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Costs and cost-effectiveness of community health worker programmes focussed on non-communicable diseases in low- and middle-income countries (2015–2024): a scoping literature review

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ABSTRACT

Background Non-communicable diseases (NCDs) are the leading cause of death and morbidity worldwide, responsible for 7 out of 10 deaths, 86% occurring in low- and middle-income countries (LMICs). As the NCD burden on health systems increases, community health workers (CHWs) have become increasingly involved in NCD care provision and management. This study updates a 2015 review to synthesise and critically analyse the recent evidence base on the cost-effectiveness and affordability of CHW programmes addressing NCDs in LMICs.

Methods A scoping review searched 10 databases and the grey literature for original studies published between August 2015 and July 2024. Recognised search terms related to 'Community Health Workers' and 'Economic Evaluation(s)' in LMICs were used. Covidence software was employed to screen studies based on inclusion and exclusion criteria. Data on study methodology, costs and cost-related outcomes were then extracted, tabulated in a data-extraction form and analysed using Microsoft Excel.

Results We identified 20 studies with 52 different scenarios covering five areas: cardiovascular disease including hypertension (n=22 scenarios); human papillomavirus and cervical cancer screening (n=13); diabetes (n=12); mental health (n=4); and behavioural risk factors (n=1). Of the 44 scenarios assessing cost-effectiveness, 35 scenarios suggest that CHW programmes are cost-effective. 11 studies compared CHW programmes against an alternative (usual care) to generate an incremental cost-effectiveness ratio, evaluated against the country's gross domestic product per capita. Methodological heterogeneity across studies and inconsistencies or data gaps in reporting (most importantly the lack of CHW salary information) limits the usefulness of the data. Few studies assessed affordability, despite being equally relevant to decision-making.

Conclusions More studies including economic evaluations (particularly for NCDs not found in our review), along with more robust and consistent reporting are needed.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Community health worker (CHW) programmes have shown effectiveness in addressing various health issues, including non-communicable diseases (NCDs).
⇒ However, the economic evaluations and affordability of these CHW programmes for NCDs remain understudied.
⇒ A 2015 review by Vaughan *et al* identified only three economic evaluations of CHW-led NCD programmes, highlighting significant methodological challenges and a lack of comprehensive evidence on cost-effectiveness in this area.

INTRODUCTION

Non-communicable diseases (NCDs), including heart disease, stroke, cancer, diabetes, chronic lung disease and mental health disorders, are long-term, non-contagious health conditions.[1] They are the leading cause of death and ill health, responsible for 7 out of every 10 deaths worldwide. Notably, 86% of these deaths occur in low- and middle-income countries (LMICs), where health systems often lack the resources and infrastructure to manage these long-term, complex conditions and patients/communities bear high out-of-pocket payments. Without decisive action to reverse this trend,

WHAT THIS STUDY ADDS

⇒ Our review identified 20 studies published between 2015 and 2024, covering 52 scenarios across five NCD categories: cardiovascular disease (CVD) including hypertension (n=22), human papillomavirus (HPV) and cervical cancer screening (n=13); diabetes (n=12); mental health (n=4); and behavioural risk factors (n=1).

⇒ Incremental cost-effectiveness ratios for CHW-led interventions ranged from being dominated to US$4080 per disability-adjusted life year averted and from US$57 to US$13191 per quality-adjusted life year gained.

⇒ CHWs' roles were typically limited, focusing on discrete tasks like screening or education.

⇒ Studies across four categories of NCDs in low- and middle-income countries: CVD including hypertension; diabetes; HPV and cervical cancer and mental health generally concluded that CHW programmes were cost-effective against a gross domestic product per capita threshold, the validity of which is increasingly debated.

⇒ Few studies assessed affordability, and CHW compensation details were often not fully reported, limiting a comprehensive assessment of cost-effectiveness.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Economic evaluations of critical CHW-led NCD interventions remain fragmented, with limited data on the cost-effectiveness of specific CHW roles (eg, administrative vs service delivery) and certain disease areas (eg, respiratory NCDs and non-cervical cancers).

⇒ This lack of comprehensive evidence poses challenges for governments and non-governmental organizations (NGOs) in planning and implementing NCD programmes.

⇒ Task sharing or shifting NCD management to CHWs cannot be assumed cost-effective without a more detailed assessment of affordability.

⇒ Methodological improvements and more comprehensive reporting—particularly regarding CHW compensation and affordability—are needed to inform evidence-based policy decisions and optimise CHW integration in NCD management.

⇒ Cost-effectiveness is more likely when vertical NCD interventions are bundled within horizontal, integrated healthcare programmes.

annual deaths from NCDs are projected to rise to 52 million by 2030.[2–5]

Exacerbating this challenge is the projected shortfall of 10 million health workers by 2030,[6] and expected NCD-related costs totalling US$30 trillion between 2011 and 2030. Identifying effective interventions for NCD control that are affordable and accessible to those who need them most has therefore become a global priority and development imperative.[7–9]

One practical and potentially cost-effective (CE) solution lies in unlocking the potential of community health workers (CHWs) by enabling them to carry out tasks typically performed by nurses and doctors.[10–13] While CHWs have been around for nearly a century, their emergence as a professional occupational group (proCHWs) who are salaried, skilled, supervised and supplied in line with WHO guidelines is gaining momentum.[14]

CHWs are uniquely situated to focus on NCD prevention and management given their positionality at the intersection between communities and the formal health system.[15 16] They serve as a vital link, ensuring that prevention and management efforts are both accessible and culturally relevant. This aligns with broader efforts to strengthen primary healthcare and helps to prevent individuals from falling through systemic gaps common in NCD management—such as limited access to healthcare services, fragmented care and inadequate follow-up.[17 18] Evidence attests to CHW-led programmes succeeding in promoting healthy lifestyles to reduce risk factors for heart disease[19 20] and diabetes,[21] conducting community-based screenings for conditions like hypertension[22 23] and cancer,[24 25] facilitating referrals to specialised services,[26] delivering mental health interventions[27] and addressing behavioural risk factors like tobacco use[28] and physical inactivity.[29]

While the literature suggests that CHWs offer great potential for NCD prevention and management in LMICs, a systematic and comprehensive evaluation of the costs and cost-effectiveness of CHW-led NCD programmes has been lacking. The most recent study to broadly review the costs and consequences of CHW programmes in LMICs was a scoping review by Vaughan *et al*[30]; identifying 36 economic evaluations of various CHW programmes, it concluded that CHWs may be a CE approach in some settings. However, this review did not focus specifically on NCDs and found only three NCD-related studies. That review also highlighted significant heterogeneity and methodological challenges in existing economic evaluations, making it difficult to draw definitive conclusions about the cost-effectiveness of these programmes.

This study aims to address this gap in the literature by providing an updated overview of the evidence on the costs, cost-effectiveness and affordability of CHW programmes for NCDs in LMICs between 2015 and 2024. Additionally, it assesses the methodologies used in these evaluations and examines how costs, cost-effectiveness and affordability are reported, with the goal of identifying best practices and areas for improvement. By fulfilling these objectives, this research intends to enhance the understanding of the economic value of CHW programmes supporting NCD management and prevention and to support evidence-based decision-making for community health system strengthening.

METHODS

Nature of review

This analysis forms part of a broader scoping review that systematically mapped evidence on economic evaluations of CHW programmes in LMICs between 2015 and 2024 (protocol registered on the Open Science Framework, July 2023).[31] Given the large and heterogeneous body of evidence identified, findings are presented through a series of disease-specific papers to enable clearer synthesis and comparison.[32] The present paper focuses on vertical CHW programmes addressing NCDs and limits inclusion to single-disease interventions (eg, hypertension-specific

initiatives). A scoping review was chosen given the broad and varied nature of the field[30 33] and methods followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews guidelines; the checklist is provided in online supplemental material S2.[34]

Search strategy and study selection criteria

The search strategy and database list were identical to those used in the first review published from this series (see O'Donovan *et al*, 2025 for full search strings and database coverage).[32] Briefly, searches were conducted across major health and social science databases and complemented by a comprehensive grey literature search including repositories such as Google Scholar, BASE and DART-Europe. The search strategy included all appropriate controlled vocabulary and keywords for 'Community Health Workers', 'Economic Evaluations' and 'LMICs', which are defined below. Reference lists of included studies were reviewed to identify any additional studies missed by database searches. Full search strategies are available in the online supplemental material S4. The initial search covered January 2015 to July 2023 and was updated to include publications up to July 2024.

Definitions

Operational definitions for CHWs, economic evaluations and how we classified LMICs followed those outlined in the first review.[32] In brief, CHWs were considered individuals primarily based in the community providing primary healthcare services, who are trained and integrated within the health system (ie, government or NGO supported) but do not hold tertiary-level professional degrees.[35 36]

Both full and partial economic evaluations were included, consistent with Drummond *et al* definitions.[37–39] LMIC status was determined according to the World Bank classification at the time costs were reported.[40]

Inclusion and exclusion criteria

Studies were eligible for inclusion if they met all the following conditions:

- The intervention under evaluation was delivered primarily by CHWs, rather than by other cadres such as nurses, physicians or midwives.
- The programme was disease-specific, focusing on a single NCD or risk factor (eg, hypertension-only initiatives).
- The publication reported findings from a full or partial economic evaluation, providing cost data and at least one measurable outcome.
- The study was conducted in an LMIC as classified by the World Bank in the year in which costs were estimated.
- The article was published between August 2015 and July 2024, following on from a previous review that covered evidence up to mid-2015.

Studies were excluded if they:

- Focused solely on other health professionals or cadres, or that did not involve CHWs in intervention delivery.
- Presented only commentaries, editorials, protocols, opinion pieces, policy briefs or conference abstracts. Although systematic reviews were excluded from synthesis, their reference lists were screened for potentially eligible primary studies.
- Examined the economic implications of digital enhancements or mobile health add-ons to CHW programmes, as this analysis concentrated on the cost-effectiveness of CHW-led service delivery itself.

No language restrictions were applied: while searches were conducted in English, full texts were reviewed in any language available. Studies were not excluded based on methodological quality, reflecting the scoping nature of this review and the aim to capture the full breadth of existing evidence. A detailed description of the eligibility framework is provided in online supplemental appendix S3.

Screening and data extraction

Screening and extraction followed the same multi-reviewer process described in the first review.[32] In summary, titles and abstracts were screened and duplicates removed using Covidence software; two reviewers assessed each record independently, and disagreements were resolved by a third reviewer.[41] Quality control checks were held at random to ensure accuracy.

Data were extracted into a standardised Excel template capturing study characteristics, cost data and reported outcomes.

Outcomes were categorised into five domains:

1. Service provision (eg, visits, number of medications distributed, number of household visits);
2. Population coverage (eg, households covered);
3. Mortality and morbidity outcomes (eg, reduction in mortality, lives saved);
4. Cost savings and cost recovery outcomes (eg, amount of money saved); and
5. Societal outcomes (eg, economic growth).

Cost data were grouped as: (1) cost per CHW; (2) cost per consultation; (3) cost per service; (4) cost per capita; or (5) cost per beneficiary. Where available, we extracted cost per outcome estimates such as cost per disability-adjusted life year (DALY) averted or cost per quality-adjusted life year (QALY) gained. All costs were converted to and reported in 2024 US dollars using currency conversion and inflation adjustment procedures detailed in O'Donovan *et al* (2025).[32]

Cost-effectiveness was assessed using either explicit thresholds (eg, willingness to pay or gross domestic product (GDP)/capita) or a comparison against alternative services or standard care. Affordability was determined based on whether authors discussed the interventions budgetary implications or conducted a budget impact analysis.

Patient and public involvement

Patients and the public were not consulted as part of this scoping review.

Ethics approval

A self-assessment was conducted via the University of Washington Human Subjects Institutional Review Board (IRB) which determined that this study was not human subjects research and did not require IRB review.

RESULTS

Search results

The initial broader search (which included NCDs but also other health areas) yielded 9790 articles, which were reduced to 5663 after the removal of duplicates. 5345 studies were excluded following abstract screening, and an additional 170 were excluded after full-text review. After coding studies by disease area, this process resulted in 20 studies being included in this review, representing 52 scenarios (table 1). Further details can be found in the PRISMA flow chart (figure 1).

The following five subsections present cost and cost-effectiveness findings by type of NCD: cardiovascular disease (CVD) including hypertension; diabetes; human papillomavirus (HPV) and cervical cancer; mental health; and behavioural risk factors. Each section describes the CHW programmes and alternatives assessed and reports relevant cost, cost-effectiveness and affordability findings. For cost-effectiveness, we report the incremental cost-effectiveness ratios (ICERs) converted to 2024 US dollars. An ICER reports the difference in total costs (incremental cost) divided by the difference in the chosen measure of health outcome or effect (incremental effect) to provide a ratio of 'extra cost per extra unit of health effect'. The included studies measured health outcomes in both DALYs (n=14 scenarios) and QALYs (n=14 scenarios).

Tables 1–3 summarise the design and operational details of each CHW intervention, including programme descriptions, CHW roles and comparators, while tables 4 and 5 present the economic evaluation results, detailing country context, population served, CHW compensation, costs per beneficiary, cost-effectiveness metrics (including ICERs) and affordability conclusions.

Cardiovascular disease

We identified five studies focused on CVD (including hypertension), representing 22 scenarios, conducted in nine countries (three upper-middle-income,[42] four lower-middle-income[43 44] and two low-income countries[45 46]) across four regions.

The CVD interventions under study were heterogeneous in design (see table 1), involving CHW workforces ranging from 52 to 122 000 and targeting populations from 49 000 to over 13 million individuals. The roles of CHWs within these studies were diverse, from involvement only in hypertension screening[42] to providing holistic service packages including conducting screenings (n=12), ongoing management and monitoring of patients (n=16), offering outreach, education or training to patients (n=16), referring complex cases (n=15) and administration, logistics and management (n=1).

The compensation of CHWs also varied. In two studies, CHWs were salaried, although the specific amounts were not provided. In one study, CHWs received a stipend, and in another, the costing accounted for hypothetical remuneration equivalent to the national minimum wage, reported as US$66/month. One study did not report any details about CHW compensation.

Four out of the five studies, representing 21 scenarios, assessed cost-effectiveness by comparing the CHW intervention against usual care. In these studies, the ICERs ranged from US$411 per DALY averted in Nepal to US$4080 in Sri Lanka; for QALYs, one ICER was cost-saving while the highest was US$1890. As assessed by the study authors, all interventions were cost-effective, most commonly using GDP per capita as the threshold. The cost per capita of the interventions ranged from US$0.23 to US$1.33. Only one paper assessed affordability, concluding that its multicomponent hypertension management programme would require a 3–10% increase in the health budget depending on the country.[43]

Cervical cancer and human papillomavirus

We identified five studies focused on cervical cancer and HPV, representing 13 scenarios. The studies were conducted in four countries, including three middle-income countries[47–50] and one low-income country.[52]

Only three cervical cancer and HPV interventions reported on the number of CHWs involved, ranging from 10 to 68 (median: 30) and targeting populations from 250 to 1002 (median: 584) or the exact number not reported but including the 18% of women aged 30–59 years unable or unwilling to be screened at clinic.[50] The roles of CHWs within these studies included providing administrative and supply chain management and logistics (n=4), often including distributing HPV self-test kits; conducting HPV screenings (n=2); ongoing management and monitoring of patients (n=1); offering outreach, education or training to patients (n=6); and providing referrals (n=2). In two studies, CHWs were salaried, with only one reporting the specific monthly salary (US$512).[50] In two studies, CHWs received an unspecified stipend. One study did not report any details about CHW compensation.

Three studies were full economic evaluations (cost-effectiveness analyses) and two were partial economic evaluations.[47 48] The comparators in these studies were either clinical-based testing (n=2) or community health campaigns (n=3).

In these studies, there was no reporting of ICERs per DALY or QALY averted, although one paper[49] reported on an ICER per woman screened of US$6.45 and another[50] reported on ICER per life year saved of US$1210 (home visits) and US$770 (clinical-based). Four studies, representing 11 scenarios, assessed cost-effectiveness. Six of these scenarios were deemed CE by

Table 1 Details of CHW roles and scenarios in included studies on NCDs

Intervention description	Scenarios description	Role of CHW	Comparator
CVD and hypertension			
COBRA-BPS hypertension management programme[43]	Nine scenarios: Bangladesh, Pakistan and Sri Lanka over 3 years, considering coverage levels (60%–100%) and annual costs.	Home health education, blood pressure monitoring, referral services	Usual care: CHWs focus on maternal/child care only
Community-based hypertension control in Vietnam plus three trial enhancements[44]	One scenario	Patient education, home self-monitoring support, facilitate storytelling interventions	Usual care: national hypertension programme
CDCom programme: a 10-year initiative for management of hypertension and NCDs in Uganda[45]	One scenario	Biannual door-to-door screenings, monthly patient management clinics, patient education, medication delivery, referral of complex cases	N/A
CVD screening by CHWs in low-resource countries[42]	Six scenarios: South Africa, Guatemala and Mexico evaluated paper-based or mobile phone-based tools.	Community-based CVD screening	Usual care: clinical-based screening
Community-based management of hypertension in Nepal (COBIN study)[46]	Five scenarios: one targeting only adults with hypertension, and four expanding to all adults, with variations by year (1–3) and whether the model relies on standalone implementation or existing CHWs.	Blood pressure screening, healthy lifestyle counselling, referral, medication adherence follow-up, home visits 3×annually	Usual care: current community-level hypertension management
Cervical cancer and HPV			
ASPIRE trial: HPV screening programme in Uganda[73]	Six scenarios: by screening frequency (once, three times or five times) and method (self-collection vs clinical-based triage).	Educate women on how to self-screen, sample transport, results delivery	Standard clinical-based VIA without CHW involvement.
HPV testing in rural Western Kenya[47]	Two scenarios: testing via CHCs or home visits for women not screened during campaigns.	Door-to-door mobilisation, patient education, home visits to notify results	CHCs home-based testing
HPV screening in rural Kenya[48]	Two scenarios: through government clinics or via community health campaigns.	Outreach via door-to-door mobilisation and posters, group education, consent and distribution of self-collection kits	Government clinical-based screening
Recruitment strategies to promote uptake of cervical cancer screening in the west region of Cameroon[49]	One scenario: CHWs paid per woman recruited.	Recruitment and awareness, prevention counselling, community engagement, logistical support, referral and follow-up	Recruitment via community information channels (media, banners, posters)
HPV self-collection in El Salvador[50]	Two scenarios: home-based vs clinical-based HPV screening.	Home visits for education, distribution of self-collection kits, sample transport logistics, results delivery and referrals	Clinical-based HPV testing
Diabetes			
Community groups or mobile phone messaging to prevent and control type 2 diabetes and intermediate hyperglycaemia in rural Bangladesh (DMagic)[55]	One scenario: mHealth intervention/community mobilisation for diabetes prevention/control in adults aged 30+.	Led group sessions, recruited and mobilised community members	Usual care: healthcare seeking in government/private facilities with limited preventive campaigns

Continued

Table 1 Continued

Intervention description	Scenarios description	Role of CHW	Comparator
Culturally tailored CHW programme to improve management of type 2 diabetes mellitus in American Samoa[53]	One scenario	Home visits for education, behavioural support, medication adherence support	Usual care: standard medical treatment at local health facilities
Diabetes group education programme, consisting of four sessions, delivered in underserved communities in Cape Town, South Africa[52]	Four scenarios: modelled on whether the benefits occurred once, persisted indefinitely, diminished over time or were repeated annually.	Conducted group education sessions, coordinated logistics, monitored progress.	Usual care: screening, monthly monitoring, medication delivery, patient referral
12-month lifestyle intervention in high-risk individuals for diabetes in India; Kerala Diabetes Prevention Programme[54]	Two scenarios: evaluated from health system and societal perspectives.	Facilitated 15 community support group sessions	No intervention beyond a lifestyle advice booklet
Lifestyle Africa: a group diabetes education prevention programme in urban South Africa[51]	Our scenarios: annual intervention with persistent benefits, one-time intervention with persistent benefits, one-time intervention with benefits lasting 1 year and one-time intervention with benefits gradually declining over 3 years.	Delivering 17 weekly in-person group sessions, usual care (monthly monitoring of weight, blood pressure and blood glucose). Referrals	Usual care: monthly monitoring, medication delivery, referrals

CHCs, community health campaigns; CHWs, community health workers; CVD, cardiovascular disease; HPV, human papillomavirus; mHealth, mobile health; NCDs, non-communicable diseases; PLA, Participatory Learning and Action; VIA, visual inspection with acetic acid.

authors, most commonly using comparison to alternative as the threshold. The cost per capita of the interventions ranged from US$6.82 to US$110.06. None of the studies assessed affordability.

Diabetes

We identified five studies focused on diabetes, representing 12 scenarios conducted in the middle-income countries of South Africa (n=2),[51 52] American Samoa (n=1),[53] India (n=1)[54] and Bangladesh (n=1)[55] across three regions.

The diabetes interventions under study were heterogeneous in design. Only the study from Bangladesh documented the number of CHWs involved in the programme (n=16), and target populations across the studies ranged from 268 to 125 000 individuals (median: 1107). The roles of CHWs within these studies were diverse, including conducting screenings (n=1),[51] ongoing management and monitoring of patients (n=2), (57.59) offering outreach, education or training to patients (n=8),[51 52 54 55] referring complex cases (n=1)[51] and administration or logistics (n=1).[51] CHW compensation also varied. In one study, CHWs were salaried[52] and in another, CHWs received a stipend,[51] although the specific dollar amounts were not specified. In the remaining three studies, CHW compensation was not documented.

All four studies, representing nine scenarios, assessed cost-effectiveness. Three studies did so through a comparison against usual care[51–53] and one through both usual care and an mHealth intervention.[55] The remaining study compared the CHW intervention to providing participants with a booklet highlighting lifestyle advice.[54] In total, five out of nine scenarios across the studies were deemed CE using either GDP per capita or a combination of willingness to pay and GDP per capita as thresholds, and ICERs ranging from US$57.09 per QALY gained in India to US$13 191 in American Samoa (median: US$983.49). One scenario drew no conclusions about cost-effectiveness.[51] The remaining study from South Africa[52] presented four distinct scenarios; the scenario where the intervention is repeated annually and the benefits persist over time was determined to be CE using GDP per capita as the threshold. This scenario closely reflects how the intervention would be implemented within health services and is of most interest to decision-makers. The other three scenarios, which involved the intervention being performed only once with benefits either limited to that year, persisting indefinitely or gradually decreasing over 3 years, were not found to be CE.

Where reported (n=3), the annual cost per capita ranged from US$176.39 in Bangladesh[55] to US$367.80 in India (median: US$303.60)[54] and the annual cost per beneficiary (n=6) ranged from US$22 in South Africa[52] to US$411.57 in Bangladesh (median: US$22).[55]

No studies assessed affordability of CHW-led diabetes interventions.

Mental health

We identified four studies, representing four scenarios, on mental health in Uganda,[56 57] Kenya[58] and Zimbabwe.[59] The

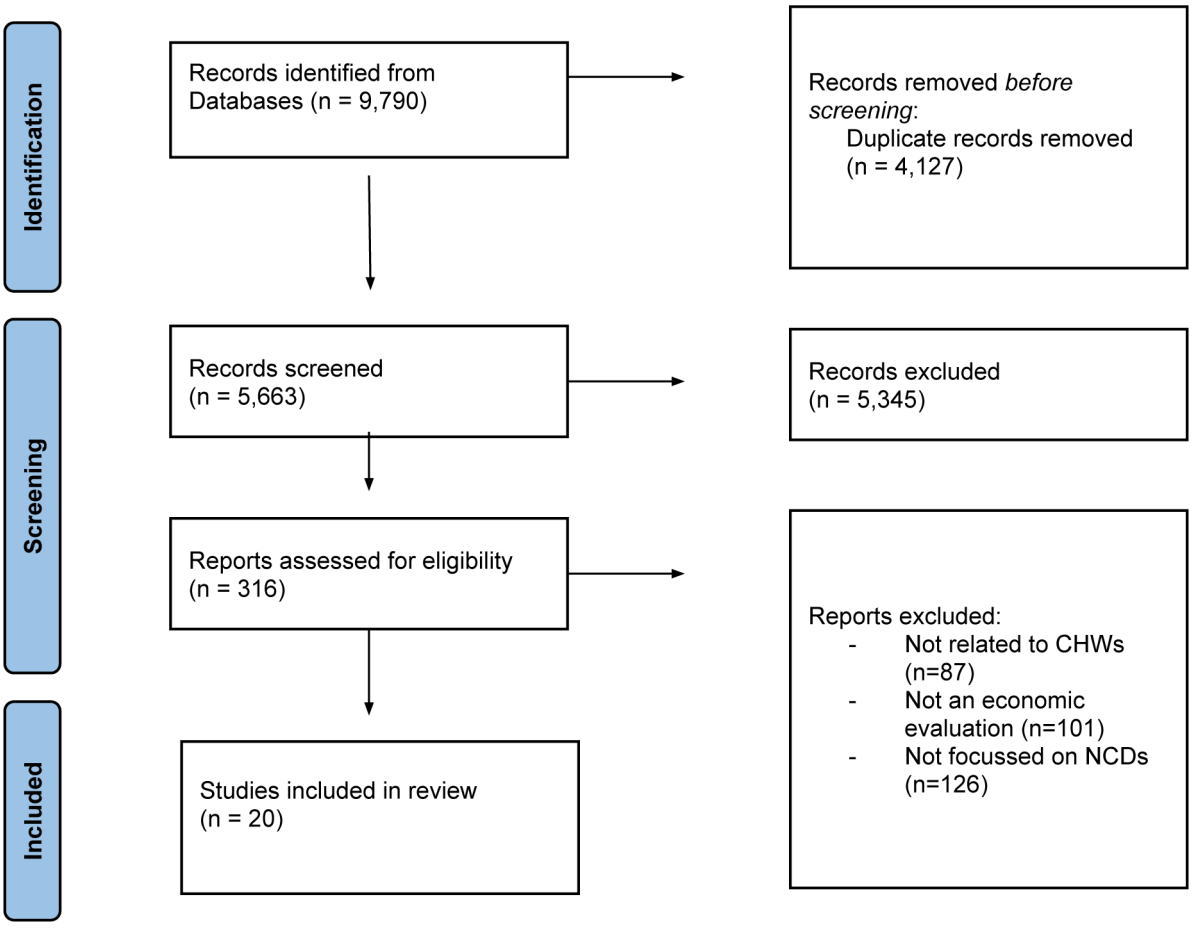

Figure 1 PRISMA flow chart. CHW, community health worker; NCD, non-communicable disease; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

interventions were similar in design, typically employing CHWs to deliver outreach, education and training[56–58] and to provide psychological counselling therapies.[56 57 59] Two interventions were school-based, targeting child and adolescent mental health[56 58] and two focused on adults.[57 59]

Most interventions aimed to address common mental health disorders such as depression and anxiety.[57–59] The CHW workforce in these studies ranged from 12 to 340 workers (median: 115), targeting populations from 205 to 12 364 individuals (median: 4986). One study did

Table 2 Details of CHW roles and scenarios in included studies on mental health

Intervention description	Scenarios description	Role of CHW	Comparator
SMART Africa: an intervention to improve child and adolescent behavioural health in Uganda through multiple family group intervention delivered in schools by CHWs or parents peers[56]	One scenario	Facilitated sessions, recruited, educated and mobilised families	Comparator: bolstered standard care (mental health wellness materials only)
Shamiri intervention: CHWs delivered a brief, group-based mental health programme to reduce depression and anxiety in adolescents in Kenya[58]	One scenario	Conducted 4 weekly group sessions teaching mental health concepts	Active study skills programme
Friendship Bench: provision of therapy on a bench within clinic grounds for common mental disorders in Zimbabwe[59]	One scenario	Six sessions of problem-solving therapy, initial clinical assessments, peer-led support groups and patient mobilisation talks	Usual care without the Friendship Bench intervention
Group support psychotherapy to people in Uganda with HIV to address depression and coping skills in Uganda[57]	One scenario	Administered group mental health therapy	Group HIV education

CHW, community health worker.

Table 3 Details of CHW roles and scenarios in included studies on behavioural risk factors

Intervention description	Scenarios description	Role of CHW	Comparator
Community-based smoking cessation services in Vietnam[74]	One scenario	Three sessions of home-based smoking cessation counselling, in follow-up to clinical-based support.	Facility-based counselling (without CHW follow-up)

CHW, community health worker.

not report details on the target population. Only one programme paid CHWs a salary, while the other three provided stipends, though none of the studies reported the specific amounts paid.

Three studies conducted full cost-effectiveness analyses. The fourth performed a cost analysis and found that the CHW-led family group intervention had similar costs compared with the parent-led intervention but achieved higher family attendance.[56] The remaining studies all concluded the interventions were CE, including the Friendship Bench programme in Zimbabwe with an ICER of US$191 per year lived with disability (which is one part of a DALY measurement) averted,[59] CHWs treating depression among people living with HIV in rural Uganda with an ICER of US$13 per DALY averted,[57] and CHWs effectively reducing depression and anxiety symptoms in students with costs ranging from US$48.28 to US$172.72 per clinically significant improvement.[58] No studies assessed affordability.

Behavioural risk factors

We identified one study with a single scenario focused on an unspecified number of CHWs providing support for smoking cessation in Vietnam.[62] It was not specified how CHWs were compensated.

The study estimated that smoking cessation delivered by CHWs cost US$2.20/counselling session for home-based counselling by a CHW, or US$12.08 per counselling session and US$16.47 per smoker counselled when facility-based counselling by a provider is also included. The study did not draw conclusions about cost-effectiveness or affordability, though noted that the inclusion of CHW-led counselling, while increasing costs, did improve quit rates compared with provider counselling alone.

Methodological findings across all studies

In this section, we summarise selected methods-related findings across all included studies (n=20) and scenarios (n=52). Despite the majority of studies being full economic evaluations (n=15), only four studies reported using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist,[60] while one study reported following HPV-FRAME reporting standards.[61] Best practices according to these checklists, like clearly reporting study perspective and conducting sensitivity analysis, were also lacking in a few studies: 4 of the 20 did not report study perspective and 5 of the 20 did not conduct a sensitivity analysis. Of those studies that reported the study perspective (n=40 scenarios from 16 studies), 'health system' was the most popular perspective (n=19 scenarios), followed by societal perspective (n=15 scenarios). Of those studies that did not clearly report the study perspective (n=9 scenarios from four studies), the majority of scenarios were again 'health system' (n=6 scenarios).

Nearly half (n=24) of scenarios were based on a time horizon of more than 1 year, 18 scenarios used a 1 year time horizon and the remaining 7 scenarios used a time horizon of less than 1 year.

We found some variability across studies and scenarios in the inclusion of different cost categories. All scenarios included some recurrent costs, most scenarios including costs of training (n=43) and non-training capital items (meaning items used over 1 year, such as equipment) (n=included training (n=41). However, only some scenarios included indirect or overhead costs (n=13), costs averted (n=13) and out of pocket or opportunity costs (n=22).

Outcome reporting focused on measures like DALYs (n=14 scenarios) and QALYs (n=14 scenarios), which are composite measures that capture the combined changes in morbidity and mortality. Service provision outcomes such as number of smokers counselled, and number of women screened for HPV (n=21 scenarios) and population coverage outcomes (n=21 scenarios) were also frequently used. Studies also reported disease-specific measurements, such as changes in diastolic and/or systolic blood pressure (n=17 scenarios).

Across all studies, the most reported cost metric was cost per beneficiary per year (n=37 scenarios), followed by annual cost per capita (n=13), cost per service (n=7) and cost/consultation (n=4). No study reported on cost per CHW.

See online supplemental material—Methods Findings for summary tables related to methods findings.

DISCUSSION

This scoping review provides updated evidence about the costs and cost-effectiveness of CHW programmes focused on five categories of NCDs in LMICs: CVD including hypertension; diabetes; HPV and cervical cancer; mental health; and behavioural risk factors. Drawing on 20 studies published between 2015 and 2024, encompassing 52 analytical scenarios, we found that most CHW-led NCD interventions were CE or cost saving when compared with standard care. These findings reinforce the growing

Table 4 Summary details of NCD interventions

Country	Type of Econ. analysis	Pop. served	CHWs (#)	Compensation method (2024 US$)	Cost/ beneficiary (2024 US$)	ICER (2024 US$)		Cost-effectiveness conclusion† (threshold used)	Affordability conclusion
						DALY	QALY		
CVD and hypertension									
Budget impact and cost-effectiveness analyses of the COBRA-BPS multicomponent hypertension management programme in rural communities in Bangladesh, Pakistan and Sri Lanka (2021)[43]									
Bangladesh	Full - CE analysis	9 671 504–13 009 795	122 000	Salaried (not reported)	7.33–12.90	3430	n/a	3/3 scenarios Cost-effective (GDP per capita)	Require a health budget increase of 10% in the first year, lowering slightly in subsequent years.
Sri Lanka	Full - CE analysis	3 428 737–4 079 978	6247	Salaried (not reported)	7.17–7.78	4080	n/a	3/3 scenarios Cost-effective (GDP per capita)	Requires a health budget increase of 2%, raising slightly in subsequent years due to costs of medications.
Pakistan	Full - CE analysis	5 619 670–7 796 449	110 000	Salaried (not reported)	6.21–12.42	2270	n/a	3/3 scenarios Cost-effective (GDP per capita)	Require a health budget increase of 3%, lowering slightly in subsequent years.
Cardiovascular disease screening by community health workers can be cost-effective in low-resource countries (2015)[42]									
Guatemala	Full - CE analysis	1 000 000	450	Salaried (not reported)	0.86–1.71	n/a	Paper-based: 565 Mobile app: 1890	2/2 scenarios Cost-effective (GDP per capita)	Not assessed
Mexico	Full - CE analysis	1 000 000	450	Salaried (not reported)	4.15–6.99	n/a	Paper-based: 3.57 Mobile app: 195	2/2 scenarios Cost-effective (GDP per capita)	Not assessed
South Africa	Full - CE analysis	1 000 000	450	Salaried (not reported)	1.41–2.75	n/a	Paper-based: 47 Mobile app: cost-saving	2/2 scenarios Cost-effective (GDP per capita)	Not assessed
CDCom programme: hypertension and non-communicable disease care by village health workers in rural Uganda (2021)[45]									
Uganda	Partial - cost analysis	49 000	52	Stipend (not reported)	n/a	n/a	n/a	Not assessed	Not assessed
Cost-effectiveness and budget impact of the community-based management of hypertension in Nepal study (COBIN): a retrospective analysis (2019)[46]									
Nepal	Full - CE analysis plus budget impact analysis	3 077 519–12 355 334	Range 3522–50 000	Other (66)	0.49–2.67	411–582	n/a	5/5 scenarios Cost-effective (Nepalese WHO threshold for cost-effectiveness)	Not assessed
Cost-utility analysis of community-based interventions for hypertension control in Vietnam (2024)[44]									
Vietnam	Full - cost utility analysis	Not reported	Not reported	Not reported	185	n/a	1632	1/1 scenarios Cost-effective (GDP per capita)	Not assessed
Cervical cancer and HPV									
Community-based HPV self-collection vs visual inspection with acetic acid in Uganda: a cost-effectiveness analysis of the ASPIRE trial (2018)[73]									

Continued

Table 4 Continued

Country	Type of Econ. analysis	Pop. served	CHWs (#)	Compensation method (2024 US$)	Cost/ beneficiary (2024 US$)	ICER (2024 US$)		Cost-effectiveness conclusion† (threshold used)	Affordability conclusion
						DALY	QALY		
Uganda	Full - CE analysis	250	Not reported	Salaried (not reported)	6.82	Not assessed	Not assessed	3/6 scenarios: HPV self-collection Cost-effective (GDP per capita) 3/6 scenarios: clinical-based triage not cost-effective (ICER dominant)	Not assessed
Comparison of the costs of HPV testing through community health campaigns vs home-based testing in rural Western Kenya: A microcosting study (2020)[47]									
Kenya	Partial - cost description	1002	Not reported	Not reported	Home-based: 39.03 CHC: 39.68	Not assessed	Not assessed	Not assessed	Not assessed
Cost of HPV screening at CHCs and health clinics in rural Kenya (2018)[48]									
Kenya	Partial - cost analysis	Not reported	10	Stipend (not reported)	CHC: 29.80 government clinic: 35.24	Not assessed	Not assessed	CHC more cost-effective than home-based testing (comparison with alternative)	Not assessed
Recruitment strategies to promote uptake of cervical cancer screening in the west region of Cameroon (2022)[49]									
Cameroon	Full - CE analysis	584	68	Stipend (not reported)	11.18	Not assessed	Not assessed	1/1 scenarios Cost-effective (comparison with alternative)	Not assessed
The cost-effectiveness of human papillomavirus self-collection among cervical cancer screening non-attenders in El Salvador (2020) [50]									
El Salvador	Full - CE analysis	Not reported	30	Salaried (512/ month)	Home based: 53.83 Home based and clinic: 110.06	Not assessed	Not assessed	1/2 scenarios: home-based Cost-effective (Willingness to pay) 1/2 scenarios: clinical-based unclear	Not assessed
Diabetes									
Community groups or mobile phone messaging to prevent and control type 2 diabetes and intermediate hyperglycaemia in Bangladesh (DMagic): a cluster-randomised controlled trial (2019)[55]									
Bangladesh	Full - CE analysis	125 000	16	Not reported	5.76	n/a	n/a	1/1 scenarios Cost-effective (GDP per capita)	Not assessed
Cost-effectiveness analysis of a cluster-randomised, culturally tailored, community health worker home-visiting diabetes intervention vs standard care in American Samoa (2019)[53]									
American Samoa	Full - CE analysis	268	Not reported	Not reported	n/a	n/a	13 191	1/1 scenarios Cost-effective (willingness to pay and GDP per capita)	Not assessed
Cost-effectiveness of a diabetes group education programme delivered by health promoters with a guiding style in underserved communities in Cape Town, South Africa (2015)[52]									
South Africa	Full - CE analysis	Not reported	Not reported	Salaried (not reported)	21.15	n/a	1790	1/4 scenarios: annual delivery Cost-effective (GDP per capita)	Not assessed
South Africa	Full - CE analysis	Not reported	Not reported	Salaried (not reported)	21.15	n/a	Dominant	3/4 scenarios: one-time delivery Not cost-effective (GDP per capita)†	Not assessed
Cost-effectiveness of a lifestyle intervention in high-risk individuals for diabetes in a low- and middle-income setting: trial-based analysis of the Kerala Diabetes Prevention Programme (2020)[54]									
India	Full - CE analysis	1007	Not reported	Not reported	n/a	n/a	57.09–176.98	2/2 scenarios Cost-effective (GDP per capita)	Not assessed

Continued

Table 4 Continued

Country	Type of Econ. analysis	Pop. served	CHWs (#)	Compensation method (2024 US$)	Cost/ beneficiary (2024 US$)	ICER (2024 US$)		Cost-effectiveness conclusion† (threshold used)	Affordability conclusion
						DALY	QALY		
Cost-effectiveness of lifestyle Africa: an adaptation of the diabetes prevention programme for delivery by community health workers in urban South Africa (2023)[51]									
South Africa	Full - CE analysis	Not reported	Not reported	Stipend (not documented)	78.59	n/a	n/a	1/1 scenarios no conclusion (comparison with alternative)	Not assessed

*As reported by the authors. Commonly used thresholds such as GDP per capita have faced criticism for failing to consider local resource availability, such as health opportunity costs and for being less useful in decision-making since it often results in most interventions being labelled as cost-effective.[47]
†Cost per beneficiary defined as the cost per patient treated.
CE, cost-effective; CHCs, community health campaigns; CHW, community health worker; DALY, disability-adjusted life year; GDP, gross domestic product; HPV, human papillomavirus; ICER, incremental cost-effectiveness ratio; n/a, not applicable; NCD, non-communicable disease; ND, not documented; QALY, quality-adjusted life year.

recognition that CHWs can provide cost-efficient front-line responses to the expanding NCD burden in resource-constrained settings.

Of 52 scenarios, 35 concluded that the CHW interventions were CE, while 9 found them not to be CE or yielded inconclusive results. The remaining eight scenarios were partial economic evaluations or cost analyses that did not formally assess cost-effectiveness. Across disease areas, interventions that combined multiple components, such as education, screening and ongoing patient follow-up, tended to yield most favourable cost-effectiveness outcomes. Examples included CHW-led activities such as blood pressure monitoring, health education; community mobilisation, sample transport; home visits; and structured group psychotherapy.

That said, most of the studies which concluded that CHW programmes were CE generally compared the ICER against GDP per capita thresholds. Given recent critiques of these thresholds,[62] new recommendations are to use country-specific thresholds which consider a range of criteria that better reflect health opportunity costs.[63–65] This means the outcomes that could have been generated by an alternative intervention, given the same money spent. Affordability was only assessed by a few of the included studies, despite being equally as important in decision-making.[66] NCD 2030 countdown estimates predict that ministries of health will need to contribute about 20% of their budgets to high-priority NCD interventions, so presenting the cost of CHWs in terms of the government budget is likely to be helpful for priority setting.[2]

Evidence was predominantly focused on CVD and cervical cancer, which likely reflects the high burden of these diseases in LMICs[67] and the availability of simple, affordable diagnostic tools. Conversely, evidence on other significant NCDs such as breast cancer and mental health conditions remains sparse and suggests missed opportunities where CHWs could play a crucial role. This includes training individuals on breast self-examination and raising awareness about breast health, which warrants further economic analysis in LMIC settings.[68 69] Despite the significant cost-saving potential and increased policy focus of interventions addressing behavioural risk factors, they are under-represented in our review, with only one study on smoking cessation identified; though components of these interventions may be included in CVD and diabetes interventions, or integrated into horizontal CHW programmes (which have been assessed in a separate review).[32]

We found that CHWs engaged in NCD care delivery in a variety of roles, particularly in CVD where CHWs played multiple roles across the care continuum. By contrast, in other NCD areas, such as cervical cancer and diabetes, CHWs often had more focused roles. It was not always possible for us to distinguish if CHWs' involvement in NCD-related activities was the result of task shifting and task sharing, or if their efforts were to improve follow-up and adherence. Despite the documented benefits of

Table 5 Summary details of mental health and behavioural risk factor interventions

Country	Type of Econ. analysis	Pop. served	CHWs (#)	Compensation method (2024 US$)	Cost/ beneficiary (2024 US$)	ICER (2024 US$)		Cost-effectiveness conclusion** (threshold used)	Affordability conclusion
Mental health									
Costing of a multiple family group strengthening intervention (SMART Africa) to improve child and adolescent behavioural health in Uganda (2022)[56]									
Uganda	Partial - cost analysis	2391	48	Stipend (not reported)	320.76	Not assessed	Not assessed	Not assessed	Not assessed
Costs and cost-effectiveness of Shamiri, a brief, layperson-delivered intervention for Kenyan adolescents: a randomised controlled trial (2023)[58]									
Kenya	Full - CE analysis	205	12	Stipend (not reported)	17.55	Not assessed	Not assessed	1/1 scenarios Cost-effective (GDP per capita)	Not assessed
Economic threshold analysis of delivering a task-sharing treatment for common mental disorders at scale: the Friendship Bench, Zimbabwe (2021)[59]									
Zimbabwe	Full - CE analysis	12364	340	Salaried (not reported)	4.13	(744)	Not assessed	1/1 scenarios Cost-effective (other)	Not assessed
Effectiveness and cost-effectiveness of group support psychotherapy delivered by trained lay health workers for depression treatment among people with HIV in Uganda: a cluster-randomised trial (2020)[57]									
Uganda	Full - CE analysis	Not reported	60	Stipend (not reported)	Not reported	(13)	Not assessed	1/1 scenarios Cost-effective (GDP per capita)	Not assessed
Behavioural risk factors									
Cost analysis of community-based smoking cessation services in Vietnam: a cluster-randomised trial (2021)[74]									
Vietnam	Partial EE - cost analysis	Not reported	Not reported	Not reported	16.47	n/a	n/a	Not assessed	Not assessed

CE, cost-effective; CHW, community health worker; EE, Economic Evaluation ; GDP, gross domestic product; ICER, incremental cost-effectiveness ratio.

CHW involvement in NCDs, a key gap in the literature is the cost-effectiveness of CHWs focused solely on administrative tasks versus those involved in direct service delivery and education. This lack of evidence limits our understanding of which CHW roles are most beneficial or CE in NCD care. Understanding these dynamics could guide future policy decisions, especially in resource-constrained settings, by identifying the most impactful and efficient roles for CHWs.

We found a notable lack of detailed information regarding the specific remuneration amounts for CHWs. While most studies indicated whether CHWs received a salary or stipend, few provided precise dollar figures. This absence of salary data limits the ability to accurately assess the cost-effectiveness of interventions. Considering recent discussions on the importance of fair compensation for CHWs,[70–72] the lack of transparency regarding salary amounts raises important questions: Are the interventions deemed CE because CHWs are paid very low wages, if at all? What would the health outcomes be if CHWs were compensated fairly, and how might this investment improve community health and reduce disparities?

Finally, methods and reporting issues limited our ability to both understand the CHW programmes being assessed and their findings, and to ascertain if these were comparable with other studies in our review. This is a challenge we also documented in our paper on integrated horizontal CHW programmes.[32] To improve comparability and policy relevance, we recommend several practical steps for standardising cost-effectiveness reporting. Authors should follow established frameworks such as CHEERS 2022 and clearly report their adherence. Future studies should describe CHW roles in detail and specify whether these represent task-shifting, task-sharing or other activities. It is also important for studies to report how CHWs are compensated, including both the method and amounts paid, to allow accurate assessments of programme sustainability. Relevant cost components should be transparently itemised, including training, supervision, consumables, capital costs, overheads and any costs averted. Lastly, outcome measures should be better aligned across studies, with consistent use of metrics like DALYs, QALYs and disease-specific indicators, to facilitate comparison and synthesis of results. Beyond cost-effectiveness, we encourage inclusion of affordability analyses that consider national health budgets and fiscal space, to inform realistic policy decisions. Addressing affordability remains a major challenge, as even interventions deemed CE may be financially out of reach for many LMIC health budgets.

Strengths and limitations

To our knowledge, this is the only paper to specifically look at costs, cost-effectiveness and affordability of CHWs in the context of NCDs for LMICs, thereby addressing a significant gap in the literature. Another strength is that we present comparable results (in 2024 US dollars) by disease area, facilitating synthesis of findings.

The main limitation is related to heterogeneity, both of CHW programmes as well as the methods used and reporting by study authors, which unfortunately limits the above-mentioned synthesis of the data and our ability to draw definitive conclusions. This is further exacerbated by the limited number of studies and scenarios per disease area. We are unable to draw any firm conclusions about the implications of the literature findings for CHW-led NCD management or health financing decisions in LMICs.

Reflexivity statement

We followed the recommendations on equitable authorship in global health research collaborations described by Morton and colleagues (2021) and provide this reflexivity statement accordingly.

Our study was carried out by a multidisciplinary, global team representing both academic and practice-based perspectives. Contributors are based in several LMICs where CHW programmes operate, including Kenya, Liberia, Malawi, Madagascar, Mexico, Rwanda and Uganda. The authorship team spans universities, non-governmental organisations and frontline health services and includes CHWs themselves. This mix of experience allowed the team to combine operational understanding with conceptual and methodological expertise.

All members involved in study design, implementation, analysis and writing of this paper have been included as coauthors. We recognise that the authorship team does not include LMIC government stakeholders, who are a key audience for this work. Although many team members regularly collaborate with ministries of health, this gap may have influenced how policy implications were interpreted.

The research was conducted by the Community Health Impact Coalition (CHIC), a collective of thousands of CHWs and dozens of global health organisations spanning over 60 countries in five WHO regions. The research questions, data collection methods and analysis were shaped by CHIC's commitment to understanding the drivers of impact and quality in CHW-delivered care globally.

Importantly, this work was also shared with CHWs to explore their opinions and solicit their feedback. Their insights were integral to refining our approach and ensuring the relevance of our findings to those most directly impacted by CHW programmes. For a detailed reflexivity checklist, please refer to the online supplemental material S1.

Directions for future research

Given the large and growing burden of disease related to NCDs, more economic evaluations are urgently needed to better understand how CHWs can most efficiently and effectively be used in this area, especially given the current focus on achieving the NCD-related Sustainable

Development Goals.[2] Improved consistency in methods and reporting can help facilitate comparison of findings from different studies and contexts; therefore, we propose developing a reference case specifically for economic evaluations of CHW programmes. This would provide researchers with guidance on methodological issues we have observed to be less robust across included studies, particularly around outcome measures, and a reporting checklist which builds on CHEERS 2022 but pays more attention to costing details as well as includes some CHW-specific items, such as CHW remuneration (method and amount), CHW roles and responsibilities and more. This may help improve consistency and comparability across studies, enhancing their utility for policymaking.

CONCLUSION

CHW programmes show strong potential for delivering CE NCD prevention and care in LMICs. While the evidence base has expanded since the 2015 review on the costs and cost-effectiveness of CHWs, our review notes that there are still challenges with both the size and quality of the evidence which limit our ability to draw firm conclusions about these topics. Additionally, few studies consider the topic of affordability, which is critical for priority setting within governments. More research is especially needed for those NCDs that lack cost-effectiveness research, such as respiratory disease and other types of cancer beyond cervical cancer. In addition, we recommend improved consistency in methods and reporting to help facilitate comparison of findings from different studies and contexts.

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