation for NCD services at the county level.

Table 9: Assessment of specific health-system challenges and gaps by relevance and feasibility scores

Number	Gap / challenge	Domain	Relevance (0–10)	Feasibility (0–10)
1	Limited knowledge on NCDs	Service delivery	8.6	6.3
2	Poor history taking by healthcare workers	Service delivery	7.9	6.1

3	**Inadequate patient care (long waits; insufficient follow-up)**	**Service delivery**	**8.5**	**6.4**
4	**Unstandardized package of care**	**Service delivery**	**8.1**	**6.5**
5	Poor counselling services	Service delivery	7.8	5.9
6	High rate of defaulters and lost to follow-up	Service delivery	7.6	5.8
7	Lack of IEC materials	Service delivery	7.4	5.6
8	Increased mortality	Service delivery	8.2	3.9
9	Multiple complications	Service delivery	8.3	4.1
10	Low community screening	Service delivery	7.7	5.2
11	Lack of awareness and asymptomatic nature of the condition	Service delivery	7.9	5.4
12	Missed diagnosis	Service delivery	7.8	5.1
13	Lack of designated NCD social support interventions	Service delivery	7.2	4.8
14	Lack of ideal NCD clinic	Service delivery	7.5	4.6
15	**Lack of trained and competent staff on DM/HTN management**	**Health workforce**	**9.2**	**7.1**
16	**DM and HTN knowledge gap**	**Health workforce**	**8.9**	**6.8**
17	Negative perception and practice gaps	Health workforce	7.6	5.9
18	Lack of training inventory leading to non-accountability	Health workforce	7.3	4.7
19	Low application of training knowledge into practice	Health workforce	7.8	5.6
20	Prioritization of communicable diseases over NCDs	Health workforce	7.1	4.3
21	Inadequate resource allocation for NCDs management	Health financing	8.4	4.2
22	Inconsistency and delay in release of funds	Health financing	8	4
23	Delay in reimbursement (Linda mama / NHIF / SHIF)	Health financing	7.6	3.8
24	Pilferages and misappropriation of resources	Health financing	7.2	3.6
25	Over-dependence on donor funding	Health financing	7	3.9
26	Accumulation of debts	Health financing	7.1	3.7
27	No service charter	Health financing	6.4	4.5

28	Lack of diagnostic equipment	Medical products & technologies	8.5	4.6
29	Poor maintenance of products and technologies	Medical products & technologies	7.8	4.2
30	Lack of drug monitoring system	Medical products & technologies	7.9	4.3
31	Lack of DM and HTN drugs, supplies and guidelines	Medical products & technologies	8.3	4.7
32	Erratic supply of medical commodities	Medical products & technologies	8.1	4.1
33	Lack of technical personnel on maintenance	Medical products & technologies	7.2	4.4
34	Irregular/inadequate supply of reporting tools	Health information system	7.5	5.3
35	Poor documentation and reporting	Health information system	7.9	5.6
36	Knowledge gap in filling NCD registers	Health information system	7.6	5.5
37	Limited access to internet services	Health information system	6.8	4.2
38	No specific NCD register	Health information system	7.1	4.8
39	Staff shortage	Health information system	7.9	3.9
40	Missing indicators in electronic system	Health information system	7.3	4.1
41	Inconsistent use of NCD reporting tools	Health information system	7.4	4.5
42	No routine feedback on NCD performance	Leadership & governance	7.8	5.4
43	Inconsistency in supportive supervision	Leadership & governance	7.6	5.1
44	Gaps in “HALT AND REVERSE” strategy	Leadership & governance	7.2	4.6
45	Lack of provider motivation and satisfaction	Leadership & governance	7.4	4.8

46	Insufficient training opportunities for NCDs	Leadership & governance	7.7	4.9

The distribution of identified gaps was highest in service delivery (n = 14), followed by health information systems (n = 8), health financing (n = 7), and health workforce as well as medical products, vaccines, and technologies (each n = 6). Leadership and governance accounted for the fewest gaps (n = 5).