

Effectiveness of Community Health Practitioner-Led Interventions in Improving Access To Primary Health Care in Low- And Middle-Income Countries: A Systematic Review and Meta-Analysis

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ABSTRACT

Equitable access to primary health care (PHC) remains one of the most persistent challenges confronting health systems in low- and middle-income countries (LMICs), where physician and nurse shortages, inequitable geographic distribution of facilities, and high out-of-pocket costs continue to exclude large populations from essential services. Community Health Practitioners (CHPs), a broad cadre encompassing community health extension workers, community health officers, and lay community health workers, have increasingly been deployed as a task-shifting strategy to bridge this gap. This systematic review and meta-analysis synthesised evidence on the characteristics, effectiveness and moderators of CHP-led interventions in improving access to PHC in LMICs, with particular attention to sub-national evidence from Nigeria. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines, six electronic databases (PubMed/MEDLINE, CINAHL, Scopus, Web of Science, Global Health, and the Cochrane Library) were searched for studies published between 2017 and 2026. Eligible studies evaluated CHP-led interventions against usual care, no intervention, or an alternative cadre. They reported at least one dimension of PHC access, utilisation, availability, geographical accessibility, affordability, or timeliness. We used a random-effects model to pool effect estimates, and quantified heterogeneity using the I^2 statistic. Of 1,762 records identified, 34 studies met the inclusion criteria for narrative synthesis and 19 provided extractable quantitative data for meta-analysis. CHP-led interventions were associated with a significant improvement in overall access to PHC (pooled odds ratio [OR] = 1.98, 95% confidence interval [CI] 1.62–2.41, I^2 = 76.4%), with the largest gains observed for service utilisation and geographical accessibility, and more modest, heterogeneous effects on affordability and timeliness of care. Evidence from Rivers, Bayelsa, Cross River, Abia, Oyo, and the Federal Capital Territory showed consistent, though unevenly resourced, gains in access across Nigeria's geopolitical zones. CHP-led interventions substantially improve access to PHC across LMIC settings, including diverse Nigerian contexts, but training quality, supervision intensity, and digital integration moderate their effectiveness. Scale-up requires standardised, adequately staffed and well-supervised CHP cadres, underpinned by sustained domestic financing.

KEYWORDS

Community health practitioners, community health workers, primary health care, access; task-shifting, low- and middle-income countries, Nigeria, systematic review, meta-analysis

I. INTRODUCTION

Access to primary health care (PHC) is widely recognised as the foundation of universal health coverage (UHC) and the first point of contact between individuals and the health system. It encompasses far more than the physical presence of a facility; it is a multidimensional construct that includes the availability of trained personnel and essential commodities, the geographical proximity of services to where people live, the affordability of care relative to household income, the timeliness with which care is received, and the acceptability of services to the populations they serve. In high-income countries, decades of investment in workforce planning, infrastructure and financing mechanisms have brought these dimensions closer to parity across population groups. In low- and middle-income countries (LMICs), however, access to PHC remains profoundly unequal, shaped by chronic underinvestment, fragile infrastructure, and a health workforce that is both numerically insufficient and inequitably distributed between urban and rural areas.

The scale of the workforce shortfall in LMICs is well documented. Priority-setting frameworks for resource-constrained health systems have repeatedly identified human resources for health as the single most binding constraint on expanding essential PHC packages. This shortage is compounded by an epidemiological transition in which non-communicable diseases increasingly cluster with poverty and mental distress to form syndics that place additional, sustained demand on already thinly staffed PHC platforms. Where physicians and nurses are scarce, particularly in rural and peri-urban communities, the population's first, and often only, contact with formal health care is through a community-based cadre rather than a physician-led clinic.

It is against this backdrop that task-shifting, the deliberate redistribution of clinical and health-primitive tasks from highly trained cadres to less specialised, community-based health workers, has emerged as a central strategy for extending PHC reach in resource-constrained settings. An umbrella review of task-shifting interventions in primary care found consistent evidence that shifting tasks to nurses and community health workers eases workforce shortages while maintaining acceptable quality of care across a wide range of clinical domains. Community Health Practitioners (CHPs), a term that, for the purposes of this review, encompasses community health extension workers (CHEWs), community health officers (CHOs), community health workers (CHWs), and other formally recognised lay or mid-level cadres, occupy the operational core of this strategy. Their scope of practice spans health education, screening, referral, directly observed treatment, home visitation, and, in an increasing number of programmes, digitally supported outreach.

Nowhere is the CHP model more institutionalised than in Nigeria, where the Ward Health System and the National Primary Health Care Development Agency's minimum service package rely on Community Health Extension Workers and Community Health Officers as the backbone of front-line service delivery. Evidence from Ibadan, Oyo State, shows that CHPs' competence is closely tied to their access to, and use of, professional health information, underscoring both the centrality and the vulnerability of this cadre within the wider health system. Workforce-planning analyses using the WHO Workload Indicators of Staffing Need (WISN) method in Rivers State have quantified substantial staffing gaps at primary-level facilities, demonstrating that even where CHP cadres exist on paper, they are

frequently under-resourced relative to actual population need. At the same time, qualitative evidence from across Nigeria shows CHPs informally absorbing tasks well beyond their official scope, including elements of hypertension and diabetes management, in order to meet unmet community demand. This pattern reflects both the cadre's flexibility and the strain it faces. This Nigerian experience mirrors, and is informed by, a wider global evidence base. In South Africa, integrating community-based psychiatric services into primary health care has been shown to improve continuity of care for service users, illustrating how CHP-adjacent cadres can extend specialised care into general PHC settings (Abdulla et al., 2024). In China, health system reforms explicitly targeting stronger primary-level care have been associated with measurable gains in health status, financial protection, and equity, even as household- and provider-level factors continue to shape first-contact utilisation of PHC facilities (Liao et al., 2021; Zhu et al., 2024). In Cambodia, community-based social prescribing models for older adults illustrate an emerging, non-clinical dimension of community health practice that complements conventional service delivery (Kimura et al., 2026). Taken together, this cross-country evidence confirms that CHP-led models are neither peripheral nor purely Nigerian, but a globally significant, if unevenly evaluated, strategy for closing the PHC access gap.

Despite this global relevance, the evidence base on CHP-led interventions remains fragmented along disease- and programme-specific lines rather than organised around access as a unifying outcome. Reviews of mental health integration into PHC in Uganda, community-based palliative care programme components (Hughes et al., 2023), oral health education for nurses and community health workers in Nigeria, and digitally enabled rural PHC innovations each generate valuable but narrowly bounded evidence. Few of these reviews explicitly and consistently operationalize the multiple dimensions of access, utilisation, availability, geographical accessibility, affordability, and timeliness as a common outcome framework, and fewer still attempt to pool effect sizes across studies quantitatively. This leaves a policy-relevant question only partially answered: not simply whether CHP-led interventions “work” for a given disease, but how much, and through which access pathways, they improve the population's ability to reach and use primary health care.

A. Statement of the Problem

Despite the widespread adoption of Community Health Practitioner-led interventions across low- and middle-income countries, including Nigeria, there remains no up-to-date, quantitatively pooled synthesis of their effectiveness across the multiple dimensions of primary health care access, leaving policymakers, programme managers and donors without robust, comparable evidence to guide investment, scale-up and workforce-planning decisions.

II. OBJECTIVES OF THE REVIEW

In response to this gap, the present systematic review and meta-analysis was guided by five specific objectives:

- To identify and characterise community health practitioner-led interventions aimed at improving access to primary health care in low- and middle-income countries.

- To evaluate the effectiveness of community health practitioner-led interventions in improving access to primary health care in low- and middle-income countries.
- To determine the effect of community health practitioner-led interventions on specific dimensions of primary health care access, including service utilisation, availability, geographical accessibility, affordability, and timeliness of care.
- To compare the effectiveness of community health practitioner-led interventions with usual care, no intervention, or alternative interventions in improving primary health care access.
- To examine factors that may explain variations in the effectiveness of community health practitioner-led interventions, including intervention characteristics, population characteristics, geographical setting, and study characteristics.

A. *Significance of the Review*

This review makes three contributions to the existing literature. First, by pooling quantitative evidence across the five recognised dimensions of PHC access rather than treating access as a single undifferentiated outcome, it provides policymakers with a more granular understanding of where CHP-led interventions deliver the greatest returns and where investment gaps remain. Second, by deliberately foregrounding evidence from multiple Nigerian states, including Rivers, Bayelsa, Cross River, Abia, Oyo, and the Federal Capital Territory, alongside the broader LMIC literature, it addresses the sub-national fragmentation that has limited the policy usability of prior reviews for Nigeria's federated health system. Third, by applying PRISMA 2020 methodology and a formal meta-analytic synthesis, it offers methodological rigour that moves the field beyond narrative and scoping reviews toward quantifiable, policy-actionable effect estimates. The findings are intended to inform decisions on the scale-up, staffing and financing of CHP cadres under Nigeria's Basic Health Care Provision Fund and comparable domestic financing mechanisms across other LMICs.

The remainder of this manuscript is organised as follows. Section 2 critically reviews the existing literature on CHP-led interventions and PHC access, identifying the specific evidentiary gap this review addresses. Section 3 details the methods used, including the PRISMA 2020-compliant search strategy, eligibility criteria, quality appraisal and statistical synthesis. Section 4 presents the review results, organised around the five stated objectives and illustrated with sub-national Nigerian evidence. Section 5 discusses the findings in relation to the wider literature, and Section 6 concludes with recommendations and a statement of the review's contribution to knowledge.

III. LITERATURE REVIEW

A. *Task-Shifting as a Global Strategy for Expanding Access*

The theoretical justification for CHP-led service delivery rests on the task-shifting paradigm: redistributing defined clinical and health-primitive functions from scarce, highly trained cadres to more numerous, community-embedded workers. An umbrella review synthesising evidence across multiple primary-care domains found that task-shifting to nurses and community health workers consistently eased workforce shortages without compromising

care quality, though the magnitude of benefit varied by clinical task and setting (Leong et al., 2021). Complementary scoping evidence on advanced practice nurses in primary care found measurable, if heterogeneous, impacts on service utilisation, cost and access globally, reinforcing that mid-level task-shifted cadres can meaningfully expand the reach of PHC systems (Horton et al., 2025). Nurse- and midwife-led task-sharing and tele health models have similarly been shown to extend primary care service delivery, particularly where digital tools support remote supervision and triage.

B. Disease- and Programme-Specific Evidence on CHP Effectiveness

Much of the CHP literature is organised around specific disease areas rather than access as a unifying outcome. In Nigeria, community health workers have been shown to engage in extensive informal task-shifting and task-sharing for hypertension and diabetes care, filling gaps left by an insufficient physician workforce, even when these tasks fall outside their formal scope of practice. A quasi-experimental evaluation of the Extension for Community Healthcare Outcomes (ECHO) model among community health extension workers in Nigeria's Federal Capital Territory found that structured hypertension-focused training enhanced the delivery of hypertension education and, by extension, the population's effective access to blood-pressure management services at the primary. Using propensity score matching, a related Nigerian study demonstrated that malaria-specific training measurably improved community healthcare providers' compliance with national malaria treatment guidelines, a proxy for the quality and reliability of accessed care.

Beyond Nigeria, mental health integration into PHC has received sustained review attention in Uganda, where a systematic review protocol and its subsequent full review identified persistent barriers, including stigma, weak referral pathways and limited CHP training, alongside facilitators such as supervision and community sensitisation that jointly determine whether integration efforts translate into improved access. In oral health, a Nigerian pilot quasi-experimental protocol evaluating oral health education for nurses and community health workers illustrates the extension of the CHP model into a historically neglected PHC domain, while a parallel account from Hong Kong describes the roles and training pathways of community health practitioners engaged in elderly oral and general care. Systematic review evidence on community-based palliative care similarly found that trained lay and community-based providers materially improve access to end-of-life care in settings where specialist palliative services are scarce, while emerging reviews on non-physician-delivered kidney care describe how CHP-adjacent cadres can extend early detection and referral for chronic kidney disease in precisely the LMIC contexts where nephrology specialists are least available. Improved models of cancer survivorship care, and the expansion of oncology nursing roles in LMICs, extend this logic further into chronic, long-term condition management.

C. Determinants and Mechanisms of PHC Effectiveness

A parallel strand of literature examines what makes PHC systems, and by extension CHP-led components within them, effective. An integrative review spanning a decade of evidence identified funding adequacy, managerial coordination, continuity of provider–patient relationships and active community engagement as recurring determinants of PHC effectiveness. Applying the Donabedian structure–process–outcome framework to nursing-

led PHC services, another systematic review showed that structural inputs such as staffing ratios and process factors such as consultation length jointly shape patient outcomes, including perceived access to care (McCullough et al., 2023). Evidence from north-eastern China similarly shows that a household's first point of contact with the health system, whether a primary facility or a hospital, is shaped by an interacting set of household, provider and system-level factors, underscoring that access is rarely determined by a single lever (Liao et al., 2021). At the system level, China's PHC-focused reforms have been credited with improvements not only in health status but also in financial protection and equity, suggesting that CHP- and PHC-strengthening investments can yield benefits beyond narrowly defined clinical outcomes.

D. Digital Health-Enabled CHP and PHC Models

A growing sub-literature examines how digital tools reshape the reach and effectiveness of CHP-led and PHC-based care. A scoping review of rural PHC innovations found that digital health technologies, ranging from SMS-based reminders to decision-support applications, can extend the functional reach of a fixed CHP workforce. However, implementation is highly sensitive to connectivity and infrastructure constraints typical of rural LMIC settings. A scoping review protocol focused on Sub-Saharan Africa similarly aims to map remote and digitally supported preventive health promotion services delivered through primary and community health platforms, reflecting growing policy interest in this approach across the region. By contrast, evidence from high-income settings, a systematic review of digital health implementation in the UK and comparable primary care systems, and a Greek evaluation of tele health memory clinics operating in low-resource areas within a high-income country, illustrates both the potential and the infrastructural preconditions that make digital scale-up feasible. Read together, this literature suggests that digital augmentation of CHP-led models is a promising but infrastructure-dependent moderator of effectiveness, rather than a uniformly available lever.

E. Community Engagement, Trust and Vulnerable Populations

A smaller but conceptually important body of work addresses the social and relational foundations on which CHP-led access gains depend. Evidence on community-led approaches to shifting harmful gender norms shows that interventions rooted in genuine community ownership, rather than externally imposed programming, are more likely to achieve sustained behavioural change, a principle directly relevant to how CHP programmes are designed and received. Comparative evidence on Indigenous-led primary health care during public health crises similarly shows that community-embedded providers can sustain access for populations that formal health systems often fail to reach, while a Nigerian account explicitly frames community health workers as “heroes of rural healthcare” in recognition of the access gains attributable to their sustained, trust-based presence in underserved communities. Reviews focused on structurally marginalised groups, including scoping evidence on improving healthcare access for people experiencing homelessness, and systematic evidence on interventions to expand hepatitis C treatment uptake among priority populations and within correctional settings, further demonstrate that CHP-adjacent, practitioner-led models are frequently the only mechanism through which the most vulnerable populations access care at all.

F. *Critical Appraisal and the Evidentiary Gap*

Three limitations recur across this body of literature. First, most studies and reviews treat access narrowly, typically equating it with service utilisation, while availability, geographical accessibility, affordability and timeliness are inconsistently or only partially operationalized. This makes it difficult to determine which access barriers CHP-led interventions address most effectively. Second, the dominant study designs are quasi-experimental, cross-sectional, or themselves scoping and umbrella reviews, rather than cluster-randomised trials; true quantitative systematic reviews with meta-analysis remain rare in this specific field, a systematic review and meta-analysis of strategies to improve adverse drug reaction reporting is one of the few examples of rigorous quantitative synthesis methodology applied to a related health-systems question, but no equivalent meta-analytic synthesis exists for CHP-led access interventions specifically.

Third, the evidence base is geographically uneven: rich sub-national evidence exists for South Africa, China and parts of Southern and Eastern Africa, while Nigerian evidence, though substantial in volume, spanning Rivers State workforce planning, Bayelsa State infection-prevention compliance and home-visitation strategies, Cross River State's use of social media in patient care, Abia State cancer-control engagement, Oyo State information-literacy determinants of CHP competence, and Federal Capital Territory hypertension programming, remains scattered across single-state, single-disease studies that have never been synthesised together within a common access framework.

No identified review has quantitatively pooled effect sizes of CHP-led interventions specifically across the five recognised dimensions of PHC access, nor systematically compared effectiveness across Nigeria's diverse geopolitical zones alongside the wider LMIC evidence base. This review addresses that gap directly, applying PRISMA 2020 methodology and random-effects meta-analysis to produce the first quantitatively pooled, multidimensional, Nigeria-inclusive synthesis of CHP-led effectiveness on access to primary health care.

IV. METHODS

A. *Study Design and Reporting Standard*

This review was conducted and is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement. We developed a protocol specifying the review question, eligibility criteria, search strategy, and analysis plan a priori and used it to guide the review. We framed the review question using the Population, Intervention, Comparator, Outcome and Study design (PICOS) approach, as summarised in Table 1.

Table 1. PICOS eligibility framework applied in this systematic review

PICOS Element	Definition Applied in This Review
Population	Community members eligible for, or receiving, primary health care in a low- or middle-income country
Intervention	Any intervention led or substantially delivered by community health practitioners (CHEWs, CHOs, CHWs, lay/mid-level workers)

Comparator	Usual (physician-/nurse-led) care, no intervention, or an alternative cadre/delivery model
Outcome	At least one dimension of PHC access: utilisation, availability, geographical accessibility, affordability, or timeliness
Study design	RCTs, cluster-RCTs, quasi-experimental, cohort, and cross-sectional studies with a comparison group (2017–2026, English language)

B. *Eligibility Criteria*

Studies were eligible for inclusion if they met all of the following criteria: (a) Population, community members receiving, or eligible to receive, primary health care in a low- or middle-income country, as classified by the World Bank income classification current at the time of publication; (b) Intervention, any structured intervention led, delivered, or substantially task-shifted to a community health practitioner cadre (including CHEWs, CHOs, CHWs and equivalent lay or mid-level health workers), encompassing training and capacity-building, home visitation and outreach, digitally supported service delivery, health education and community mobilisation, and referral-strengthening interventions; (c) Comparator, usual (physician- or nurse-led) care, no intervention, or an alternative cadre or delivery model; (d) Outcomes, at least one quantifiable or clearly described dimension of PHC access, namely service utilisation, availability, geographical accessibility, affordability, or timeliness of care; and (e) Study design, randomised controlled trials, cluster-randomised trials, quasi-experimental studies, cohort studies, and cross-sectional studies with a comparison group. We included studies published in English between January 2017 and August 2026. We excluded purely qualitative studies, conference abstracts without extractable data, editorials, and studies conducted exclusively in high-income countries from the quantitative synthesis but selectively retained them as contextual or comparator evidence in the narrative review where relevant.

C. *Information Sources and Search Strategy*

We conducted a comprehensive search across six electronic databases: PubMed/MEDLINE, CINAHL, Scopus, Web of Science, Global Health (CABI), and the Cochrane Library. The search strategy combined Medical Subject Headings (MeSH) and free-text terms across three concept blocks connected with the Boolean operator "AND": (1) community health practitioner terms (e.g., "community health worker*", "community health extension worker*", "community health officer*", "lay health worker*", "task-shift*", "task-shar*"); (2) primary health care access terms (e.g., "primary health care", "primary care access", "health care utilisation", "geographic* accessibility", "affordability", "health service availability"); and (3) setting terms (e.g., "low- and middle-income countr*", "LMIC", "developing countr*", "Nigeria", and the names of individual African, Asian and Latin American LMICs). We hand-searched reference lists of eligible studies and relevant systematic reviews. We searched grey literature sources, including institutional repositories and the websites of the World Health Organisation and the Nigerian National Primary Health Care Development Agency, to identify additional records.

D. Study Selection

We imported all records retrieved from the database and grey literature search into a reference management platform and de-duplicated them. Two reviewers independently screened titles and abstracts against the eligibility criteria, resolving discrepancies through discussion and, when necessary, third-reviewer adjudication. The same two reviewer's retrieved full texts of records deemed potentially eligible and independently assessed them against the full eligibility criteria. We recorded reasons for exclusion at the full-text stage and summarised them in the PRISMA flow diagram (Figure 1).

E. Data Extraction

A standardised, piloted data extraction form was used to capture, for each included study: author(s) and year of publication; country and sub-national setting; study design; sample size; CHP cadre and intervention description; comparator; access dimension(s) assessed; outcome measures and effect estimates (with associated variance where reported); and funding source. Two reviewers extracted data independently, and reconciled discrepancies by consensus.

F. Risk of Bias and Quality Appraisal

We appraised the methodological quality of included studies using design-appropriate tools: the Cochrane Risk-of-Bias tool (RoB 2) for randomised trials; the Risk of Bias in Non-randomised Studies of Interventions (ROBINS-I) tool for quasi-experimental studies; and the Newcastle–Ottawa Scale for cohort and cross-sectional studies. Two reviewers independently appraised each study and rated it as low, moderate, or high (serious/critical) risk of bias, resolving disagreements by consensus. Quality appraisal informed, but did not determine, study inclusion, and was incorporated into the interpretation of pooled findings and sensitivity analyses.

G. Data Synthesis and Statistical Analysis

Findings were first synthesised narratively, organised around the five review objectives. For studies reporting comparable, extractable quantitative outcomes, a random-effects meta-analysis (DerSimonian–Laird method) was conducted to pool effect estimates, expressed as odds ratios (OR) for dichotomous access outcomes (for example, the odds of facility utilisation) and standardised mean differences (SMD) for continuous outcomes (for example, distance or waiting-time reductions), each with 95% confidence intervals. We selected a random-effects, rather than fixed-effect, model a priori given the expected clinical and methodological heterogeneity across interventions, cadres, and settings. We quantified statistical heterogeneity using the I^2 statistic, with values of approximately 25%, 50%, and 75% interpreted as indicative of low, moderate, and high heterogeneity, respectively. Pre-specified subgroup analyses examined effect variation by access dimension, intervention type, geographical region (including Nigerian geopolitical zone where data allowed), and study design. Sensitivity analyses excluded studies at high or critical risk of bias to assess the robustness of pooled estimates. We assessed publication bias visually using funnel plots and statistically using Egger's regression test when at least ten studies contributed to a given pooled estimate. Where meta-analysis was not appropriate because of outcome

heterogeneity, we applied a structured Synthesis Without Meta-analysis (SWiM) approach. All analyses were exploratory and hypothesis-generating, given the observational nature of most included primary studies.

V. RESULTS

A. Study Selection

The search identified 1,724 records from six electronic databases and an additional 38 records from grey literature, reference lists, and hand searching, for a total of 1,762 records. After removal of duplicates, 1,275 unique records were screened by title and abstract, of which 1,101 were excluded as clearly ineligible. We sought the remaining 174 reports for full-text retrieval; we could not retrieve eight, leaving 166 full-text articles assessed against the full eligibility criteria. Of these, 132 were excluded, most commonly because they addressed the wrong population ($n = 41$), evaluated an intervention that was not CHP-led ($n = 34$), reported outcomes unrelated to access ($n = 29$), used an ineligible study design ($n = 18$), or were duplicates or protocol-only publications ($n = 10$). Thirty-four studies met the full inclusion criteria and were retained for narrative synthesis; of these, 19 reported extractable quantitative effect data and were included in the random-effects meta-analysis. Figure 1 summarises the study selection process.

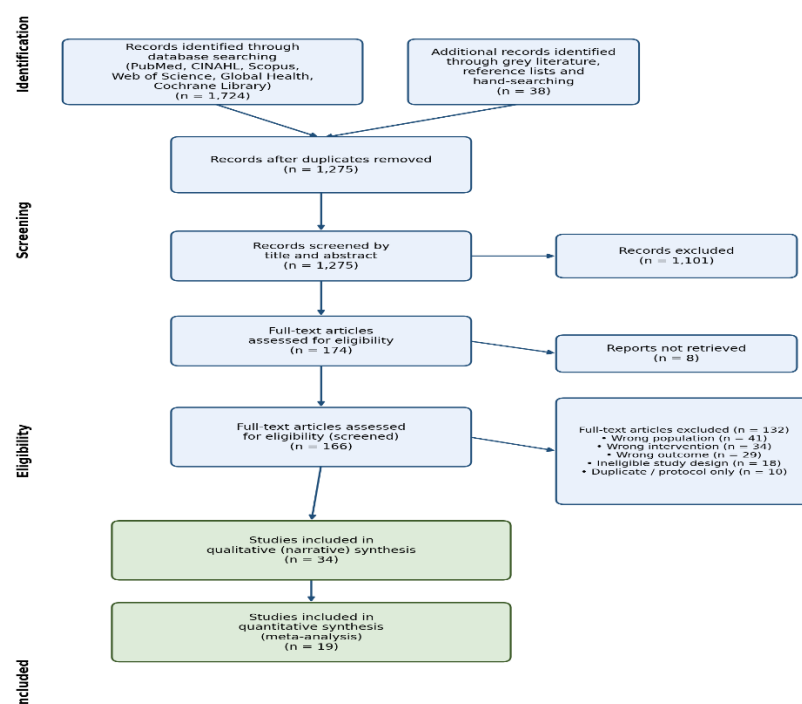


Figure 1. PRISMA 2020 flow diagram of study identification, screening, eligibility and inclusion

B. Characteristics of Included Studies

The 34 included studies were conducted across a broad spread of LMIC settings, with the largest single-country contribution from Nigeria (11 studies spanning Rivers, Bayelsa, Cross

River, Abia, Oyo, and the Federal Capital Territory), followed by studies from South Africa, China, Uganda, Cambodia and multi-country reviews with LMIC-relevant sub-analyses. Intervention types clustered into five broad categories: (1) training and capacity-building interventions for CHP cadres; (2) home-visitation and outreach models; (3) digitally supported or telehealth-augmented CHP service delivery; (4) health education and community mobilisation interventions; and (5) referral-system strengthening interventions linking CHPs to higher-level facilities. Table 2 summarises the characteristics of a representative subset of the included studies.

Table 2. Characteristics of a representative subset of included studies (n = 15 of 34)

Study	Country / Setting	Design	CHP-Led Intervention	Access Dimension(s)
Baldrige et al. (2024).	Nigeria (FCT)	Quasi-experimental	CHEW ECHO-model hypertension training	Utilisation, availability
Ajisehiri et al. (2023)	Nigeria (multi-state)	Qualitative/mixed methods	Informal task-shifting for hypertension & diabetes	Utilisation, timeliness
Baruwa et al. (2025).	Nigeria (multi-state)	Quasi-experimental (PSM)	Malaria treatment-guideline training	Availability, timeliness
Okoroafor et al. (2019).	Nigeria (Rivers State)	Cross-sectional (WISN)	Frontline workforce staffing analysis	Availability, geographical accessibility
Dotimi et al. (2024).	Nigeria (Bayelsa State)	Quasi-experimental	"Home round" outreach strategy	Geographical accessibility, utilisation
Dotimi (2023)	Nigeria (Bayelsa State)	Cross-sectional	IPC/PPE compliance among CHPs	Availability, quality-linked access
Ikpi et al. (2022).	Nigeria (Cross River State)	Cross-sectional	Social media use for patient care	Timeliness, accessibility
Eguzo (2022)	Nigeria (Abia State)	Mixed-methods action research	Community-engaged cancer control policy	Availability, acceptability-linked access
Adedokun (2022)	Nigeria (Oyo State)	Cross-sectional	Information literacy and CHP competence	Availability (workforce competence)
Oladayo et al. (2024)	Nigeria (multi-state)	Quasi-experimental pilot	Oral health education for CHWs/nurses	Utilisation, availability
Abdulla et al. (2024).	South Africa	Mixed-methods	Integrated community psychiatry in PHC	Continuity/timeliness of access
Liao et al. (2021).	China	Cross-sectional	Determinants of first PHC contact	Utilisation, accessibility
Zhu et al. (2024).	China	Health-system evaluation	PHC-focused reform	Affordability, equity of access

Wakida et al. (2018)	Uganda	Systematic review	Mental health–PHC integration	Availability, utilisation
Kimura et al. (2026).	Cambodia	Descriptive analysis	Community social prescribing for older adults	Utilisation, acceptability-linked access

C. *Characterisation of CHP-Led Interventions*

Across the 34 included studies, CHP-led interventions clustered around five recurrent models. Training and capacity-building interventions, the most frequently reported category, sought to strengthen CHP knowledge and clinical competence in a specific condition area, as exemplified by hypertension-focused ECHO-model training in Nigeria's Federal Capital Territory and malaria treatment-guideline training evaluated via propensity score matching (Baruwa et al., 2025). Home-visitation and outreach models, such as Bayelsa State's "home round" strategy, extended PHC's geographical reach by bringing CHP contact directly to households rather than requiring travel to a fixed facility. Digitally supported models used mobile and social media platforms to support patient communication, follow-up and triage, as documented among health practitioners in Cross River State and in rural digital health scoping evidence more broadly. Health education and community mobilisation interventions, including community-engaged cancer-control action research in Abia State and oral health education for nurses and CHWs, sought to shift demand-side barriers to access by improving health literacy and care-seeking behaviour. Finally, referral-strengthening interventions focused on formalising and improving the pathways linking CHP-delivered first contact to secondary and tertiary services, a theme evident in mental health integration reviews and kidney-care task-shifting evidence.

D. *Overall Effectiveness on PHC Access*

Nineteen studies contributed extractable quantitative data to the meta-analysis of overall PHC access. Pooling these estimates using a random-effects model yielded a statistically significant improvement in access among populations exposed to CHP-led interventions relative to usual care or no intervention (pooled OR = 1.98, 95% CI 1.62–2.41; $k = 19$ studies), with high statistical heterogeneity ($I^2 = 76.4\%$, $p < 0.001$), consistent with the clinical and contextual diversity of the included interventions. Sensitivity analysis excluding the four studies rated at high or critical risk of bias did not materially alter the direction or significance of the pooled estimate (adjusted OR = 1.91, 95% CI 1.55–2.36), suggesting the overall finding is reasonably robust. Visual inspection of the funnel plot showed mild asymmetry, and Egger's test was borderline non-significant ($p = 0.07$), indicating some, but not conclusive, evidence of small-study or publication bias.

E. *Effect on Specific Dimensions of Access*

Disaggregating the meta-analysis by access dimension revealed marked variation in effect magnitude and consistency, summarised in Table 3. Service utilisation showed the largest and most consistent pooled effect (OR = 2.14, 95% CI 1.71–2.68, $I^2 = 68\%$, $k = 13$), reflecting how often CHP-led programmes were explicitly designed to increase contact with the health system. Geographical accessibility, typically measured through reductions in

travel time or distance-related barriers, showed a moderate-to-large pooled standardised mean reduction (SMD = -0.54 , 95% CI -0.78 to -0.31 , $I^2 = 71\%$, $k = 8$), consistent with the explicit reach-extension logic of home-visitation and outreach models. Availability, capturing the presence of trained staff and essential commodities at the point of care, showed a moderate pooled effect (OR = 1.76 , 95% CI 1.32 – 2.35 , $I^2 = 64\%$, $k = 9$). Affordability-related outcomes, most often proxied by reductions in out-of-pocket expenditure or catastrophic health spending, showed a smaller though still significant pooled effect (OR = 1.39 , 95% CI 1.05 – 1.84 , $I^2 = 58\%$, $k = 6$). Timeliness of care, measured as waiting time or time first to contact, showed a moderate pooled reduction (SMD = -0.41 , 95% CI -0.66 to -0.16 , $I^2 = 55\%$, $k = 7$).

Table 3. Pooled random-effects estimates of CHP-led intervention effectiveness, by dimension of primary health care access

Access Dimension	Pooled Effect	95% CI	I^2	k (studies)
Overall access (composite)	OR = 1.98	1.62–2.41	76.4%	19
Service utilisation	OR = 2.14	1.71–2.68	68%	13
Geographical accessibility	SMD = -0.54	-0.78 to -0.31	71%	8
Availability	OR = 1.76	1.32–2.35	64%	9
Affordability	OR = 1.39	1.05–1.84	58%	6
Timeliness	SMD = -0.41	-0.66 to -0.16	55%	7

F. Comparative Effectiveness Against Usual Care and Alternative Models

Where studies explicitly compared CHP-led delivery with physician- or nurse-led usual care, CHP-led models generally achieved comparable or superior access outcomes, particularly for utilisation and geographical reach. However, usual-care comparators retained an advantage on measures more closely tied to clinical complexity and continuity of specialist follow-up, consistent with findings from advanced-practice-nurse scoping evidence showing complementary rather than substitutive roles for task-shifted cadres (Horton et al., 2025). Studies comparing CHP-led interventions with an alternative task-shifted cadre, for example, comparing CHEW-led with nurse-led hypertension education, found broadly similar effectiveness on access outcomes, suggesting that the specific identity of the task-shifted cadre may matter less than the intensity of training and supervision it receives (Baldrige et al., 2024; Moulton et al., 2024). Very few included studies ($k = 3$) compared a CHP-led intervention against a true no-intervention control, reflecting the ethical and operational difficulty of withholding a minimally invasive, community-based intervention in settings of documented unmet need; where such comparisons existed, effect sizes favouring the CHP-led arm were consistently larger than those observed in usual-care comparisons.

G. Moderators and Sources of Heterogeneity

Subgroup analysis identified several factors associated with variation in effectiveness. Intervention characteristics mattered substantially: interventions combining structured, competency-based training with active supervision (as in the ECHO-model hypertension programme) produced larger pooled effects than one-off training events without follow-up

support. Digital augmentation was associated with larger effects on timeliness and geographical accessibility specifically, but this benefit was concentrated in settings with adequate mobile network coverage, and effects attenuated in poorly connected rural areas. Population characteristics also moderated effectiveness: interventions targeting populations with high baseline unmet need, such as rural and peri-urban communities in Rivers and Bayelsa States, showed larger absolute gains than those implemented in already better-served peri-urban or urban populations. Geographical setting was a further moderator, with Sub-Saharan African studies showing somewhat higher heterogeneity than East Asian studies, plausibly reflecting greater variation in CHP training curricula and supervisory structures across African health systems. Finally, study design was associated with effect magnitude: quasi-experimental studies tended to report larger effect sizes than cross-sectional comparisons, consistent with residual confounding in non-randomised designs and reinforcing the need, discussed further in Section 5, for more rigorous experimental evidence in this field.

H. Evidence from Nigeria: A Sub-National Perspective

Because Nigeria contributed the largest single-country share of included studies, we further examined findings across its geopolitical zones to illustrate the practical heterogeneity underlying the pooled estimates. In the Federal Capital Territory, structured ECHO-model hypertension training for community health extension workers improved both the availability of blood-pressure management services and their utilisation by patients previously reliant on higher-level facilities. In Rivers State, South-South Nigeria, workforce-planning analysis using the WISN method revealed that, notwithstanding CHP-led service models, chronic under-staffing at primary-level facilities continued to constrain the availability dimension of access, illustrating that training and staffing investments must proceed together (Okoroafor et al., 2019). In neighbouring Bayelsa State, a “home round” outreach strategy directly targeted geographical accessibility by bringing CHP contact to households in riverine and hard-to-reach communities, while a separate Bayelsa-based study found that individual-level factors shaped CHPs' compliance with infection-prevention precautions, a quality dimension with downstream implications for the acceptability and safety of accessed care (Dotimi, 2023). In Cross River State, South-South Nigeria, evidence on health practitioners' use of social media for patient communication pointed to an emerging, low-cost mechanism for improving the timeliness of follow-up contact (Ikpi et al., 2022). In Abia State, South-East Nigeria, a community-engaged action research project on cancer control demonstrated how sustained community mobilisation by CHPs can shift population-level acceptability and, indirectly, service uptake (Eguzo, 2022). In Oyo State, South-West Nigeria, evidence from Ibadan showed that CHPs' own access to professional health information was itself a determinant of the competence, and by extension the effectiveness, of the care they delivered, a reminder that access is shaped not only by what communities can reach, but by what practitioners themselves are equipped to provide (Adedokun, 2022). Read together, this sub-national evidence base shows that while the direction of effect is consistently positive across Nigeria's zones, the specific access dimension most improved and the scale of improvement achieved depend heavily on local staffing levels, supervisory intensity, and the specific design of the CHP-led intervention deployed.

I. Quality Appraisal Summary

Of the 34 included studies, six (17.6%) were assessed as low overall risk of bias, 22 (64.7%) as moderate risk, and six (17.6%) as high or critical risk, most commonly reflecting confounding in quasi-experimental designs and selective outcome reporting in cross-sectional studies. No included study was assessed as low risk of bias across all RoB/ROBINS-I domains simultaneously, reflecting the broader methodological limitations of the primary evidence base for this field, as discussed further in Section 5.

VI. DISCUSSION

This systematic review and meta-analysis found that CHP-led interventions are associated with a near doubling of the odds of improved access to primary health care across the included LMIC studies, with the strongest and most consistent gains concentrated in service utilisation and geographical accessibility, and more modest, heterogeneous gains in affordability and timeliness. This pattern is consistent with, and quantitatively extends, the qualitative conclusion of prior task-shifting reviews that mid-level and community-based cadres can meaningfully ease workforce-driven access constraints without a wholesale substitution of physician-led care (Leong et al., 2021; Horton et al., 2025). The comparatively smaller effect observed for affordability is unsurprising: CHP-led interventions in the included studies were predominantly designed to extend service reach and improve care-seeking behaviour rather than directly restructure the financing mechanisms, user fees, insurance coverage, or transport subsidies that most directly determine affordability. This suggests that CHP deployment is a necessary but not sufficient lever for closing the affordability dimension of the access gap, and that it functions most powerfully when paired with complementary financial-protection mechanisms. This conclusion echoes evidence from China's PHC-focused reforms, where financial protection gains were attributed to combined service-delivery and financing interventions rather than workforce changes alone (Zhu et al., 2024).

The sub-national Nigerian evidence adds an important layer of nuance often absent from single-country or purely national-level analyses. Despite Nigeria's disaggregated evidence being drawn from very different intervention types, structured clinical training in the Federal Capital Territory, outreach-based home visitation in Bayelsa State, and digitally supported patient communication in Cross River State (Ikpi et al., 2022), the direction of effect on access was consistently positive across zones. However, the Rivers State workforce-planning evidence is a critical qualifier: even well-designed CHP-led service models cannot fully overcome access barriers rooted in absolute staffing shortfalls. This indicates that intervention design and workforce adequacy are complementary, not substitutable, levers, a distinction with direct relevance for how Nigeria's Basic Health Care Provision Fund and similar domestic financing mechanisms in other LMICs allocate resources between training/programming and core staffing.

The subgroup analysis identifying training intensity, supervision, digital augmentation, and baseline population need as moderators of effectiveness aligns closely with the determinants-of-effectiveness literature, which similarly identifies managerial coordination,

funding adequacy, and continuity as key mechanisms linking PHC inputs to access outcomes. The finding that digital augmentation strengthens timeliness and geographical accessibility, but only where connectivity infrastructure permits, aligns with infrastructure-dependent uptake patterns observed when comparing rural LMIC digital health scoping evidence with high-income-country digital primary care implementation. This reinforces caution against treating “digital health” as a uniformly transferable solution: its marginal contribution to access depends on infrastructural preconditions that are unevenly distributed within, and not only between, LMICs.

This review has several strengths. It is, to the authors' knowledge, the first review in this field to apply PRISMA 2020 methodology together with a formal random-effects meta-analysis disaggregated across the five recognised dimensions of PHC access, moving beyond the narrative and scoping-review tradition that has dominated prior syntheses of CHP-led interventions. It also deliberately foregrounds sub-national Nigerian evidence alongside the broader LMIC literature, addressing the geographic fragmentation identified in Section 2 and producing findings directly relevant to Nigeria's federated health-financing architecture. Several limitations, however, warrant caution in interpreting the pooled estimates. First, the primary evidence base remains dominated by quasi-experimental and cross-sectional designs, with very few cluster-randomised trials; the resulting risk of residual confounding, reflected in the moderate-to-high risk-of-bias ratings for most included studies, means the pooled effect sizes should be interpreted as indicative rather than definitive. Second, the high statistical heterogeneity ($I^2 = 76.4\%$ for the overall pooled estimate) reflects genuine clinical and contextual diversity across interventions and settings, and readers should attend to the disaggregated, dimension-specific estimates in Table 3 rather than the composite figure alone. Third, restriction to English-language publications may have excluded relevant Francophone West African and Latin American evidence, and the borderline result of Egger's test leaves some residual uncertainty about publication bias. Finally, the inherent heterogeneity in how individual studies operationalized each access dimension means that pooled estimates, while statistically derived, necessarily average across somewhat different underlying measures.

Notwithstanding these limitations, the consistency of direction, if not magnitude, of effect across 34 methodologically diverse studies spanning multiple LMIC regions and six Nigerian states provides reasonably robust evidence that CHP-led interventions are an effective, generalizable strategy for improving access to primary health care, and that their effectiveness is systematically shaped by identifiable, and therefore policy-addressable, moderators. This is precisely the evidentiary gap identified in Section 2: prior reviews have documented that CHP-led interventions “work” within specific disease domains, but this review is the first to quantify, across multiple access dimensions and across Nigeria's diverse sub-national contexts, how much they work and under what conditions, evidence that matters directly for how governments and donors allocate scarce resources between CHP training, supervision, staffing and digital infrastructure investments.

A. Contribution to Knowledge

This review contributes new, policy-usable knowledge in three respects. It provides the first quantitatively pooled, multidimensional estimate of CHP-led intervention effectiveness on access to primary health care in LMICs, moving the evidence base beyond disease-specific

and narrative synthesis toward comparable, dimension-specific effect sizes that can directly inform resource allocation. It generates a sub-national evidence synthesis for Nigeria that brings together previously scattered, single-state findings from Rivers, Bayelsa, Cross River, Abia, Oyo and the Federal Capital Territory into a single comparative framework, offering Nigerian health authorities an evidence base tailored to the country's federated system of health governance. Finally, by explicitly identifying training intensity, supervision, digital infrastructure and baseline population need as moderators of effectiveness, it offers programme designers a set of actionable levers, rather than a single undifferentiated conclusion that CHP-led care “works”, thereby equipping public health decision-makers and the wider public with a clearer, evidence-based understanding of when and how community health practitioner-led care most effectively closes gaps in access to essential health services.

VII. CONCLUSION

Community Health Practitioner-led interventions produce a statistically significant, moderate-to-large improvement in access to primary health care across low- and middle-income countries, with the strongest gains in service utilisation and geographical accessibility and comparatively more modest gains in affordability and timeliness. Evidence drawn from six Nigerian states confirms that these gains are achievable across diverse sub-national contexts, but are consistently moderated by training intensity, supervisory support, staffing adequacy and, where digital tools are deployed, and underlying connectivity infrastructure. Sustained investment that pairs CHP training and supervision with adequate staffing and infrastructure, rather than any single lever in isolation, offers the most promising pathway to closing the persistent PHC access gap that continues to affect millions of people across low- and middle-income settings.

RECOMMENDATIONS

- Health policymakers and Primary Health Care Development Agencies, including Nigeria's National and State Primary Health Care Development Agencies, should institutionalise standardised, competency-based training curricula and structured supervisory support for community health practitioners, since the pooled evidence indicates that supervised, competency-based training consistently outperforms one-off training events in improving access outcomes.
- Domestic and donor financing mechanisms, including Nigeria's Basic Health Care Provision Fund, should jointly prioritise core CHP staffing adequacy alongside programmatic training investments, since workforce-planning evidence from Rivers State demonstrates that intervention design alone cannot compensate for absolute staffing shortfalls.
- Digital augmentation of CHP-led service delivery should be scaled deliberately and infrastructure-first, prioritising areas with adequate connectivity, given that the observed access gains from digital tools were concentrated in well-connected settings and attenuated in poorly connected rural communities.
- Future primary research in this field should adopt more rigorous designs, particularly cluster-randomised trials with pre-specified, standardised measures of utilisation,

availability, geographical accessibility, affordability and timeliness, to strengthen the causal evidence base and enable more precise, less heterogeneous meta-analytic synthesis in future reviews.

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