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REVIEWS

Community health workers, nurse-led training, and capacity building in low- and middle-income countries: a scoping review

Agentes comunitarios de salud, formación liderada por enfermería y desarrollo de capacidades en países de ingresos bajos y medios: una revisión panorámica

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ABSTRACT:
Introduction: Community health workers (CHWs) deliver primary healthcare across low- and middle-income countries (LMICs), and nurses increasingly lead their training, shaping CHW performance. However, evidence on nurse-led training remains fragmented, lacking a shared theoretical framework.
Objective: To map evidence on nurse-led training, supervision, and capacity-building for CHWs in LMICs, characterise the nurse's role within these systems, and identify gaps limiting evidence synthesis and policy application.
Method: We conducted a scoping review using the Arksey and O'Malley framework, following PRISMA-ScR guidelines. We searched PubMed, Scopus, and Google Scholar with a Boolean strategy; after two-stage screening, 20 studies met the inclusion criteria.
Results: Four themes emerged: (1) structural design of CHW training; (2) nurse roles in supervision and clinical oversight; (3) contextual determinants of effectiveness; and (4) health outcomes in nurse-CHW models. Nurse-led training and supervision were consistently linked to improved CHW performance across mental health, HIV, non-communicable disease, and maternal-child health domains.
Discussion: Studies vary in method and outcome measures and lack a shared theoretical framework, limiting cross-study comparison. We propose the Integrated Nurse-CHW Capacity Building System (IN-CCS) as a preliminary, hypothesis-generating model for future testing.
Implications for Practice: Health systems should formally position nurses as CHW training and supervision agents, with dedicated supervisory time, structured competency frameworks, and technology-assisted tools, while policymakers invest in preparing nurse supervisors to sustain this model.

Recommendations: Future research should test IN-CCS prospectively, adopt standardised CHW competency instruments, and use longitudinal mixed-methods designs to build transferable, policy-relevant evidence.

Keywords: Community Health Workers; Nurses; Inservice Training; Capacity Building; Primary Health Care.

RESUMEN:
Introducción: Los agentes comunitarios de salud (ACS) prestan atención primaria en países de ingresos bajos y medios (PIBM); las enfermeras lideran cada vez más su formación, influyendo en su desempeño. Sin embargo, la evidencia sigue fragmentada, sin un marco teórico común.
Objetivo: Mapear la evidencia sobre formación, supervisión y desarrollo de capacidades lideradas por enfermería para ACS en PIBM, caracterizar el rol de la enfermera e identificar vacíos que limitan su aplicación en políticas.
Método: Revisión de alcance según Arksey y O'Malley, siguiendo PRISMA-ScR. Se buscó en PubMed, Scopus y Google Scholar; tras cribado en dos etapas, se incluyeron 20 estudios.
Resultados: Surgieron cuatro temas: diseño de la formación; roles de enfermería en supervisión y vigilancia clínica; determinantes contextuales de la efectividad; y resultados de salud en modelos enfermera-ACS. La formación y supervisión lideradas por enfermería mejoraron el desempeño de los ACS en salud mental, VIH, enfermedades no transmisibles y salud materno-infantil.
Discusión: Los estudios varían en método y medidas de resultado, sin marco teórico común para comparación. Proponemos el Sistema Integrado de Desarrollo de Capacidades Enfermera-ACS (IN-CCS), un modelo preliminar para futuras pruebas.
Implicaciones para la práctica: Los sistemas de salud deberían formalizar el rol de las enfermeras en la formación y supervisión de ACS, con tiempo dedicado, marcos de competencias y herramientas tecnológicas, e invertir en enfermeras supervisoras**.**
Recomendaciones: Investigaciones futuras deberían probar prospectivamente el marco IN-CCS, adoptar instrumentos estandarizados de competencias para ACS y usar diseños longitudinales mixtos que generen evidencia transferible para políticas.

Palabras clave: Agentes Comunitarios de Salud; Enfermeras y Enfermeros; Capacitación en Servicio; Creación de Capacidad; Atención Primaria de Salud.

INTRODUCTION

The global health workforce crisis threatens Universal Health Coverage (UHC) and the health-related Sustainable Development Goals. WHO[1] projects a shortfall of 10 million health workers by 2030[2], mostly in sub-Saharan Africa and South Asia. Nursing accounts for the largest share of this gap. The global nursing workforce grew from 27.9 million in 2018 to 29.8 million in 2023, yet projections still point to a shortage of an estimated 4.1 million nurses by 2030, concentrated in the WHO African and Eastern Mediterranean regions.[3] Closing this gap needs sustained investment in education, employment, leadership, and service delivery, the domains current global nursing workforce policy prioritises.[4] In LMICs, where physician density remains inadequate, community health workers (CHWs) connect communities to formal health services.

Global policy frameworks increasingly emphasise CHWs as a strategic workforce for strengthening primary health care, expanding service coverage, and advancing Universal Health Coverage. WHO[5] guidance on CHW programmes states that training alone is not enough: programmes also need supervision, fair remuneration, integration into health systems, reliable supplies, and clear competency expectations. Primary health care and health workforce strategies make a similar case for team-based service delivery, task redistribution, and structured support for non-physician health workers.[1,2,6] Large-scale CHW programmes still face structural tensions around planning, governance, financing, and integration with the wider health workforce, and sustained political commitment and predictable financing remain preconditions for these programmes to work at scale.[7]

In this review, nurse-led training refers to structured instructional activities delivered or coordinated by nurses to improve CHW knowledge and skills. Supervision refers to ongoing practice monitoring, feedback, mentorship, and clinical oversight after initial training. Competency development refers to the acquisition and application of measurable knowledge, skills, confidence, and practice behaviours by CHWs. Capacity building is the broader umbrella term for training, supervision, competency development, organisational support, and the system-level conditions needed to sustain CHW performance.

A growing body of evidence links trained, supervised CHWs to improved health outcomes. A household-based CHW programme under nurse clinical oversight in Malawi reported significant improvements in HIV antiretroviral adherence, malnutrition management, and tuberculosis case detection.[8] In rural India, CHWs receiving structured nurse supervision achieved significant reductions in depression severity at 12-month follow-up, comparable to physician-delivered care.[9] In Nepal, a nurse-facilitated CHW education programme was associated with clinically meaningful reductions in uncontrolled hypertension.[10]

Nurses make up the largest professional health workforce globally, and most LMIC health systems position them as the primary supervisors, clinical mentors, and competency assessors of CHW cadres. A qualitative systematic review found that nurses and midwives with structured pedagogical preparation produced significantly superior CHW performance outcomes compared to non-clinical supervisors, across multiple geographic and disease contexts.[11] Yet policy and regulatory frameworks inconsistently recognise nursing leadership within primary care teams. A recent integrative review of community health nurses in LMICs found that role ambiguity, limited remuneration, and weak institutional recognition constrain their practice, and called for clearer leadership positioning and regulatory recognition to advance universal health coverage.[12] Evidence on how nursing-leadership frameworks translate into everyday practice remains limited more broadly. A recent scoping review across public healthcare systems described nursing leadership as a responsive practice shaped by clinical credibility, managerial demands, and interprofessional influence, and identified implementation barriers such as hierarchical constraints, limited protected time, and inconsistent organisational support.[13]

Despite this convergent evidence, the nurse-CHW relationship remains theoretically under-conceptualised. Most studies treat the nurse supervisory role as a contextual descriptor rather than an active explanatory variable. A theoretical gap persists: no unified, empirically validated framework characterises the mechanisms by which nurse-led training and supervision may support CHW competency and health-related outcomes in LMIC primary healthcare systems. A related methodological gap concerns outcome measurement: no two studies in the existing literature employ identical CHW competency or health impact instruments, which complicates cross-study comparison and policy translation.[14,15]

We chose a scoping review as the most appropriate methodology, given the heterogeneous evidence base and the aim of mapping conceptual terrain rather than generating pooled effect estimates. We adopted the Arksey and O'Malley framework,[16] refined by Levac et al.,[17] and report this review in accordance with the PRISMA extension for Scoping Reviews (PRISMA-ScR).[18]

Primary research question: What is the current state of evidence regarding nurse-led training, supervision, and capacity-building interventions for CHWs in LMICs, and what theoretical, methodological, and implementation gaps persist? Secondary questions address: (a) training modalities and content; (b) nurse supervisory roles and mechanisms; (c) contextual determinants of training effectiveness; and (d) health outcomes reported in nurse-CHW dyadic models.

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METHODS

Study Design

This scoping review follows the five-stage Arksey and O'Malley framework[16] with refinements by Levac et al.[17] We developed a structured review protocol before data extraction to guide study selection, data charting, and thematic synthesis. We report this review in accordance with the PRISMA-ScR 20-item checklist.[18] Supplementary File 1 contains the completed PRISMA-ScR checklist.

We used two complementary tools for quality appraisal, chosen to reflect the range of study designs identified during full-text screening. We applied the Mixed Methods Appraisal Tool (MMAT, version 2018)[19] as the primary appraisal instrument for the 18 primary empirical studies, covering its five applicable categories (qualitative, randomised controlled trial, non-randomised, quantitative descriptive, and mixed-methods designs). MMAT has no category for appraising systematic reviews as a study design. We therefore applied the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses[20] to the two systematic-review studies included in this review, Westgate et al.[14] and Etowa et al.[11], evaluating review-question clarity, search comprehensiveness, independent duplicate appraisal, and synthesis appropriateness. This supplementary JBI appraisal shaped how we interpreted the two reviews but did not change study inclusion. To keep a single, comparable metric across the heterogeneous designs in Table 2, we report only MMAT percentage scores there. For both tools, quality scores informed interpretive weighting rather than exclusion, consistent with scoping review methodology.

Eligibility Criteria

Inclusion criteria: (i) CHW training, supervision, competency development, or broader capacity-building processes as a primary or secondary objective; (ii) nurses, midwives, or mid-level health professionals as trainers, supervisors, or collaborative partners; (iii) conducted in LMICs according to World Bank classification[21], or conducted in high-income settings but reporting nurse-led CHW training architectures, supervision systems, digital support mechanisms, competency-based approaches, or workforce development strategies considered operationally transferable to LMIC primary healthcare systems; (iv) published in PubMed or Scopus-indexed peer-reviewed journals; (v) any study design; (vi) published January 2018-December 2025.

Exclusion criteria: (i) exclusively physician-level training without CHW or nursing component; (ii) no training or supervision mechanism described or analysed; (iii) exclusively clinical or biomarker studies without health workforce dimension; (iv) grey literature, conference abstracts, editorials, or opinion pieces without primary empirical data; (v) exclusively high-income country focus without LMIC applicability or transferable workforce mechanism; (vi) duplicate or overlapping publications.

We retained several studies from high-income countries under criterion (iii). Two reviewers jointly assessed their transferability to LMIC contexts against four explicit operational criteria, applied narratively rather than as a numerical score: (a) mechanism relevance; the study reported a nurse-CHW workforce, supervision, or training mechanism (e.g., structured mentorship, competency-based curricula, telehealth-supported supervision) rather than a clinical or biomarker outcome alone; (b) resource independence; the core mechanism did not depend on infrastructure, financing, or technology unlikely to be available in LMIC primary healthcare systems, and we excluded studies reliant on proprietary high-cost platforms without a plausible low-resource adaptation pathway at full-text review; (c) structural analogy; the reported supervisory, pedagogical, or governance structure had a plausible LMIC counterpart (for example, community health centre nurse supervision structurally resembling LMIC CHW supervision arrangements); and (d) reviewer consensus; both reviewers independently judged the mechanism transferable, resolving disagreements through discussion and excluding the study where they could not reach consensus. This operationalisation follows implementation science perspectives that recognise transferable operational strategies may offer conceptual and systems-level insights beyond their original geographic context, while acknowledging that transferability is a matter of contextual judgement rather than binary equivalence. We address the specific high-income-setting studies retained under this process, and the corresponding limitations of extrapolating their findings to LMIC health systems, in the Discussion (Transferability of High-Income Context Findings to LMIC Settings) and Limitations sections.

Search Strategy

We conducted a comprehensive Boolean search across PubMed, Scopus, and Google Scholar using three concept blocks: (A) CHW terminology, (B) training and capacity-building terms, and (C) nurse and supervisor terms. Table 1 presents the search database. We supplemented electronic searches with hand-searching of reference lists of included studies and forward citation searches of key global health journals. We restricted Google Scholar screening to the first 20 pages because relevance dropped sharply beyond this point, in line with standard scoping-review practice for handling large result volumes. Provides the full database-specific search strategies, including Boolean syntax, field tags, filters, search dates, and search limits, to enhance methodological transparency and reproducibility.

Table 1. Boolean Search Strategy Database

Database	Block A CHW Terms	Block B Training/ Capacity Terms	Block C Nurse/ Supervisor Terms	Boolean Structure	Limiters
PubMed (MEDLINE)	"Community Health Worker*"[MeSH] OR "CHW"[tiab] OR "Village Health Worker*"[tiab] OR "Health Extension Worker*"[tiab] OR "Lay Health Worker*"[tiab]	"Training"[MeSH] OR "Capacity Building"[tiab] OR "Education"[MeSH] OR "In-service Training"[tiab] OR "Competency"[tiab] OR "Supervision"[tiab] OR "Mentorship"[tiab] OR "Professional Development"[tiab]	"Nurse*"[MeSH] OR "Nursing"[MeSH] OR "Midwif*"[tiab] OR "Supervisor"[tiab] OR "Mentor*"[tiab] OR "Health Professional*"[tiab]	(A) AND (B) AND (C)	2018–2025; English; Peer-reviewed; Human subjects
Scopus	TITLE-ABS-KEY("community health worker*" OR "CHW" OR "lay health worker*" OR "health extension worker*" OR "village health worker*")	TITLE-ABS-KEY("training" OR "capacity building" OR "competency" OR "supervision" OR "mentorship" OR "in-service")	TITLE-ABS-KEY("nurse*" OR "nursing" OR "midwif*" OR "supervisor*" OR "mentor*")	(A) AND (B) AND (C)	PUBYEAR > 2017; LANGUAGE(English); DOCTYPE(ar OR re)
Google Scholar	"community health worker" OR "CHW" OR "village health worker" OR "lay health worker"	"training" OR "capacity building" OR "in-service education" OR "supervision"	"nurse" OR "nursing" OR "supervisor" OR "mentor"	(A) AND (B) AND (C)	2018–2025; LMIC context; cited ≥ 5; first 20 pages screened
Hand Search	Reference lists of included studies; WHO, USAID, UNICEF technical reports	BMJ Global Health; Health Policy and Planning; The Lancet Global Health; PLOS Global Public Health	-	Forward and backward citation searching	2018–2025

Screening and Selection

Two reviewers independently conducted title and abstract screening using predefined eligibility criteria. We then assessed full-text eligibility for all potentially relevant records. We resolved discrepancies at both stages through consensus discussion, with iterative re-review where necessary to keep study selection decisions consistent. Figure 1 presents the PRISMA-ScR flow diagram of study identification, screening, and inclusion, structured according to the PRISMA-ScR reporting item for study selection.[18] The flow-diagram template follows the general PRISMA 2020 diagram structure recommended for evidence-synthesis flow reporting,[22] and we generated the diagram itself using the PRISMA2020.

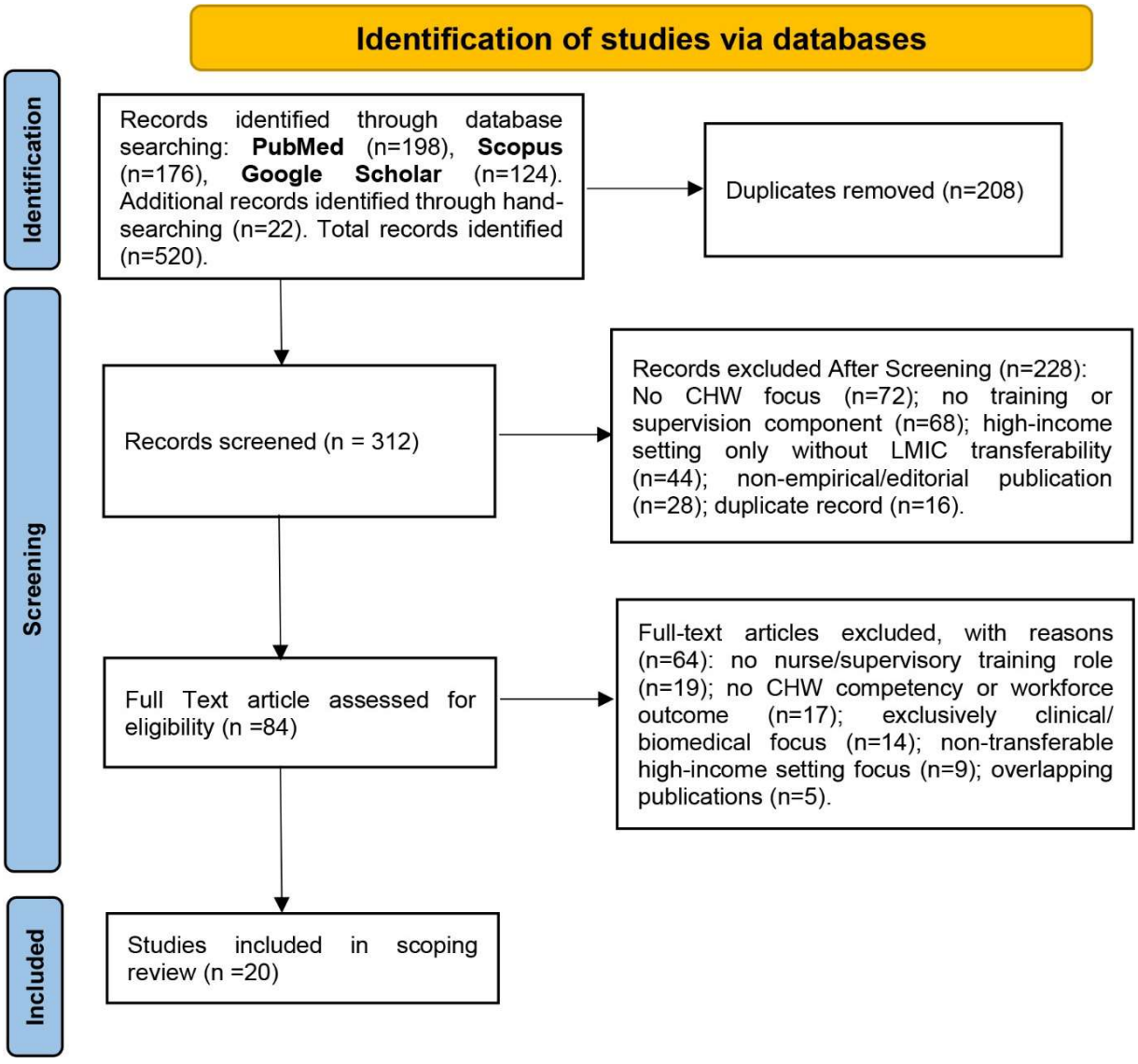


Figure 1. PRISMA-ScR Systematic Screening and Selection[18]

Data Extraction

Data from the 20 included studies were extracted into a standardised charting form capturing: citation; study design and sample; country and health system context; CHW

cadre and training modality; nurse or supervisor role; theoretical framework; outcome measures; and key findings. Thematic synthesis followed Braun and Clarke reflexive thematic analysis approach.[23] Initial codes were generated independently by two authors, organised into candidate themes through iterative review, validated against a deductive framework from the health workforce development literature, and confirmed by all authors.

RESULTS

Overview of Included Studies

The 20 included studies span 2020-2025, with the majority (n=14, 70%) published between 2021-2024, reflecting accelerating research interest in CHW capacity building. Geographically, included studies came from sub-Saharan Africa (n=8, 40%), South Asia (n=4, 20%), multi-country LMIC settings (n=4, 20%), and high-income settings with operationally transferable nurse-CHW training or supervision mechanisms (n=4, 20%). We included high-income setting studies only when they reported supervision systems, telehealth-supported training architectures, competency-based CHW education models, or implementation mechanisms considered operationally adaptable to LMIC workforce contexts. Study designs included cluster randomised controlled trials (n=5, 25%), qualitative studies and systematic reviews (n=6, 30%), mixed-methods evaluations (n=4, 20%), quasi-experimental studies (n=3, 15%), and validation/proof-of-concept studies (n=2, 10%). MMAT quality scores ranged from 78% to 95% (mean: 85.3%), indicating a predominantly high-quality evidence base.

Health domains addressed included mental health and psychosocial care (n=5), non-communicable disease management (n=5), HIV and infectious disease (n=4), maternal and child health (n=3), cancer navigation (n=1), vaccination and preventive health (n=1), and cross-cutting multi-disease models (n=1). Table 2 presents the systematic quality assessment for all 20 included studies.

Table 2: Systematic Quality Assessment

Author	Country/ Region	Study Design	Sample/n	CHW Focus	Nurse Focus	Theoretical Framework	MMAT %	Primary Theme
Westgate et al.[14]	Multi-country (LMICs)	Systematic Review	68 primary studies	CHW supervision systems	Nurse/health worker supervisor	WHO health workforce model	N/A	CHW Supervision & Nurse Mentorship
Wroe et al. [8]	Malawi (Neno District)	Stepped-wedge Cluster RCT	2,652 households	Household CHW programme	Nurse clinical oversight	Task-shifting; Primary Healthcare	90%	Integrated Nurse-CHW Programme
Maulik et al. [9]	India (rural)	Cluster RCT (SMART MH)	2,187 participants	CHW mental health delivery	Nurse/ASHA supervision	Systems strengthening	94%	Nurse-Supervised CHW Mental Health
Etowa et al. [11]	LMICs (multi-country)	Qualitative Systematic Review	14 included studies	Nurse & midwife training role	Nurses as primary training agents	Role theory; feminist framework	N/A	Nurse Role in CHW Development
Draper et al. [24]	South Africa (Soweto)	Process Evaluation (RCT)	Mixed methods	CHW behaviour change counselling	Nurse-delivered Conversation Skills	Healthy Conversation Skills framework	84%	Nurse-Trained CHW Behaviour Change
Hamon et al. [25]	Malawi (peri-urban)	Qualitative (46 interviews)	46 health workers & managers	Integrated CHW service delivery	Nurse integration with CHW	Health systems integration theory	83%	Nurse-CHW Service Integration
Hook et al. [26]	Ethiopia (Butajira)	Qualitative (contextual)	25 key informants	Brief psychological intervention CHW	Nurse adaptation & co-training	Task-sharing; social learning	80%	CHW Psychological Training Context

Author	Country/ Region	Study Design	Sample/n	CHW Focus	Nurse Focus	Theoretical Framework	MMAT %	Primary Theme
Khanal et al. [10]	Nepal (Nawalparasi)	Cluster RCT	1,746 patients (45 clusters)	CHW health education/home visits	Nurse-facilitated CHW training	Health belief model; andragogy	91%	Nurse-Led CHW Hypertension Training
Lukyamuzi et al. [27]	Uganda (rural)	Quasi-experimental	738 HIV-affected couples	CHW HIV disclosure mechanism	Nurse-mentored CHW outreach	Social cognitive theory	86%	CHW-Nurse HIV Disclosure Model
Xie et al. [28]	Bangladesh (rural)	Proof-of-concept (mixed)	Mixed (CHW + patients)	Digital CHW hypertension/diabetes	Nurse-CHW digital decentralisation	Digital health implementation	80%	Digital Nurse-CHW Decentralisation
McAlearney et al. [29]	USA/LMIC parallel	Qualitative (interviews)	54 CHW trainers & administrators	Structured CHW training frameworks	Health professional training oversight	Competency-based education	85%	CHW Training Framework Design
Quintiliani et al. [30]	USA (public housing)	Feasibility RCT	CHWs (n=45)	CHW weight management delivery	Nurse-supervised CHW programme	Social cognitive theory; RE-AIM	78%	Nurse-Supervised CHW Weight Management
Mallaiah [15]	LMICs (multi-country)	Psychometric Validation	CHWs (n=250)	CHW stroke literacy assessment	Nurse-validated competency tool	Competency-based assessment	81%	CHW Competency Assessment Tool
Kollie et al. [31]	Liberia (national)	Multimethod Evaluation	Mixed (HCW & community)	CHW NTD case management	Nurse supervisors for CHW NTD care	Systems strengthening	85%	Nurse-CHW NTD Case Management

Author	Country/ Region	Study Design	Sample/n	CHW Focus	Nurse Focus	Theoretical Framework	MMAT %	Primary Theme
Bukuluki et al. [32]	Uganda & Malawi	Qualitative (52 interviews)	52 healthcare workers	CHW digital vaccination training	Nurse HCW digital training experience	Gender & digital transformation	78%	CHW-Nurse Digital Capacity Building
Freeman et al. [33]	Kenya (Western)	Cluster RCT (WASH/Nutrition)	4,498 participants (108 clusters)	CHW community behaviour change	Nurse oversight & CHW care group	Social norms theory; BCC model	92%	CHW Community Behaviour Change
Ebbs et al. [34]	Uganda (Gulu District)	Prospective mHealth study	CHWs + trainers (n=87)	Train-the-trainer + mHealth	Nurse/trainer facilitation	Adult learning; mHealth theory	88%	Technology-Assisted CHW Training
Vaughan et al. [35]	USA/LMIC transferable	Quasi-experimental	CHWs (n=21)	Telemedicine-based CHW training	Nurse-led remote supervision	Telehealth; competency theory	82%	Remote Nurse-Led CHW Training
Patel et al. [36]	USA (oncology)	Randomised Clinical Trial	318 patients (CHW-led)	CHW cancer navigation	Nurse-CHW oncology collaboration	Navigation theory; patient-centred care	93%	Nurse-CHW Cancer Navigation RCT
Ziolkowski et al. [37]	USA (shelter)	Mixed-methods Evaluation	Mixed (shelter residents + CHW)	CHW-led vaccination education	Nurse trainer for CHW COVID	Implementation science; health literacy	82%	CHW Nurse-Led Vaccination Training

*MMAT was not applicable to Westgate et al.(14) and Etowa et al.(11), as MMAT has no category for systematic-review designs; these two studies were quality-appraised using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses instead (see Methods).

Structural Design and Delivery of CHW Training and Capacity-Building Programmes

Training modalities across the 20 studies differed: classroom-based didactic instruction (n=11), train-the-trainer models (n=7), mobile health and digital platform-mediated training (n=8), on-the-job or workplace-based learning (n=6), and structured community care group facilitation (n=4). Several studies combined multiple modalities. Ebbs et al.[34] provided the strongest evidence for multi-modal superiority. Their evaluation of the Laro Kwo Project in Uganda demonstrated that combining a mobile health platform with a train-the-trainer architecture significantly improved CHW knowledge retention and community referral rates compared to didactic training alone, and the nurse trainer layer proved critical for maintaining fidelity.

Training duration varied, from single-day refresher workshops to multi-year integrated programmes. McAlearney et al.[29] identified the absence of standardised minimum training duration criteria as a primary structural weakness in LMIC CHW programme design. Fewer than half of included studies (n=9, 45%) explicitly articulated the theoretical frameworks underpinning their training design, with competency-based education,[29] the health belief model,[10] social cognitive theory,[27,30] and the Healthy Conversation Skills framework[24] most prevalent. The majority of studies applied ad hoc or implicitly theorised designs, impeding systematic replication and scale-up.

Nurse Roles in CHW Supervision, Mentorship and Clinical Oversight

We identified five distinct nurse functional roles across included studies: (i) clinical trainer providing initial competency instruction; (ii) ongoing supervisor monitoring practice fidelity; (iii) clinical mentor providing case-based guidance; (iv) competency assessor evaluating CHW performance against standards; and (v) community liaison reinforcing CHW credibility and social trust. In most studies, a single nurse filled multiple roles simultaneously without formal time allocation or responsibility boundaries.

The three cluster RCTs provide the strongest available evidence regarding the potential contribution of the nurse training function. Khanal et al.[10] reported that nurse-facilitated community health education in Nepal was associated with a mean systolic blood pressure reduction of 7.2 mmHg greater than control communities at 12-month follow-up. Maulik et al.[9] identified that CHWs receiving structured nurse supervision outperformed unsupervised counterparts on both protocol fidelity and patient-reported depression outcomes. Freeman et al.[33] reported that nurse-endorsed community care group leaders were associated with greater behaviour change in exclusive breastfeeding and handwashing practices.

Etowa et al.[11] concluded that LMICs systematically under-utilise the institutional positioning of nurses as policy participants and frontline trainers. Draper et al.[24] found that nurse-delivered training improved CHW counselling confidence and protocol fidelity, but nurses excessive patient workloads consistently constrained implementation, a systemic barrier that recurs across Malawi,[25] Uganda,[14] and Liberia.[31]

Contextual Determinants of Training Effectiveness

Factors operating at community, health system, and individual levels moderated training effectiveness. At the community level, social trust and gender norms acted as critical moderators. Freeman et al.[33] demonstrated that community trust in CHWs actively cultivated through nurse endorsement was a prerequisite for training-informed behaviour change. Lukyamuzi et al.[27] found that CHW effectiveness in facilitating HIV disclosure was contingent upon community-level acceptance of the nurse-CHW dyadic authority, which nurse-delivered community sensitisation partly achieved.

At the health system level, supply chain reliability, digital infrastructure, and CHW integration into formal reporting systems acted as key enablers. Wroe et al.[8] found that commodity stock-outs and irregular nurse supervisor availability directly limited CHW capacity to apply training-acquired skills. Mobile health-mediated supervision substantially mitigated geographic barriers to supervisory access in two studies,[28,34] enabling more frequent, lower-intensity contacts associated with better training retention. Bukuluki et al.[32] documented gender-differential digital engagement patterns that programme designers had not anticipated, illustrating the emergent and non-linear character of contextual factors.

At the individual level, Mallaiah[15] demonstrated that CHW baseline health literacy was a significant independent predictor of stroke knowledge acquisition following structured training. Vaughan et al.[35] found nurse instructional scaffolding most effective when calibrated to individual CHW knowledge levels, a finding consistent with andragogical principles that LMIC CHW programmes rarely put into practice.

Health Outcomes Reported in Nurse-CHW Capacity Building Models

Nurse-CHW training models were associated with measurable health improvements across five domains in the 20 included studies.

Mental health: Maulik et al.[9] demonstrated significant PHQ-9 reductions and improved WHO Disability Assessment Schedule scores in rural India, with effect sizes comparable to physician-delivered care. Hook et al.[26] established contextual feasibility of nurse-adapted psychological interventions delivered by CHWs in Ethiopia.

Cardiovascular disease and NCDs: Khanal et al.[10] reported a clinically significant blood pressure reduction in Nepal. Digital CHW training models improved hypertension and diabetes self-management knowledge in Bangladesh and the USA.[28,35]

HIV and infectious disease: Lukyamuzi et al.[27] reported a 34 percentage point increase in HIV status disclosure rates in a nurse-mentored CHW outreach model in Uganda. Wroe et al.[8] documented simultaneous improvements in HIV antiretroviral adherence, TB case detection, and malnutrition management within a nurse-supervised multi-disease CHW programme in Malawi.

Maternal and child health: Freeman et al.[33] reported significant improvements in exclusive breastfeeding, handwashing, and diarrhoeal disease incidence in Kenya within a nurse-facilitated CHW care group training model.

Other outcomes: The cancer navigation RCT[36] recorded reduced emergency department visits and improved advance care planning. Nurse-trained CHWs improved COVID-19 vaccination uptake in marginalised shelter populations.[37]

Measurement heterogeneity poses a critical cross-cutting limitation: no two included studies employed identical outcome instruments or follow-up periods, restricting cross-study comparability and policy application. The four thematic domains provided the empirical basis for developing the preliminary IN-CCS framework presented in the Discussion section.

DISCUSSION

The findings suggest that training alone is insufficient to explain CHW performance. Across the included studies, positive outcomes were more commonly reported when training was embedded within broader capacity-building systems that included supervision, mentorship, competency assessment, community trust-building, and supportive health system conditions.

Theoretical Gap and the Proposed IN-CCS Framework

This reviews primary finding confirms that no unified, empirically validated framework characterises the mechanisms through which nurse-led training and supervision may support CHW competency and sustained health impact in LMIC settings. This gap has direct operational consequences: without a shared conceptual architecture, programme designers cannot distinguish essential from incidental training components, nor adapt interventions to new contexts without reverting to empirical trial and error. This pattern mirrors broader evidence that nursing-leadership frameworks generally encounter persistent gaps between conceptual design and everyday implementation,[13] reinforcing the case for empirically grounded, context-specific models such as IN-CCS rather than generic supervisory or leadership frameworks transplanted without adaptation.

We developed the IN-CCS framework through an integrative interpretation of the four themes identified in this review. Structural prerequisites, pedagogical mechanisms, CHW agency processes, and community-system responses emerged from recurring patterns across the included studies. The model does not claim causal confirmation; rather, it offers a preliminary explanatory structure for understanding how nurse-led training and supervision may support CHW competency development and programme outcomes across diverse implementation contexts.

Based on the synthesised evidence, we propose the Integrated Nurse-CHW Capacity Building System (IN-CCS) as a preliminary conceptual model. The model consists of four interacting components. First, structural prerequisites include health system support, protected nurse supervisory time, adequate staffing, resource availability, digital infrastructure, and formal recognition of the nurse supervisory role. Second, pedagogical mechanisms include training content, training modality, supervision frequency, mentorship, feedback systems, and fidelity monitoring. Third, CHW agency processes include motivation, self-efficacy, knowledge acquisition, skill development, confidence, and practice change. Fourth, community-system responses include social trust, gender norms, community acceptability, service uptake, and feedback from community experience into CHW practice.

In this model, we position nurses not merely as generic supervisors but as pedagogical and clinical actors who link health system structures with CHW competency development. The IN-CCS should therefore be interpreted as a hypothesis-generating framework requiring prospective empirical validation before adoption as a policy or implementation framework.

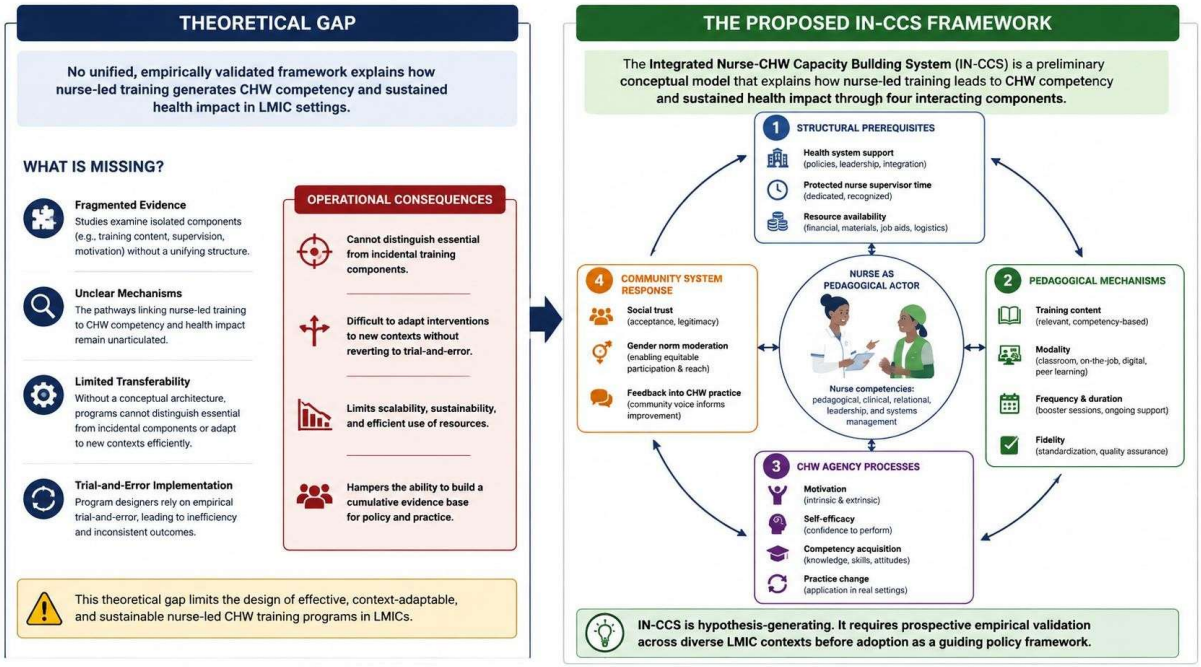


Figure 2. Integrated Nurse-CHW Capacity Building System (IN-CCS) framework

Transferability of High-Income Context Findings to LMIC Settings

Several included studies originated from high-income healthcare systems. We included them for the transferability of specific workforce and supervision mechanisms, not for contextual equivalence. Telehealth-supported supervision, competency-based CHW training, structured mentorship, and digital monitoring offer operational insights for LMIC health systems facing workforce shortages and geographic barriers. We applied the transferability criteria set out in the Methods: mechanism relevance, resource independence, structural analogy, and reviewer consensus. Five included studies from high-income settings met these criteria: a structured CHW training framework,[29] supervised weight-management delivery,[30] telemedicine-based supervision,[35] nurse-CHW oncology collaboration,[36] and nurse-led vaccination education.[37] We judged their mechanisms resource-independent and structurally analogous to LMIC nurse-CHW supervisory arrangements. None demonstrates direct outcome equivalence to LMIC health systems.

Transferability has limits. High-income and LMIC contexts differ in workforce density, financing capacity, digital infrastructure, supply chain reliability, regulatory systems, and nurse-to-population ratios. Implementation approaches that work in high-income settings may need substantial adaptation, local piloting, and context-specific process evaluation before LMIC primary healthcare systems adopt them. Readers should treat the findings from these five studies as illustrative of potentially transferable mechanisms, not as evidence of effectiveness within LMIC health systems.

The IN-CCS framework aligns with WHO[5] policy directions that position CHWs within integrated primary health care systems, not as stand-alone community volunteers. This reviews findings show that CHW performance depends on more than training: supervisory structures, competency-based support, digital or logistical infrastructure, and clear linkage with formal health services all play a part. The model also frames nurse-led CHW capacity building as a complex intervention shaped by context, implementation fidelity, workforce readiness, and system-level resources. Determinant frameworks such as the Consolidated Framework for Implementation Research (CFIR) provide a structured way to specify these contextual influences across innovation, individual, inner-setting, outer-setting, and implementation-process domains.[38] A systematic evaluation of CFIR applications in low- and middle-income countries indicates that most core constructs translate to resource-constrained health systems, provided researchers make systems-level factors such as financing architecture, community governance, and geopolitical context explicit rather than assume them.[39] Prospective empirical tests of the IN-CCS framework could draw on CFIR or comparable implementation-science frameworks to characterise the contextual determinants of nurse-led CHW capacity-building fidelity, adaptation, and scale-up.

Methodological Contributions

Qualitative and cross-sectional designs dominate the evidence base (n=10, 50%). Rigorous cluster RCTs (n=5, 25%) address bundled CHW interventions instead of isolating the nurse training component. This bundling limits causal inference about nurse-led training specific contribution. Methodological heterogeneity precludes meta-analytic pooling, which is why a scoping review design suits this evidence base. The fields most urgent priority is minimum reporting standards, standardised CHW competency assessment instruments,[15] and a minimum data set for characterising training exposure.[29]

Limitations

This review has several limitations. By restricting the search to English-language publications, we may have excluded relevant studies published in Portuguese, French, or other languages common in LMIC contexts. Heterogeneous CHW terminology across countries may have caused inadvertent omissions despite a comprehensive Boolean search. The sample of 20 studies reflects our inclusion criteria. We advance the IN-CCS framework as a hypothesis-generating contribution pending prospective empirical testing.

A further limitation is the small number of included high-income-setting studies. We retained these studies for their potentially transferable workforce, supervision, or digital implementation mechanisms, not because their findings apply directly to LMIC contexts. Differences in financing, workforce density, digital infrastructure, governance, and service delivery capacity may limit direct transferability. We assessed transferability narratively against the four Methods criteria rather than through a validated instrument, so residual subjectivity in these judgements is possible. This is a limitation we acknowledge. Future reviews of this evidence base could apply a structured, validated transferability or applicability appraisal tool instead.

IMPLICATIONS FOR NURSING PRACTICE

Clinical and Community Practice

Nurses working in LMIC primary healthcare settings should treat CHW training and supervision as formal professional responsibilities, not informal ancillary tasks. This review identified five nurse roles: clinical trainer, ongoing supervisor, clinical mentor, competency assessor, and community liaison. CHW programme designers should use these roles to structure formal role delineation. Nurses should co-develop practical tools such as standardised competency checklists, structured supervision visit protocols, and case-based mentorship guides, and implement them within existing primary care structures. Programme designers should use technology-mediated supervision models,[28,34] particularly mobile health platforms, to extend supervisory reach in geographically dispersed settings.

Nursing Education

Pre-service and in-service nursing curricula in LMICs should incorporate adult learning principles, competency-based CHW training methods, and contextual adaptation skills. Nurses with structured pedagogical preparation generate better CHW outcomes,[11] which supports dedicated pedagogy modules in nursing training programmes. Nursing schools and professional bodies should develop standardised training-of-trainers content that addresses the CHW supervisory role as a nursing competency in its own right.

Health Policy

Nursing professional bodies and health ministries should advocate for three policy changes: (1) protected nurse supervisor time formally allocated within nursing job descriptions and healthcare staffing models; (2) national CHW competency frameworks co-developed with nursing input and linked to nursing professional standards; and (3) institutional recognition and remuneration of the CHW training function as a core nursing role. The documented effectiveness of digital supervision tools[40] supports policy investment in digital health infrastructure for nurse-CHW programme delivery in resource-limited settings. These recommendations follow global guidance that calls for embedding CHW programmes within formal primary health care systems, backing them with defined supervision structures, and aligning them with national workforce planning.

CONCLUSIONS

This scoping review maps current evidence on nurse-led CHW training, supervision, and capacity building across 20 systematically selected and quality-appraised studies. Four thematic domains characterise the evidence: structural training design, nurse supervisory functions, contextual determinants, and health-related outcomes reported in nurse-CHW capacity-building models. Across the included studies, we found nurse-led CHW training and supervision models consistently linked to positive workforce and health-related outcomes across communicable disease, non-communicable disease, mental health, and maternal-child health domains. These outcomes were context-dependent, modality-sensitive, and contingent on enabling health system conditions, including protected nurse supervisory time and adequate digital or supply chain infrastructure.

The central finding is a persistent theoretical gap: no unified, empirically validated framework explains how nurse-led training and supervision may support CHW competency and health-related outcomes within complex LMIC health systems. The IN-CCS framework proposed here provides a preliminary, testable structure for future primary research. Future priorities include testing the IN-CCS prospectively across diverse LMIC contexts using longitudinal mixed-methods studies, developing and validating standardised CHW competency measurement batteries, and translating effective nurse-CHW capacity-building models into national health workforce development strategies in partnership with policymakers. Closing this evidence gap matters for CHWs and for the nurses who train, supervise, and sustain them. Their combined potential is central to global health equity.

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CONFLICTS OF INTEREST

The author declares no competing interests that could have influenced the conception, interpretation, or presentation of the work.

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