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Application of Primary Health Care Principles in National Community Health Worker Programs in Low- and Middle - Income Countries: A Scoping Review

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3 1 **Title of the article:** Application of Primary Health Care Principles in National
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5 2 Community Health Worker Programs in low- and Middle -Income Countries: A Scoping
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7 3 Review
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3 27 **Abstract**
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6 28 **Objective:** To identify which PHC principles are reflected in the implementation of
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8 29 national CHW programs and how they may contribute to the outcomes of these
9
10 30 programs in the context of low-and middle-income countries (LMICs).

11
12 31 **Design:** Scoping review

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14 32 **Data sources:** A systematic search was conducted through PubMed, CINAHL,
15
16 33 EMBASE and Scopus databases.

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18 34 **Eligibility Criteria:** The review only considered published primary studies on
19
20 35 national programs, projects or initiatives utilising the services of CHWs in LMICs
21
22 36 focused on maternal and child health. We included only English language studies.
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24 37 Excluded were programs operated by non-government organisations, study
25
26 38 protocols, reviews, commentaries, opinion papers, editorials and conference
27
28 39 proceedings.

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30 40 **Data extraction and Synthesis:** We reviewed the application of four PHC principles
31
32 41 (universal health coverage, community participation, intersectoral coordination and
33
34 42 appropriateness) in the CHW program's objectives, implementation and stated
35
36 43 outcomes. Data extraction was undertaken systematically in an excel spreadsheet
37
38 44 while the findings were synthesised in a narrative manner. The quality appraisal of
39
40 45 the selected studies was not performed in this scoping review.

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42 46 **Results:** From 1,280 papers published between 1983 and 2019, 26 met the
43
44 47 inclusion criteria. These 26 papers included 14 CHW programs from 13 LMICs.
45
46 48 Universal health coverage and community participation were the two commonly
47
48 49 reported PHC principles, while intersectoral coordination was generally missing.
49
50 50 Similarly, cultural acceptability aspect of the principle of appropriateness was present
51
52 51 in all programs as these programs select CHWs from within the communities. Other
53
54 52 aspects, particularly effectiveness, was not evident.

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56 53 **Conclusion:** The implementation of PHC principles across national CHW programs
57
58 54 in LMICs is patchy. For comprehensiveness and improved health outcomes, programs
59
60 55 need to incorporate all attributes of PHC principles. Future research may focus on how
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57 56 to incorporate more attributes of PHC principles while implementing national CHW
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59 57 programs in LMICs. Better documentation and publications of CHW program
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58 implementation is also needed.

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Keywords: Primary Health Care, Community Health Worker; Community Health Program; Low-and Middle-Income Countries.

Strengths and limitations of the study

- CHW programs in developing and lower middle income countries are an essential aspect of the strategy to achieve health for all and sustainable development goals, and this scoping review can be considered as an important step towards reviewing national community health worker programs in LMICs applying the lens of primary health care principles
- Four bibliographic databases were searched using a basic search strategy that was modified as per the database requirement.
- The studies were heterogeneous in their methods and outcomes assessed and that posed a challenge in comparing primary health care principles
- The generalisability of results of this study is limited to larger national level programs in developing and lower and middle income countries only.

74 BACKGROUND

75 Primary Health Care (PHC), as an approach to reorientation of health services and
76 provision of universal health care, has remained the benchmark for most countries'
77 discourse on health since PHC approach was mobilized by the Alma Ata Health for All
78 (HFA) declaration for comprehensive, evidence-based responses to local health
79 needs with reference to the social context.¹ PHC is a whole-of-society approach to
80 health and aims to attain the highest possible level and distribution of health and well-
81 being by providing an accessible and wide range of services, including: health
82 promotion; disease prevention, treatment and rehabilitation; and palliative care.¹

83 'Health for All' requires that health systems respond to the challenges of a changing
84 world and growing expectations for better performance. PHC includes the key
85 elements needed to improve health security, through a focus on community
86 engagement, preventative collective action, access to good quality medicines, rational
87 prescribing, and a core set of essential public health functions, including surveillance
88 and early response.¹ A PHC approach achieves this by strengthening community
89 based initiatives, and building resilience.

90 Across a wide variety of settings in low-, middle-, and high income countries, PHC-
91 oriented health systems have consistently produced better health outcomes,
92 enhanced equity, and improved efficiency.¹ In Brazil, for example, enrolment in the
93 family health strategy has been linked to a higher likelihood of regular care, better
94 access to medication, and improved patient satisfaction. Hence, PHC has been rightly
95 advocated as the key to achieve HFA and the 2018 Astana Declaration reiterated the
96 importance of this approach for achieving Universal Health Coverage (UHC).^{2 3}

97 PHC, as an approach to achieve HFA goals' was built on the principles of equity in
98 access to health services and the right of people to participate in decisions about their
99 own health care.¹ These principles i.e. 'equity' and 'community empowerment'
100 underpin preventive and promotive health services, appropriate technology, and
101 intersectoral collaboration.⁴

102 Evidence suggests that if countries have explicitly organised their health systems
103 around PHC principles, it has led to improved health outcomes. Congo, Iran and
104 Portugal when incorporated PHC principles have demonstrated significant health
105 gains in terms of reduced maternal and child mortality and improved coverage and
106 access to care.⁵

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3 107 PHC's emphasis on community-based services is an important way to ensure access,
4 108 even in rural, remote areas and for disadvantaged populations. With limited resources
5 109 and geographical and epidemiological context it is a challenge for health care systems
6 110 in LMICs to reach out to the whole populations. Therefore, as part of the PHC
7 111 approach and with a view to its principle of community empowerment, CHW programs
8 112 were envisioned as a way to reach a wider population for essential health needs and
9 113 to achieve HFA and national CHW programs were implemented by many governments
10 114 from 1978.⁶⁻¹⁰ Established under the PHC principles, these programs were expected
11 115 to encompass and promote them and in doing so achieve improvements in health
12 116 outcomes.¹¹

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21 117 National CHW programs, as vehicles to incorporate PHC principles into healthcare
22 118 provision, have contributed significantly in reducing under-five child mortality in
23 119 Brazil¹², Indonesia¹² and Nepal¹³. In Indonesia, immunization coverage also improved
24 120 many-fold with increase in community health workers. CHW programs' success is
25 121 rooted in application of PHC principles, as it has been noted that where CHW
26 122 programs lacked a focus on PHC principles they suffered from failure.^{14 15}

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32 123 These examples demonstrate the clear link and need for incorporating PHC principles
33 124 when implementing CHW programs. However, there is not
34 125 widespread/comprehensive evidence of the extent to which PHC principles are
35 126 systematically applied across the national CHW programs. This study aims to identify
36 127 the PHC principles in the implementation of these programs in the context of LMICs
37 128 and to understand their contribution to the outcomes of those programs.

38 39 40 41 42 129 **METHODS**

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45 130 A systematic scoping review was conducted using a predefined protocol¹⁶ and
46 131 reported as per the Preferred Reporting Items for Systematic Reviews and Meta-
47 132 analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.¹⁷ The databases
48 133 searched in September 2019 were PubMed (MEDLINE), CINAHL (EBSCOhost),
49 134 EMBASE (Elsevier) and Scopus (Elsevier). The review only considered published
50 135 primary studies on programs, projects or initiatives utilising the services of CHWs in
51 136 LMICs. We focused on the national level CHW programs defined as any CHW
52 137 program that is operated or implemented by the government of a specific country, on
53 138 multiple sites (jurisdictions/provinces/regions) within a country and has been functional
54 139 for a minimum of three years. We considered national CHW programs with a maternal

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3 140 and child health (MCH) focus as it is a national priority in the majority of LMICs.
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6 141 Papers published only in English language from October 1978 to September 2019
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8 142 were considered as 1978 was the year of the Alma-Ata declaration that promoted the
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10 143 establishment of national level CHW programs under the PHC principles. Excluded
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12 144 were study protocols, narrative reviews, commentaries, text and opinion papers,
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14 145 viewpoints, editorials, conference proceedings/abstracts, correspondences,
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16 146 systematic and scoping reviews and the papers on the CHW programs operated by
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18 147 non-government organisation (NGOs). Papers were also excluded if they involved
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20 148 health professionals other than CHWs such as midwives, nurses and traditional birth
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22 149 attendants. Papers were not excluded on the basis of unavailability of abstract.

23 150 The search strategy, including all identified keywords and index terms, was adapted
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25 151 for each included database (appendix I – logic grid). The search terms used included
26
27 152 “community health worker”, “Program”, “Maternal and Child Health” and “Low-and
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29 153 Middle-Income Countries”. The results of the search are presented in PRISMA-ScR
30
31 154 flow diagram in the results section.

32 155 Following the search, all identified records were collated and uploaded into Covidence
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34 156 software¹⁸ and duplicates removed. Two authors (SP and ZL) independently screened
35
36 157 titles and abstracts and then matched the full texts selected during screening against
37
38 158 the inclusion criteria. The reference lists of relevant papers were also searched for
39
40 159 additional studies. Papers meeting the inclusion criteria were included in the review
41
42 160 for data charting. In scoping reviews, the data extraction process is referred to as
43
44 161 charting the results.¹⁹ SP and ZL completed data charting using a pre-developed data
45
46 162 charting form. Key attributes of the data charting form included the country of origin,
47
48 163 study objective, design and key findings, name of the CHW program, objective, and
49
50 164 reflection of PHC principle/s in program objective, implementation activities, and stated
51
52 165 outcomes along with the selection process of CHWs (appendix II). The data charting
53
54 166 form was pilot tested and modified accordingly. The operational definition of the PHC
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56 167 principles used as reference in this scoping review are as follows:

57 168 1. Universal Health Coverage: all people receive the health services they need,
58
59 169 including public health services designed to promote better health, prevent illness,
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170 and to provide treatment, rehabilitation and palliative care of sufficient quality to be
171
effective, while at the same time ensuring that the use of these services does not

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- 172 expose the user to financial hardship.^{2 20}
- 173 2. Community Participation: Active community involvement in defining health problem
174 and needs, developing solutions and implementing and evaluating programs.²
- 175 3. Intersectoral Coordination: The linkage between health and development.²
- 176 4. Appropriateness: Services should be effective, culturally acceptable, affordable and
177 manageable.²

178 We looked for all or any of the sub attribute of the above listed four PHC principles in
179 the included studies and reported accordingly.

180 There was no quality assessment conducted of the included studies. The findings were
181 synthesised in a tabular and narrative manner. The conceptual framework, including
182 definitions of the four principles, for collating and summarizing the data is presented
183 in the published protocol.¹⁶

184 RESULTS

185 Search Results

186 We identified 1,280 citations through database searches. After removing duplicates
187 and screening out non-relevant abstracts, we assessed 281 full text papers for
188 eligibility. 263 of those 281 were excluded as these did not meet the eligibility
189 criteria. In total, 18 papers²¹⁻³⁸, published from 1983 to 2019 met the eligibility
190 criteria (Figure 1). Eight³⁹⁻⁴⁶ papers were further included from the reference lists of
191 the included studies, making a total of 26 papers. The main characteristics on
192 distribution and nature of the included studies are reported in table 1.

193 Of the 26 papers, two studies were conducted in western Asia^{21 32}, 12 studies were
194 conducted in South Asia^{23 25 27 29 34 36 37 39-43} and one study in South East Asia.²⁴
195 Seven studies were conducted in Africa ranging from the Horn of Africa^{26 33 44 45},
196 Central Africa³¹, Western Africa²⁸ and South Africa³⁸. Two studies were conducted in
197 South America^{30 46}, one in Central America³⁵ and one study was conducted in the
198 Caribbean.²² Altogether, these 26 studies covered 14 CHW programs from 13
199 LMICs.

200 Fourteen of the 26 included studies were quantitative^{22 24 27 28 30 32 33 35 39 41 42 44-46} and
201 12 studies were qualitative.^{21 23 25 26 29 31 34 36-38 40 43} Table 1 provides an overview of the
202 included studies outlining the key objective/s, methods and findings as reported by the
203 authors.

204 Table 1: Key characteristics of included studies as reported by the authors

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Damari 2018 / IRAN ²¹	To evaluate the national Iranian Women Health Volunteers program	Qualitative <ul style="list-style-type: none"> • Document review • One FGD • Semi-structured questionnaires filled by 44 key informants 	Achievements: Increased community participation, increasing health literacy, increased coverage and utilization of health services.
Nasseri 1991 / IRAN ³²	To determine the impact of PHC services on immunisation activities in areas where the two services are integrated	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey 	Higher coverage in rural areas is attributed to active approach of CHWs and vaccinators.
Memon 2016 / PAKISTAN ²⁹	To explore community barriers in accessing MCH services in 10 remote and rural districts of Pakistan	Qualitative <ul style="list-style-type: none"> • Sixty FGDs with mothers and fathers of children under five and CHWs - 20 each group 	Better awareness was seen among community caregivers for antenatal care and family planning services in the CHW-covered areas.
Hafeez 2011 / PAKISTAN ²³	To assess the contribution of the LHWP in enhancing coverage and access of health care services as well as towards improvement of health indicators	Qualitative <ul style="list-style-type: none"> • Document review • Interviews, formal and informal interactions and discussions with all the stakeholders • Performance validation exercises in the field 	The LHWP has led to a development of a very well-placed cadre that links first-level care facilities to the community, thus improving the delivery of PHC services. The health indicators are significantly better than the national average in the areas served by the CHWs.

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
		<ul style="list-style-type: none"> • Feedback from community being served by the program 	
Douthwaite 2005 / PAKISTAN ⁴¹	To assess the impact of the LHWP on the uptake of modern contraceptive methods	Quantitative <ul style="list-style-type: none"> • Secondary data analysis from the 2002 national evaluation of the LHWP 	The study provides strong evidence that the LHWP has succeeded in integrating family planning into the doorstep provision of preventive health care and in increasing the use of modern reversible methods in rural areas.
Afsar 2005 / PAKISTAN ⁴⁰	To assess the strengths and weaknesses of the LHWP from the Lady Health Workers perspective	Qualitative <ul style="list-style-type: none"> • 20 key informant interviews with CHWs (n=14), CHW Supervisors (n=4) and 2 medical officers (District Coordinator and District Health Education Officer) 	Major strengths: provision of services at the grassroots level, reinforcement of health messages and the community acceptability of workers. Weaknesses: contract-based job, low salaries, irregularity of payment, no career development, and poor logistical support.
Afsar 2003 / PAKISTAN ³⁹	To estimate the proportion of patients who were referred and to identify the factors associated with unsuccessful referral in Karachi, Pakistan	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey of 347 patients 	A high referral rate (55%) by CHWs was found in this study; 76.4% (n=265) were successful and 23.6% (n=82) were unsuccessful referrals. Key factors for unsuccessful referral: never referred before, never visited the referral site before, no knowledge of who to meet at the referral site, and failure of CHW to follow up.
Kohli 2015 / INDIA ⁴²	To assess the knowledge and practices for maternal health care delivery among Accredited Social Health	Quantitative <ul style="list-style-type: none"> • Descriptive cross-sectional study (n = 55) 	CHWs' knowledge is good but practices about maternal health were not adequate due to the number of problems faced by them which need to be addressed through skill-

Author and year of publication / Country	Key objective of the study	Methods	Main findings
	Activist workers in North-East district of Delhi, India		based training in terms of good communication and problem solving. Monitoring should be made an integral part of CHW working in the field to ensure that knowledge is converted into practices as well.
Kosec 2015 / INDIA ²⁷	To understand predictors of essential health and nutrition service delivery in Bihar, India	Quantitative <ul style="list-style-type: none"> • Secondary data analysis of a 2012 cross-sectional survey of 6,002 households in 400 randomly selected villages in 1 district of Bihar state • Primary data collection from 382 CHWs 	CHWs who maintained records of pregnant women were significantly associated with households receiving such information. Incentivizing frontline workers and helping them organize their work is associated with greater receipt of services by households.
Saprii 2015 / INDIA ³⁶	To explore stakeholders' perceptions and experiences of the CHW scheme in strengthening maternal health	Qualitative (exploratory study) <ul style="list-style-type: none"> • Eighteen in-depth interviews and 3 FGDs with CHWs, key stakeholders and community members 	CHWs are valued for their contribution towards maternal health education and for their ability to provide basic biomedical care, but their role as social activists is much less visible as envisioned in the CHW operational guidelines

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
Ved 2019 / INDIA ³⁷	To examine how the program is seeking to address gender inequalities facing CHWs, from the program's policy origins to recent adaptations	Qualitative <ul style="list-style-type: none"> • Document review • 12 key informant interviews 	The value of community embeddedness for CHW programs is widely recognized as a mechanism to ensure program relevance to local needs and secure community ownership, support, and recognition of CHWs
Koblinsky 1989 / BANGLADESH ²⁵	To identify and examine organizational constraints to quality care and to provide a feasible strategy for program managers to overcome those barriers	Qualitative <ul style="list-style-type: none"> • Observations • FGDs – number not reported in the study 	Only brief, interactions are possible if CHWs are to complete their rounds in the three-month period mandated by the government. The CHWs compensate for the pressure of their workload by skipping visits with some of the women in their area, by visiting even fewer during the monsoon season, and by neglecting to provide valuable information about family planning or health with some of the women they do visit
Panday 2019 / NEPAL ³⁴	To explore use of MCH care services delivered by CHWs and the reasons for the underutilisation of these services	Qualitative <ul style="list-style-type: none"> • Interviews and FGDs with 34 CHWs, 26 service users and 11 health workers 	Perceived factors that discourage the use of healthcare services by ethnic minority groups are; <ol style="list-style-type: none"> 1. Lack of knowledge among service users - related to CHWs' inability to communicate health messages; 2. Lack of trust in volunteers; 3. Traditional beliefs and healthcare practices; 4. Low decision-making power of women –

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Panday 2017 / NEPAL ⁴³	To explore the role and experience of CHWs in maternal healthcare provision	Qualitative <ul style="list-style-type: none"> • Interviews with 20 CHWs, 26 service users and 11 health workers • Four FGDs with 18 CHWs 	<ul style="list-style-type: none"> • All study participants acknowledged the contribution of CHWs in basic maternity care in villages • With support available to CHWs from the local health centres (regular training and access to medical supplies), CHWs were able to assist with childbirth, distribute medicines, and administer pregnancy tests. Whereas such activities were not reported in the other region where such support was not available to CHWs. • Key challenge: lack of monetary incentives
Hasegawa 2013 / CAMBODIA ²⁴	To identify determinants of caregivers' Village Malaria Workers service utilization for childhood illness and caregivers' knowledge of malaria management	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey with CHWs and primary caregivers of children under five years 	<ul style="list-style-type: none"> • Among the caregivers, 23% in M villages (villages with only malaria control services) and 52% in M+C villages (with both malaria and child health services) utilized CHW services for childhood illnesses.
Negussie 2017 / ETHIOPIA ³³	To assess the contribution made by the CHWs in MCH care service delivery in Dale district, southern Ethiopia	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey with 613 mothers of reproductive age (15-49), having at least one under-five child 	<ul style="list-style-type: none"> • Overall service coverage of antenatal care (four and more visits), delivery and postnatal care services were low in the district as compared to the national status; and the input from the CHWs, in this regard, was unsatisfactory. • The number of home visits was also inadequate for the necessary support of the mothers. • Mothers who listen to the radio and who had received information about the MCH

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
			services by CHWs were more likely to utilize MCH services.
Kok 2015 / ETHIOPIA ²⁶	To identify facilitators of and barriers to interpersonal relationships between CHWs and actors in the community and health sector	Qualitative <ul style="list-style-type: none"> • Fourteen FGDs and 44 interviews in 2013 with CHWs, traditional birth attendants, health professionals and community members 	<ul style="list-style-type: none"> • CHWs were selected by their communities which enhanced trust and engagement between them • Program design elements facilitating relationships support for CHWs activities from the community and health sector, monitoring and accountability structures (community and health sector), referral, supervision and training (health sector)
Medhanyie 2012 / ETHIOPIA ⁴⁴	To investigate the role of CHWs in improving utilization of maternal health services by rural women	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey with 725 women with under-five children 	<ul style="list-style-type: none"> • CHWs have contributed substantially to the improvement in women's utilization of family planning, antenatal care and HIV testing.
Admassie 2009 / ETHIOPIA ⁴⁵	To evaluate the short-term and intermediate-term effects of the Ethiopian HEP on MCH indicators	Quantitative <ul style="list-style-type: none"> • Program evaluation using a propensity score matching method and village, facility and household surveys 	<ul style="list-style-type: none"> • HEP has significantly increased the proportion of children fully and individually vaccinated • Women in the HEP villages appeared to make their first contact with a skilled health service provider significantly earlier during pregnancy; very little effect is detected on other prenatal and postnatal care services. • HEP has not reduced the incidence and duration of diarrhoea and respiratory diseases among under-five children
Musabyimana 2018 /	To explore perceptions of healthcare officials, providers,	Qualitative	The effectiveness of use of mobile phones to remind of the appointments for improved

Author and year of publication / Country	Key objective of the study	Methods	Main findings
RWANDA ³¹	and beneficiaries on the impact of the RapidSMS program	<ul style="list-style-type: none"> • 10 FGDs with 93 participants • In-depth interviews with 56 beneficiaries and 36 CHWs 	access to midwifery services at the health facilities was found to be limited. Indirectly, it alerts to the emerging role of contemporary technologies in community health program.
Magnani 1996 / NIGER ²⁸	To assess the impact of differential access to health services through the comparison of service use patterns and under-five mortality levels among villages provided different levels of health services	Quantitative <ul style="list-style-type: none"> • Secondary data analysis of National Morbidity and Mortality Survey – 1985 on 974 women of reproductive age 	<ul style="list-style-type: none"> • Children residing in villages proximate to health dispensaries were approximately 32% less likely to have died during the study period than children living further away.
Wilford 2018 / SOUTH AFRICA ³⁸	To explore the quality of CHW household visits providing MCH services	Qualitative <ul style="list-style-type: none"> • 30 observations [a CHW visit to a mother or pregnant woman was observed by a field worker, followed by an in-depth interview with the participating women and CHWs] • 15 in-depth interviews with mothers/pregnant women and 15 in-depth interviews with CHWs 	<ul style="list-style-type: none"> • Mothers receiving the services were satisfied with CHW visits and appreciated that CHWs understood their life experiences and provided relevant and accessible advice and support. • CHWs expressed concern of not having the required knowledge to undertake all activities in the household, and requested training and support from supervisors during household visits
Mues 2012 / BRAZIL ³⁰	To assess factors influencing perspectives on Brazil's national family health	Quantitative <ul style="list-style-type: none"> • Cross-sectional household survey of 253 households 	<ul style="list-style-type: none"> • Most caretakers of young children were satisfied. However, less than half of the

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
	program and perceptions about PSF accessibility among frequent users (primary caretakers of children under 5)	with at least one child 5 years or younger and covered by the PSF	caretakers perceived the PSF unit as being accessible <ul style="list-style-type: none"> • about a quarter of households in the Vespasiano PSF coverage area were not receiving an urgent home visit once a month

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
Aquino 2009 / BRAZIL ⁴⁶	To evaluate the effects of the implementation of the CHW Program on infant mortality rates in Brazilian municipalities from 1996 to 2004	Quantitative – ecological and longitudinal approach <ul style="list-style-type: none"> Secondary data analysis from 1991 and 2000 national census and data from Brazilian MoH of 721 municipalities 	A statistically significant negative association between CHW program coverage and infant mortality rate was found after controlling for potential confounders.
Rubin 1983 / EL SAVADOR ³⁵	To evaluate the health service impact of the Rural Health Aide Program in El Salvador	Quantitative <ul style="list-style-type: none"> Survey of 363 respondents in cantons served by CHWs for one year and 169 in cantons served by CHWs for two years 	Compared to villagers of cantons served by CHWs for one year, those in cantons served by CHWs for 2 years were: <ul style="list-style-type: none"> -more likely to be visited by their CHW & to visit their CHW -more likely to visit their health centres after referral by the CHW -more likely to have their children vaccinated
Ennever 1990 / JAMAICA ²²	<ul style="list-style-type: none"> To describe the activities of CHWs currently employed, and their perceptions about supervision and management To describe the current employment status of CHWs who had left the service between 1982 and 1986, and use of the skills they had learned as CHWs. 	Quantitative <ul style="list-style-type: none"> Survey of 415 CHWs currently employed and 134 CHWs who had left the service 	<ul style="list-style-type: none"> Currently employed CHWs continued to perform duties in the community & in health centres with emphasis on the MCH services and the management of diabetics and hypertensives. Previously employed CHWs unemployed though many continued to use their skills on a voluntary basis.

205 CHW = Community Health Worker, FGD = Focus Group Discussion, HEP = Health Extension Program (Ethiopia) LHWP = Lady Health
 206 Worker Program (Pakistan), MCH = Maternal and Child Health, PSF = Programa de Saude da Familia (Family Health Program, Brazil)

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3 207 **Application of PHC Principles**
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5 208 The PHC principles were applied to a varied extent in the objective/s, implementation
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7 209 and outcome of the national CHW programs reviewed in this study. The evidence
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9 210 found in the objective, implementation or the outcome of the included studies related
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11 211 to the application of the four PHC principles is organised in table 2.
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212 Table 2: Summary of findings – Application of primary health care principles as reflected in the national CHW programs

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
1.	IRAN / Women Health Volunteers Program / 1992 ²¹	<u>Principle observed:</u> - Community Participation as the program aims to increase community involvement in health related activities in order to empower them	<u>Principles observed:</u> - UHC - Community Participation* • The CHWs encouraged and actively followed up on individuals to visit health centres at their required time especially those who needed special care --- thus contributing to increased service utilisation • CHWs delivering health messages to families and distributing educational materials reflect one aspect of comprehensiveness as part of universal health coverage • CHWs are selected from the local community - Community Participation and appropriateness	<u>Principles observed:</u> - UHC - Community Participation* - Intersectoral coordination - The active follow up by WHV increased utilization of health services – contributing to universal health coverage • The experts and stakeholders believed that CHW program increased people's participation and created self-esteem and self-reliance in people – However, the evidence on how it achieved this is not available in this study • The WHV network connects MoH, medical universities and health centers to the people – Intersectoral coordination
2.	IRAN / Primary Health Care Network – EPI / 1983 ³²	<u>Principle observed:</u> - UHC • As the program aimed to increase immunisation coverage in	<u>Principles observed:</u> - UHC - Community Participation* • CHWS were involved in provision of general preventive services for all the individuals in their coverage area –	<u>Principle observed:</u> - UHC - Appropriateness • Immunisation coverage of children improved significantly in 1987 as compared to 1984 especially for BCG (56.3%) - universal health coverage

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Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		Iranian children to 90% by their first birthday	<p>Comprehensiveness, Universal health coverage</p> <ul style="list-style-type: none"> • CHWs were also expected to provide basic therapeutic measures for minor illnesses and refer other cases to their immediate Rural Health Centre – universal health coverage • CHWs were selected from the same area in which they work – community participation 	<ul style="list-style-type: none"> • Mothers in rural areas with PHC services receive much better MCH care, advice and attention in comparison to mothers in other rural and most urban areas – appropriateness
3.	PAKISTAN / National Program for Family Planning & Primary Health Care / 1994 ²³ ₂₉	<p><u>Principle observed:</u></p> <ul style="list-style-type: none"> - UHC as the program aimed to increase utilisation of promotive, preventive and curative services at the community level particularly for women and children in poor and underserved areas – 	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - UHC - Community Participation* • CHWs were involved in health education and community mobilization along with provision of immunization, family planning services, basic curative care to the community at the doorstep and referral of patients to the appropriate health facility - reflecting universal health coverage 	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - UHC - Community Participation* • Increased utilisation of antenatal care and family planning - universal health coverage • Improved infant mortality rate, maternal mortality ratio and contraceptive prevalence rate in CHW covered areas as compared to national average - universal health coverage • Cultural acceptability of CHWs, unlimited access to households and free interaction with local women – community participation and appropriateness

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		comprehensiveness & equity		
4.	INDIA / Accredited Social Health Activist (ASHA) Program / 2005 ^{27 36 37}	<u>Principles observed:</u> - UHC through accessible care to rural population especially vulnerable groups - Appropriateness via provision of affordable and quality health care	<u>Principles observed:</u> - UHC via CHWs as 'service extension and link workers' - Community Participation as CHWs are selected from the local communities	<u>Principles observed:</u> - UHC as CHWs were motivating women for antenatal care and hospital delivery through home visits • Women empowerment – as CHWs have reported an increased sense of empowerment and personal growth, in part through their belief in the social value of their work. • Additionally, becoming a CHW enabled rural women to gain knowledge, status as a role model, and exposure beyond the village, as well as to access a limited amount of remuneration
5.	BANGLADESH / National MCH and Family Planning Program / 1976 ²⁵	Not reported	<u>Principles observed:</u> - UHC - Community Participation* • CHWs were utilised for health education and extending immunisation and family planning services at the household level. They also provided referral for antenatal, perinatal, and postnatal care. – comprehensiveness as part of universal health coverage	Not reported

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Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
6.	NEPAL / Female Community Health Volunteer Program / 1988 ³⁴	<u>Principles observed:</u> - UHC via low cost health service provision in remote areas - Community Participation via increase in local women's participation in health promotion	<u>Principles observed:</u> - Community Participation* - UHC via provision of MCH care by CHWs in rural communities	Not reported
7.	CAMBODIA / Village Malaria Worker Project as part of National Malaria Control Program / 2001 ²⁴	Not reported	<u>Principles observed:</u> - UHC - Community Participation* • Malaria prevention, diagnosis and treatment services to remote villages by CHWs – universal health coverage - Management of minor childhood illness, prescribing and providing basic medications, referral and health promotion – comprehensiveness as part of universal health coverage	<u>Principle observed:</u> - UHC • 15,898 children received child health services from village Malaria Workers in 2011
8.	ETHIOPIA / Health	<u>Principles observed:</u>	<u>Principles observed:</u> - UHC	<u>Principles observed:</u> - UHC

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Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
	Extension Program / 2003 ^{26 33}	<ul style="list-style-type: none"> - UHC - Community Participation • To improve access and utilization of health care particularly for children and mothers in rural communities – Universal Health Coverage • To improve the health status of families with their full participation, using local technologies & the community's skill & knowledge - Community Participation 	<ul style="list-style-type: none"> - Community Participation • CHWs providing antenatal and postnatal care, family planning and immunization services and conducting clean and safe deliveries - Universal Health Coverage • Quarterly evaluation of health centers performance by the community during facility or public forums. Monitoring of CHWs by the <i>kebele</i> (lowest administrative unit) administration at the health post level. Need based adjustment of maternal health education – Community Participation 	<ul style="list-style-type: none"> - Community Participation • Increased use of health post for antenatal care, family planning, delivery and other illnesses such as diarrhoea reflecting universal health coverage • Statistically significant increase in the proportion of children fully and individually vaccinated against tuberculosis, polio, diphtheria-pertussis-tetanus, and measles in the program villages. • Mothers reported that CHWs were available at health posts during their last visit for MCH services • Mothers also indicated that they had gotten a complete explanation of their own/child's health condition from the CHWs • Moreover, CHWs were understanding, friendly and helpful thus assured a “natural link” between them and the community- appropriateness • Community members reported that HEWs being female was important to them, as they prefer to discuss maternal health issues amongst women - appropriateness

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Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
9.	RWANDA / RapidSMS program / 2013 ³¹	<u>Principles observed:</u> <ul style="list-style-type: none"> - UHC - Appropriateness • To improve access to antenatal, PNC, institutional delivery and emergency obstetric care • To facilitate communication between CHWs and the broader health system, including the ambulance system, health facilities, and MoH officials 	<u>Principles observed:</u> <ul style="list-style-type: none"> - UHC - Community Participation* - Appropriateness – use of technology • The RapidSMS system sent automatic reminders to CHWs for clinical appointments, delivery, and post-natal care visits, with the intent of increasing timely access and utilization • Provision of a quick link to emergency obstetric care through so-called Red Alerts and creation of a database of clinical records on maternal care delivery – use of technology for increasing access to health care 	<u>Principles observed:</u> <ul style="list-style-type: none"> - Appropriateness (use of technology, acceptability) <p>RapidSMS was well accepted by most CHWs and community members – acceptability aspect of appropriateness principle</p> <ul style="list-style-type: none"> • mHealth appeared to have helped improve communication and potentially service use • Claims that mHealth has contributed to maternal mortality reduction are not substantiated considering the difficulties that were highlighted by the respondents
10.	NIGER / Rural Health Improvement Program / 1970s ²⁸	<u>Principle observed:</u> <ul style="list-style-type: none"> - UHC – as the program aimed to extend the coverage of PHC services 	<u>Principle observed:</u> <ul style="list-style-type: none"> - UHC – By upgrading existing health dispensaries and deploying trained village health teams to unserved villages to deliver PHC services 	Not reported

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		throughout rural Niger		
11.	SOUTH AFRICA / ward-based outreach teams (WBOT) - national CHW program / 2011 ³⁸	<u>Principle observed:</u> - UHC – via improving health outcomes by providing home and community-based health services	<u>Principle observed:</u> - UHC - Community Participation* • Universal health coverage via CHWs providing treatment support and home-based care in underserved rural areas. Core MCH activities include visiting all mothers during pregnancy, antenatal education and support. Moreover, CHWs are linked in with local PHC clinics	<u>Principle observed:</u> - Appropriateness as CHWs were trusted, accessible and able to understand the mother's situation
12.	BRAZIL / Family Health Program (Programa de Saude da Familia, PSF) / 1994 ³⁰	<u>Principle observed:</u> - UHC – as the organizational principles include universality and equity	<u>Principle observed:</u> - UHC - Community Participation* - Universal health coverage via provision of promotive, preventive and basic curative services by CHWs to mothers and children	<u>Principle observed:</u> - UHC – as the growth of the CHW program was associated with a decrease in infant and child mortality rates • Caretakers who reported that their agent made at least one home visit per month were significantly more likely to have received care for child diarrhoea from an agent
13.	EL SAVADOR / Rural Health Aide Program / 1976 ³⁵	<u>Principle observed:</u> - UHC – via provision of PHC and family	<u>Principle observed:</u> - UHC - Community Participation*	<u>Principle observed:</u> - UHC • Appropriately trained PHC workers promote contact between rural

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Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		planning services	<ul style="list-style-type: none"> • Health education by CHWs for rural families • Provision of family planning supplies to women • Provision of systematic treatment of minor illnesses; administration of prescribed intramuscular injections; dispensing of antiparasitic medication; and performance of simple first-aid measures • Promotion of registration of births and deaths 	<p>population and the health care system</p> <ul style="list-style-type: none"> • To the extent that this improves the health status of the population, particularly in the area of MCH, we might expect to see better health indices in rural populations served by these workers than in populations without them
14.	JAMAICA / Community Health Aide program / 1978 ²²	<u>Principle observed:</u> - UHC as the program aimed to train local women to provide basic health care and health education to families.	<u>Principles observed:</u> - UHC – CHWs encouraging for immunization and family planning, weighing babies and testing urine - Community Participation*	<u>Principle observed:</u> - UHC <ul style="list-style-type: none"> • CHWs have been functioning in both health centre and community, encouraging people to utilize the services and assisting in some of the less technical duties such as weighing babies and testing urine

213 UHC = Universal Health Coverage

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3 'Universal health coverage' and 'community participation' were the two commonly
4 reflected PHC principles in the national CHW programs across their objective/s,
5 implementation and outcomes. 'Intersectoral coordination' was only mentioned in the
6 outcome of Iran's Women Health Volunteers (WHV) program.²¹ The objective of two
7 CHW programs were not reported in the papers reviewed.^{24 25} In addition, studies
8 from Nepal^{34 43}, Bangladesh²⁵ and Niger²⁸ did not report on the outcomes of the
9 CHW programs.

16 *Universal Health Coverage (UHC)*

17 We reviewed the national CHW programs for the application of this fundamental
18 PHC principle in terms of coverage and access, equity and comprehensiveness.
19 UHC was reflected in the objective of 11 CHW programs^{22 23 28 30-36 38} and in the
20 implementation of 14^{21-25 28 30-36 38} programs through the service provision by CHWs
21 in the MCH and family planning domain. These 14 programs reported improvements
22 in the scope [population coverage] and range [comprehensiveness] of health
23 services provided. For example, an outcome of the CHW program in Iran was
24 increased utilisation of MCH care services as a result of the active follow up by
25 CHWs.²¹ The increase in immunisation coverage of children in the rural areas was
26 also attributed to the 'active' approach and vigilance of CHWs and vaccinators
27 serving the PHC network of Iran.³² In Pakistan the CHW program was claimed to be
28 contributing to the increasing utilisation of antenatal care and family planning.²³ In
29 Rwanda, mHealth was reported as improving communication between CHWs and
30 community members leading to better use of the health services.³¹

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42 The concept of 'care according to need' was reflected in the objective of Pakistan's
43 CHW program that focuses on provision of care in underserved areas.²³ Service
44 provision to ethnic minorities was one of the focus areas of Nepal's CHW program.³⁴

48 *Community Participation*

49 Only three^{21 33 34} of the 14 CHW programs included in this review incorporated
50 community participation in their program objective. In terms of implementation, 10
51 programs^{21 23-27 31 32 34 35} reflected community participation as they engaged CHWs
52 from within the local communities to provide care to the local population. Moreover,
53 the selection of CHWs from the local community they serve facilitated their access to
54 households, development of good relationships and high acceptability in the
55 community.^{23 26 28} Three programs^{28 30 38} did not mention the selection process of
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3 CHWs while in Jamaica it was not mandatory to select CHWs from within the local
4 community.²²
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7 Examples of other activities reflecting the process of community participation as
8 defined by Byrant (Table 1).² and beyond the use of CHWs were reported only in
9 Ethiopia's Health Extension Program.²⁶ In this program the performance of health
10 centres was evaluated by the community on a quarterly basis and the CHWs were
11 monitored by the community volunteers.²⁶
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16 *Intersectoral Coordination*

17 PHC ought to involve the health sector and all related sectors and aspects of
18 national and community development that have an impact on health.^{2,47} Intersectoral
19 coordination was not reflected in the objective/s or implementation of any CHW
20 program and only in the outcome of one²¹ program. The WHV Program of Iran
21 explicitly described the intersectoral link between health and education sectors for
22 transmitting health messages to the people.²¹ The Accredited Social Health Activist
23 (ASHA) program from India, while not reporting intersectoral collaboration directly,
24 did report actions to enhance the role of women by creating opportunities by working
25 with other sectors to empower women.³⁷
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34 *Appropriateness*

35 The final PHC principle assessed in this review was appropriateness: i.e. services
36 that are effective, culturally acceptable and financially affordable. The included
37 studies reflected one or another of these attributes but none reported all three
38 attributes of the appropriateness. For example, the concept of appropriateness was
39 reflected explicitly in the objective of India's ASHA program (to provide affordable
40 and quality health care), but did not mention cultural appropriateness.²⁷ The
41 RapidSMS program of Rwanda reported cultural acceptability of technology (phone
42 messaging services) and its affordability considering that almost all population had
43 access to a mobile phone.³¹
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51 **DISCUSSION**

52 This study has provided insights into the application of PHC principles in the
53 implementation of national CHW programs. PHC principles do not appear to be
54 applied with the rigor and regularity as one would expect considering the emphasis
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3 laid on these during conceptualisation of this significant public health movement called
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5 'PHC'.
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8 Our results show that 'UHC' and 'community participation' were the most common
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10 PHC principles reflected in the national CHW programs. In contrast, intersectoral
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12 coordination was stated in the outcome of only one of the 14 CHW programs²¹ while
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14 none of the studies described the programs with reference to all three attributes of
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16 appropriateness (effective, culturally acceptable and financially affordable).

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18 'Enhanced coverage' attribute of UHC was most commonly reflected by the national
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20 CHW programs. There is limited evidence in the reviewed 26 papers on the
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22 implementation of other two attributes, i.e., coverage on the basis of need (equity)
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24 and comprehensiveness. This finding complements the fact that soon after Alma-
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26 Ata, selective PHC was proposed as an interim strategy for disease control in
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28 LMICs.^{48 49} Many vertical programs utilised CHWs under different names and with
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30 different roles⁵⁰ resulting in a fragmented and disease-specific approach operating
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32 within the context of fragile health systems of LMICs. CHWs however, are not a
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34 "panacea for weak health systems." They require well-structured support from the
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36 formal health systems with which national CHW programs are linked. Therefore,
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38 achieving UHC requires strengthening of health systems with effective integration of
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40 comprehensive CHW programs in LMICs as PHC can only work when a country has
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42 the structures, skills and data to ensure that all people are covered.¹⁴

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44 This review found that the implementation of community participation was patchy, and
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46 when it was employed it mainly reflected in the selection of CHWs from the local
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48 community. This is not surprising as after the Alma-Ata declaration several
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50 governments started CHW programs as a means for people's participation with local
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52 lay people trained to administer basic first-line healthcare in their communities.^{7 14}
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54 While CHWs' position as community members themselves may provide a 'natural link'
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56 between them and the community, it may also appear to safeguard trust in^{26 28} and
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58 respect for them from the community side and enhanced self-esteem from the CHW
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60 side.²⁶ A higher level of community participation where community is given a stake in
the evaluation and redefining of services was evident only in the Ethiopian CHW
program.²⁶ A successful CHW program requires the support and ownership of the
community through their active involvement in the entire process of defining health

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3 problems and needs, developing solutions, implementing and evaluating the program,
4 as well as establishing a supportive social and policy environment for community
5 participation at national, district, and local levels.⁵¹ CHW programs often struggle to
6 be successful when not part of a broader community engagement process which
7 requires explicit methods for involving individuals and communities, clearly defined
8 roles and responsibilities, training of policymakers and adequate funding.⁵¹ Recent
9 WHO guidelines have explicitly recommended ways to select CHWs, engage and
10 mobilize community and this can be achieved if there is a supportive social and policy
11 environment.⁵² With little or no evidence as noted by this scoping review on community
12 involvement in needs assessment, the design of programs and evaluation may
13 indicate that invoking community participation is a challenge for these programs.¹⁴
14 Community participation is a context-dependant, gradual process which is less
15 controllable and less measurable, thereby making it harder to track.⁵³ There is need
16 for robust program evaluations of community participation activities that measure long-
17 term outcomes and provide support for the CHW programs to broaden their scope of
18 community participation.

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32 The operational problems related to partnerships working (intersectoral,
33 interinstitutional, interdisciplinary and professional/lay partnerships) were highlighted
34 in the early implementation years of these programs in LMICs.⁵⁴ Our review informs
35 that this is still the case.²¹ This finding corresponds with the fact that working
36 relationships between partners have often proved difficult,^{53 54} as each sector has its
37 own priorities.⁵³ The PHC literature reports that community participation and
38 intersectoral coordination are the two most weakly implemented principles.^{14 53} Our
39 review findings also support this evidence. National CHW programs ought to view
40 these principles as two pillars that help achieve the universal health coverage of
41 services that are appropriate for the community and their context.

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By its nature, the provision of MCH services to women by female CHWs who are
also selected from within the local community tend to make it culturally acceptable
and meet the principle of appropriateness. However, CHW programs need to
incorporate 'appropriateness' more explicitly in their objectives and then diligently
pursue this in program implementation and outcomes, which may contribute to
address the current lack of evidence on effectiveness of these programs.⁵⁵

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3 The review has a number of limitations. Firstly, it relied solely on the information
4 reported in the papers to assess the application of PHC principles within the
5 programs. Many papers did not clearly articulate these principles or provide
6 sufficient description of the program to allow an assessment to be made. As such the
7 reviewers needed to interpret the evidence about principles in how the program was
8 implemented. These principles may be delineated elsewhere, for example program
9 reports or funding agreements. Therefore, it is likely that we underestimated the
10 application of PHC principles in these programs. However, the very fact that the
11 research papers that we reviewed failed to document implementation of those
12 principles, illustrates less than adequate emphasis on the application of these
13 principles in national CHW programs.

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23 Secondly, we reviewed the CHW programs identified only through the search of
24 peer-reviewed published journal articles and there may be CHW programs that apply
25 the PHC principles but are not published in peer-reviewed journals in a way to be
26 captured in our search. This scoping review can be considered as a first step
27 towards reviewing national CHW programs in LMICs applying the lens of PHC
28 principles. Future studies on the analysis of non-peer-reviewed publications or 'grey'
29 literature may produce further evidence on this phenomenon.

30 31 32 33 34 35 **CONCLUSION**

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38 This scoping review informs that the application of PHC principles across national
39 CHW programs in LMICs is patchy. For comprehensiveness and improved health
40 outcomes, programs need to incorporate all attributes of PHC principles. The findings
41 also point to the limited research and published studies on this important topic. Better
42 documentation and publications of program implementation with reference to PHC
43 principles is needed. Further research is needed to identify reasons to this inadequate
44 emphasis on historic PHC principles, and to find out what other principles are adhered
45 to by the current CHW programs. Future research may also focus on how to
46 incorporate more attributes of the PHC principles while implementing national CHW
47 programs in LMICs.

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Figure 1: PRISMA flowchart for study selection and inclusion process

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Contributors SP had the primary responsibility for writing the manuscript and making revisions. SP contributed to the design of the review, designed and conducted the search, adjudicated and appraised studies, charted and analysed data and drafted the manuscript. ZL was involved in the screening and data charting of the articles and review of the manuscript. CL and AM were involved in the conceptualisation and design of the scoping review, provided continuous supervision and feedback during the conduct of the scoping review and reviewed all the drafts and provided instrumental feedback to improve subsequent versions by SP. HP also reviewed the drafts critically and provided feedback. All authors approved the final version.

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Ethics approval The information used in our scoping review was derived from publicly available data sources therefore, a formal ethics approval was not required.

Competing interests None declared

Patient consent for publication Not applicable

Patient and public involvement We did not involve patients or the public in this scoping review

Data availability statement All data relevant to the study are included in the article

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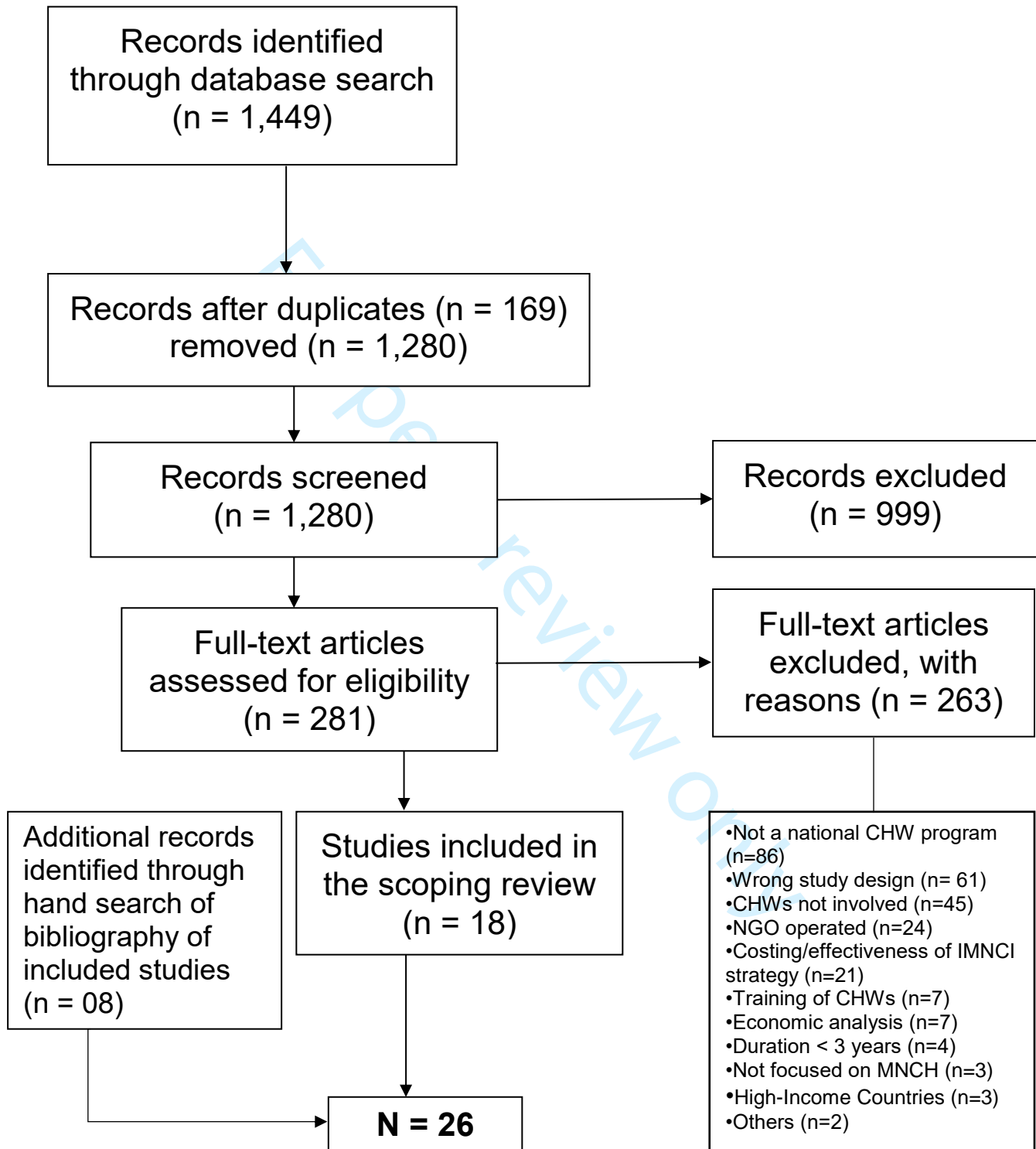


Figure 1: PRISMA flowchart for study selection and inclusion process

Appendix I: Logic grids for information sources

PubMed

Search	Query	Records retrieved
#1	“community health workers”[mh] OR community health worker*[tiab] OR community health aide*[tiab] OR village health worker*[tiab] OR barefoot doctor*[tiab] OR family planning personnel*[tiab] OR health extension worker*[tiab] OR lady health worker*[tiab] OR community health agent*[tiab] OR Shasthyo Sebika*[tiab] OR community nutrition worker*[tiab] OR maternal health worker*[tiab] OR voluntary Malaria workers*[tiab] OR village malaria worker*[tiab] OR Raedat*[tiab] OR postnatal support worker*[tiab] OR mental health worker*[tiab] OR mother coordinator*[tiab] OR rural health worker*[tiab] OR village health promoter*[tiab] OR accompagnateur*[tiab] OR Saksham Sahaya*[tiab] OR anganwadi worker*[tiab] OR accredited social health activist*[tiab] OR community-based worker*[tiab] OR community health volunteer*[tiab] OR village health guide*[tiab] OR maternal and child health promotion worker*[tiab] OR maternal child health worker*[tiab] OR kader posyandu*[tiab] OR behvarz*[tiab] OR village health helper*[tiab] OR colaborador voluntario*[tiab] OR nutrition volunteers*[tiab] OR village drug-kit manager*[tiab] OR brigadistas*[tiab] OR female community health volunteer*[tiab] OR Agente Comunitario de Salud*[tiab] OR nutrition worker*[tiab] OR community reproductive health worker*[tiab] OR community drug distributor*[tiab] OR community volunteer*[tiab] OR community health advocate*[tiab] OR lay health visitor*[tiab] OR Promotoras de Salud[tiab]	174984
#2	Program[tiab] OR programs[tiab] OR programme[tiab] OR programmes[tiab] OR initiative*[tiab] OR project[tiab] OR projects[tiab]	959578
#3	“Maternal health”[mh] OR “Maternal Welfare”[mh] OR “child health”[mh] OR “child care”[mh] OR “child welfare”[mh] OR “maternal-child health services”[mh] OR “child health services”[mh:noexp] OR maternal child health[tiab] OR maternal newborn child health[tiab]	71349

Search	Query	Records retrieved
#4	((developing country[tw] OR developing countries[tw] OR developing nation[tw] OR developing nations[tw] OR developing population[tw] OR developing populations[tw] OR developing world[tw] OR less developed country[tw] OR less developed countries[tw] OR less developed nation[tw] OR less developed nations[tw] OR less developed population[tw] OR less developed populations[tw] OR less developed world[tw] OR lesser developed country[tw] OR lesser developed countries[tw] OR lesser developed nation[tw] OR lesser developed nations[tw] OR lesser developed population[tw] OR lesser developed populations[tw] OR lesser developed world[tw] OR under developed country[tw] OR under developed countries[tw] OR under developed nation[tw] OR under developed nations[tw] OR under developed population[tw] OR under developed populations[tw] OR under developed world[tw] OR underdeveloped country[tw] OR underdeveloped countries[tw] OR underdeveloped nation[tw] OR underdeveloped nations[tw] OR underdeveloped population[tw] OR underdeveloped populations[tw] OR underdeveloped world[tw] OR middle income country[tw] OR middle income countries[tw] OR middle income nation[tw] OR middle income nations[tw] OR middle income population[tw] OR middle income populations[tw] OR low income country[tw] OR low income countries[tw] OR low income nation[tw] OR low income nations[tw] OR low income population[tw] OR low income populations[tw] OR lower income country[tw] OR lower income countries[tw] OR lower income nation[tw] OR lower income nations[tw] OR lower income population[tw] OR lower income populations[tw] OR underserved country[tw] OR underserved countries[tw] OR underserved nation[tw] OR underserved nations[tw] OR underserved population[tw] OR underserved populations[tw] OR underserved world[tw] OR under served country[tw] OR under served countries[tw] OR under served nation[tw] OR under served nations[tw] OR under served population[tw] OR under served populations[tw] OR under served world[tw] OR deprived country[tw] OR deprived countries[tw] OR deprived nation[tw] OR deprived nations[tw] OR deprived population[tw] OR deprived populations[tw] OR deprived world[tw] OR poor country[tw] OR poor countries[tw] OR poor nation[tw] OR poor nations[tw] OR poor population[tw] OR poor populations[tw] OR poor world[tw] OR poorer country[tw] OR poorer countries[tw] OR poorer nation[tw] OR poorer nations[tw] OR poorer population[tw] OR poorer populations[tw] OR poorer world[tw] OR developing economy[tw] OR developing economies[tw] OR less developed economy[tw] OR less developed economies[tw] OR lesser developed economy[tw] OR lesser developed economies[tw] OR under developed economy[tw] OR under developed economies[tw] OR underdeveloped economy[tw] OR underdeveloped economies[tw] OR middle income economy[tw] OR middle income economies[tw] OR low income economy[tw] OR low income economies[tw] OR lower income economy[tw] OR lower income economies[tw] OR low gdp[tw] OR low gnp[tw] OR low gross domestic[tw] OR low gross national[tw] OR lower gdp[tw] OR lower gnp[tw] OR lower gross domestic[tw] OR lower gross national[tw] OR lmic[tw] OR lmic[tw] OR lmic[tw] OR third world[tw] OR lami country[tw] OR lami countries[tw] OR transitional country[tw] OR transitional countries[tw] OR (Africa[tw] OR Asia[tw] OR Caribbean[tw] OR West Indies[tw] OR South America[tw] OR Latin America[tw] OR Central America[tw] OR Afghanistan[tw] OR Albania[tw] OR Algeria[tw] OR Angola[tw] OR Antigua[tw] OR Barbuda[tw] OR Argentina[tw] OR Armenia[tw] OR Armenian[tw] OR Aruba[tw] OR Azerbaijan[tw] OR Bahrain[tw] OR Bangladesh[tw] OR Barbados[tw] OR Benin[tw] OR Belarus[tw] OR Byelorussian[tw] OR Belarus[tw] OR Belorussian[tw] OR Belorussia[tw] OR Belize[tw] OR Bhutan[tw] OR Bolivia[tw] OR Bosnia[tw] OR Herzegovina[tw] OR Hercegovina[tw] OR Botswana[tw] OR Brasil[tw] OR Brazil[tw] OR Bulgaria[tw] OR Burkina Faso[tw] OR Burkina Fasso[tw] OR Upper Volta[tw] OR Burundi[tw] OR Urundi[tw] OR Cambodia[tw] OR Khmer Republic[tw] OR Kampuchea[tw] OR Cameroon[tw] OR Cameroons[tw] OR Cameron[tw] OR Camerons[tw] OR Cape Verde[tw] OR Central African Republic[tw] OR Chad[tw] OR Chile[tw] OR China[tw] OR Colombia[tw] OR Comoros[tw] OR Comoro Islands[tw] OR Comores[tw] OR Mayotte[tw] OR Congo[tw] OR Zaire[tw] OR Costa Rica[tw] OR Cote d'Ivoire[tw] OR Ivory Coast[tw] OR Croatia[tw] OR Cuba[tw] OR Cyprus[tw] OR Czechoslovakia[tw] OR Czech Republic[tw] OR Slovakia[tw] OR Slovak Republic[tw] OR Djibouti[tw] OR French Somaliland[tw] OR Dominica[tw] OR Dominican	1903167

Search	Query	Records retrieved
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#5	#1 AND #2 AND #3 AND #4	956
	Limited to 1978 onwards in English language only	863

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Community health worker	Program	MCH	LMIC
MH “community health workers” OR MH “rural health personnel” OR TX “community health worker*” OR TX “community health aide*” OR TX “village health worker*” OR TX “barefoot doctor*” OR TX “family planning personnel*” OR TX “health extension worker*” OR TX “lady health worker*” OR TX “community health agent*” OR TX “Shasthyo Sebika*” OR TX “community nutrition worker*” OR TX “maternal health worker*” OR TX “voluntary Malaria worker*” OR TX “village malaria worker*” OR TX “Raedat” OR TX “postnatal support worker*” OR TX “mental health worker*” OR TX “mother coordinator*” OR TX “rural health worker*” OR TX “village health promoter*” OR TX accompagnateur* OR TX “Saksham Sahaya*” OR TX “anganwandi worker*” OR TX “accredited social health activist*” OR TX “community-based worker*” OR TX “community health volunteer*” OR TX “village health guide*” OR TX “maternal and child health promotion worker*” OR TX “maternal child health worker*” OR TX “kader posyandu*” OR TX behvarz* OR TX “village health helper*” OR TX “colaborador voluntario*” OR TX “nutrition volunteers*” OR TX “village drug-kit manager*” OR TX brigadistas* OR TX “female community health volunteer*” OR TX “Agente Comunitario de Salud*” OR TX “nutrition worker*” OR TX “community reproductive health worker*” OR TX “community drug distributor*” OR TX “community volunteer*”	TX Program OR TX programs OR TX programme OR TX programmes OR TX initiative* OR TX project OR TX projects	MH “Maternal-Child Health” OR TX “maternal-child health”	MH “low and middle income countries” OR MH “developing countries” OR TX Afghanistan OR TX Albania OR TX Algeria OR TX Angola OR TX Antigua OR TX Barbuda OR TX Argentina OR TX Armenia OR TX Armenian OR TX Aruba OR TX Azerbaijan OR TX Bahrain OR TX Bangladesh OR TX Barbados OR TX Benin OR TX Byelarus OR TX Byelorussian OR TX Belarus OR TX Belorussian OR TX Belorussia OR TX Belize OR TX Bhutan OR TX Bolivia OR TX Bosnia OR TX Herzegovina OR TX Hercegovina OR TX Botswana OR TX Brasil OR TX Brazil OR TX Bulgaria OR TX Burkina Faso OR TX Burkina Fasso OR TX Upper Volta OR TX Burundi OR TX Urundi OR TX Cambodia OR TX Khmer Republic OR TX Kampuchea OR TX Cameroon OR TX Camerouns OR TX Cameron OR TX Camerons OR TX Cape Verde OR TX “Central Africa Republic” OR TX Chad OR TX Chile OR TX China OR TX Colombia OR TX Comoros OR TX “Comoro Islands” OR TX Comores OR TX Mayotte OR TX Congo OR TX Zaire OR TX “Costa Rica” OR TX “Cote d'Ivoire” OR TX “Ivory Coast” OR TX Croatia OR TX Cuba OR TX Cyprus OR TX Czechoslovakia OR TX “Czech Republic” OR TX Slovakia OR TX “Slovak Republic” OR TX Djibouti OR TX “French Somaliland” OR TX Dominica OR TX “Dominican Republic” OR TX “East Timor” OR TX “East Timur” OR TX “Timor Leste” OR TX Ecuador OR TX Egypt OR TX “United Arab Republic” OR TX “El Salvador” OR TX Eritrea OR TX Estonia OR TX Ethiopia OR TX Fiji OR TX Gabon OR TX “Gabonese Republic” OR TX Gambia OR TX Gaza OR TX “Georgia Republic” OR TX “Georgian Republic” OR TX Ghana OR TX “Gold Coast” OR TX Greece OR TX Grenada OR TX Guatemala OR TX Guinea OR TX Guam OR TX Guiana OR TX Guyana OR TX Haiti OR TX Honduras OR TX Hungary OR TX India OR TX Maldives OR TX Indonesia OR TX Iran OR TX Iraq OR TX “Isle of Man” OR TX Jamaica OR TX Jordan OR TX Kazakhstan OR TX Kazakh OR TX Kenya OR TX Kiribati OR TX Korea OR TX Kosovo OR TX Kyrgyzstan OR TX Kirghizia OR TX “Kyrgyz Republic” OR TX Kirghiz OR TX Kirgizstan OR TX “Lao PDR” OR TX Laos OR TX Latvia OR TX Lebanon OR

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Community health worker	Program	MCH	LMIC
OR TX "community health advocate*" OR TX "lay health visitor*" OR TX "Promotoras de Salud"			TX Lesotho OR TX Basutoland OR TX Liberia OR TX Libya OR TX Lithuania OR TX Macedonia OR TX Madagascar OR TX "Malagasy Republic" OR TX Malaysia OR TX Malaya OR TX Malay OR TX Sabah OR TX Sarawak OR TX Malawi OR TX Nyasaland OR TX Mali OR TX Malta OR TX "Marshall Islands" OR TX Mauritania OR TX Mauritius OR TX "Agalga Islands" OR TX Mexico OR TX Micronesia OR TX "Middle East" OR TX Moldova OR TX Moldavia OR TX Moldovan OR TX Mongolia OR TX Montenegro OR TX Morocco OR TX Ifni OR TX Mozambique OR TX Myanmar OR TX Myanma OR TX Burma OR TX Namibia OR TX Nepal OR TX "Netherlands Antilles" OR TX "New Caledonia" OR TX Nicaragua OR TX Niger OR TX Nigeria OR TX "Northern Mariana Islands" OR TX Oman OR TX Muscat OR TX Pakistan OR TX Palau OR TX Palestine OR TX Panama OR TX Paraguay OR TX Peru OR TX Philippines OR TX Philipines OR TX Phillipines OR TX Phillipines OR TX Poland OR TX Portugal OR TX "Puerto Rico" OR TX Romania OR TX Rumania OR TX Roumania OR TX Russia OR TX Russian OR TX Rwanda OR TX Ruanda OR TX "Saint Kitts" OR TX "St Kitts" OR TX Nevis OR TX "Saint Lucia" OR TX "St Lucia" OR TX "Saint Vincent" OR TX "St Vincent" OR TX Grenadines OR TX Samoa OR TX "Samoan Islands" OR TX "Navigator Island" OR TX "Navigator Islands" OR TX "Sao Tome" OR TX "Saudi Arabia" OR TX Senegal OR TX Serbia OR TX Montenegro OR TX Seychelles OR TX "Sierra Leone" OR TX Slovenia OR TX "Sri Lanka" OR TX Ceylon OR TX "Solomon Islands" OR TX Somalia OR TX Sudan OR TX Suriname OR TX Surinam OR TX Swaziland OR TX Syria OR TX Tajikistan OR TX Tadjikistan OR TX Tadjik OR TX Tadjik OR TX Tanzania OR TX Thailand OR TX Togo OR TX "Togolese Republic" OR TX Tonga OR TX Trinidad OR TX Tobago OR TX Tunisia OR TX Turkey OR TX Turkmenistan OR TX Turkmen OR TX Uganda OR TX Ukraine OR TX Uruguay OR TX USSR OR TX "Soviet Union" OR TX "Union of Soviet Socialist Republics" OR TX Uzbekistan OR TX Uzbek OR TX Vanuatu OR TX "New Hebrides" OR TX Venezuela OR TX Vietnam OR TX "Viet Nam" OR TX "West Bank" OR TX Yemen OR TX Yugoslavia OR TX Zambia OR TX Zimbabwe OR TX Rhodesia

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EMBASE

Community health worker	Program	MCH	LMIC
"Health Auxiliary"/de OR "community health worker*":ti,ab OR "community health aide*":ti,ab OR "village health worker*":ti,ab OR "barefoot doctor*":ti,ab OR "family planning personnel*":ti,ab OR "health extension worker*":ti,ab OR "lady health worker*":ti,ab OR "community health agent*":ti,ab OR "Shasthyo Sebika*":ti,ab OR "community nutrition worker*":ti,ab OR "maternal health worker*":ti,ab OR "voluntary Malaria worker*":ti,ab OR "village malaria worker*":ti,ab OR Raedat*:ti,ab OR "postnatal support worker*":ti,ab OR "mental health worker*":ti,ab OR "mother coordinator*":ti,ab OR "rural health worker*":ti,ab OR "village health promoter*":ti,ab OR accompagnateur*:ti,ab OR "Saksham Sahaya*":ti,ab OR "anganwandi worker*":ti,ab OR "accredited social health activist*":ti,ab OR "community- based worker*":ti,ab OR "community health volunteer*":ti,ab OR "village health guide*":ti,ab OR "maternal and child health promotion worker*":ti,ab OR "maternal child health worker*":ti,ab OR "kader posyandu*":ti,ab OR behvarz*:ti,ab OR "village health helper*":ti,ab OR "colaborador	Program:ti,ab OR programs:ti,ab OR programme:ti,ab OR programmes:ti,a b OR initiative*:ti,ab OR project:ti,ab OR projects:ti,ab	"Maternal child health care"/de OR "Maternal Welfare":ti,ab OR "child health":ti,ab OR "child care":ti,ab OR "child welfare":ti,ab OR "maternal-child health services":ti,ab OR "child health services":ti,ab OR "maternal child health":ti,ab OR "maternal newborn child health":ti,ab	Afghanistan:ti,ab OR Albania:ti,ab OR Algeria:ti,ab OR Angola:ti,ab OR Antigua:ti,ab OR Barbuda:ti,ab OR Argentina:ti,ab OR Armenia:ti,ab OR Armenian:ti,ab OR Aruba:ti,ab OR Azerbaijan:ti,ab OR Bahrain:ti,ab OR Bangladesh:ti,ab OR Barbados:ti,ab OR Benin:ti,ab OR Byelarus:ti,ab OR Byelorussian:ti,ab OR Belarus:ti,ab OR Belorussian:ti,ab OR Belorussia:ti,ab OR Belize:ti,ab OR Bhutan:ti,ab OR Bolivia:ti,ab OR Bosnia:ti,ab OR Herzegovina:ti,ab OR Hercegovina:ti,ab OR Botswana:ti,ab OR Brasil:ti,ab OR Brazil:ti,ab OR Bulgaria:ti,ab OR Burkina Faso:ti,ab OR "Burkina Fasso":ti,ab OR "Upper Volta":ti,ab OR Burundi:ti,ab OR Urundi:ti,ab OR Cambodia:ti,ab OR "Khmer Republic":ti,ab OR Kamptchea:ti,ab OR Cameroon:ti,ab OR Camerouns:ti,ab OR Cameron:ti,ab OR Camerons:ti,ab OR "Cape Verde":ti,ab OR "Central African Republic":ti,ab OR Chad:ti,ab OR Chile:ti,ab OR China:ti,ab OR Colombia:ti,ab OR Comoros:ti,ab OR "Comoro Islands":ti,ab OR Comores:ti,ab OR Mayotte:ti,ab OR Congo:ti,ab OR Zaire:ti,ab OR "Costa Rica":ti,ab OR "Cote d Ivoire":ti,ab OR "Ivory Coast":ti,ab OR Croatia:ti,ab OR Cuba:ti,ab OR Cyprus:ti,ab OR Czechoslovakia:ti,ab OR "Czech Republic":ti,ab OR Slovakia:ti,ab OR "Slovak Republic":ti,ab OR Djibouti:ti,ab OR "French Somaliland":ti,ab OR Dominica:ti,ab OR "Dominican Republic":ti,ab OR "East Timor":ti,ab OR "East Timur":ti,ab OR "Timor Leste":ti,ab OR Ecuador:ti,ab OR Egypt:ti,ab OR "United Arab Republic":ti,ab OR "El Salvador":ti,ab OR Eritrea:ti,ab OR Estonia:ti,ab OR Ethiopia:ti,ab OR Fiji:ti,ab OR Gabon:ti,ab OR "Gabonese Republic":ti,ab OR Gambia:ti,ab OR Gaza:ti,ab OR "Georgia Republic":ti,ab OR "Georgian Republic":ti,ab OR Ghana:ti,ab OR Gold Coast:ti,ab OR Greece:ti,ab OR Grenada:ti,ab OR Guatemala:ti,ab OR Guinea:ti,ab OR Guam:ti,ab OR Guiana:ti,ab OR Guyana:ti,ab OR Haiti:ti,ab OR Honduras:ti,ab OR Hungary:ti,ab OR India:ti,ab OR Maldives:ti,ab OR Indonesia:ti,ab OR Iran:ti,ab OR Iraq:ti,ab OR "Isle of Man":ti,ab OR Jamaica:ti,ab OR Jordan:ti,ab OR Kazakhstan:ti,ab OR Kazakh:ti,ab OR Kenya:ti,ab OR Kiribati:ti,ab OR Korea:ti,ab OR Kosovo:ti,ab OR Kyrgyzstan:ti,ab OR Kirghizia:ti,ab OR "Kyrgyz Republic":ti,ab OR Kirghiz:ti,ab OR Kirgizstan:ti,ab OR Lao PDR:ti,ab OR Laos:ti,ab OR Latvia:ti,ab OR Lebanon:ti,ab OR Lesotho:ti,ab OR Basutoland:ti,ab OR Liberia:ti,ab OR Libya:ti,ab OR Lithuania:ti,ab OR Macedonia:ti,ab OR Madagascar:ti,ab OR "Malagasy Republic":ti,ab OR Malaysia:ti,ab OR Malaya:ti,ab OR Malay:ti,ab OR

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Community health worker	Program	MCH	LMIC
<p>voluntario*:ti,ab OR "nutrition volunteers*":ti,ab OR "village drug-kit manager*":ti,ab OR brigadistas*:ti,ab OR "female community health volunteer*":ti,ab OR "Agente Comunitario de Salud*":ti,ab OR "nutrition worker*":ti,ab OR "community reproductive health worker*":ti,ab OR "community drug distributor*":ti,ab OR "community volunteer*":ti,ab OR "community health advocate*":ti,ab OR "lay health visitor*":ti,ab OR "Promotoras de Salud":ti,ab</p>			<p>Sabah:ti,ab OR Sarawak:ti,ab OR Malawi:ti,ab OR Nyasaland:ti,ab OR Mali:ti,ab OR Malta:ti,ab OR "Marshall Islands":ti,ab OR Mauritania:ti,ab OR Mauritius:ti,ab OR "Agalega Islands":ti,ab OR Mexico:ti,ab OR Micronesia:ti,ab OR "Middle East":ti,ab OR Moldova:ti,ab OR Moldavia:ti,ab OR Moldovan:ti,ab OR Mongolia:ti,ab OR Montenegro:ti,ab OR Morocco:ti,ab OR Ifni:ti,ab OR Mozambique:ti,ab OR Myanmar:ti,ab OR Myanma:ti,ab OR Burma:ti,ab OR Namibia:ti,ab OR Nepal:ti,ab OR "Netherlands Antilles":ti,ab OR "New Caledonia":ti,ab OR Nicaragua:ti,ab OR Niger:ti,ab OR Nigeria:ti,ab OR "Northern Mariana Islands":ti,ab OR Oman:ti,ab OR Muscat:ti,ab OR Pakistan:ti,ab OR Palau:ti,ab OR Palestine:ti,ab OR Panama:ti,ab OR Paraguay:ti,ab OR Peru:ti,ab OR Philippines:ti,ab OR Philipines:ti,ab OR Phillipines:ti,ab OR Phillippines:ti,ab OR Poland:ti,ab OR Portugal:ti,ab OR "Puerto Rico":ti,ab OR Romania:ti,ab OR Rumania:ti,ab OR Roumania:ti,ab OR Russia:ti,ab OR Russian:ti,ab OR Rwanda:ti,ab OR Ruanda:ti,ab OR "Saint Kitts":ti,ab OR St Kitts:ti,ab OR Nevis:ti,ab OR "Saint Lucia":ti,ab OR "St Lucia":ti,ab OR "Saint Vincent":ti,ab OR "St Vincent":ti,ab OR Grenadines:ti,ab OR Samoa:ti,ab OR "Samoa Island":ti,ab OR "Navigator Island":ti,ab OR "Navigator Islands":ti,ab OR Sao Tome:ti,ab OR "Saudi Arabia":ti,ab OR Senegal:ti,ab OR Serbia:ti,ab OR Montenegro:ti,ab OR Seychelles:ti,ab OR "Sierra Leone":ti,ab OR Slovenia:ti,ab OR "Sri Lanka":ti,ab OR Ceylon:ti,ab OR "Solomon Islands":ti,ab OR Somalia:ti,ab OR Sudan:ti,ab OR Suriname:ti,ab OR Surinam:ti,ab OR Swaziland:ti,ab OR Syria:ti,ab OR Tajikistan:ti,ab OR Tadjikistan:ti,ab OR Tadjik:ti,ab OR Tanzania:ti,ab OR Thailand:ti,ab OR Togo:ti,ab OR "Togolese Republic":ti,ab OR Tonga:ti,ab OR Trinidad:ti,ab OR Tobago:ti,ab OR Tunisia:ti,ab OR Turkey:ti,ab OR Turkmenistan:ti,ab OR Turkmen:ti,ab OR Uganda:ti,ab OR Ukraine:ti,ab OR Uruguay:ti,ab OR USSR:ti,ab OR "Soviet Union":ti,ab OR "Union of Soviet Socialist Republics":ti,ab OR Uzbekistan:ti,ab OR Uzbek OR Vanuatu:ti,ab OR "New Hebrides":ti,ab OR Venezuela:ti,ab OR Vietnam:ti,ab OR Viet Nam:ti,ab OR West Bank:ti,ab OR Yemen:ti,ab OR Yugoslavia:ti,ab OR Zambia:ti,ab OR Zimbabwe:ti,ab OR Rhodesia:ti,ab OR "Developing Country"/de OR Africa/exp OR Asia/exp OR Caribbean/exp OR "West Indies"/exp OR "South America"/exp OR "Latin America"/exp OR "Central America"/exp OR "Developing Countr*":ti,ab</p>

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SCOPUS

Community health worker	Program	MCH	LMIC
<p>“Health Auxiliary” OR “community health worker*” OR “community health aide*” OR “village health worker*” OR “barefoot doctor*” OR “family planning personnel*” OR “health extension worker*” OR “lady health worker*” OR “community health agent*” OR “Shasthyo Sebika*” OR “community nutrition worker*” OR “maternal health worker*” OR “voluntary Malaria worker*” OR “village malaria worker*” OR Raedat* OR “postnatal support worker*” OR “mental health worker*” OR “mother coordinator*” OR “rural health worker*” OR “village health promoter*” OR accompagnateur* OR “Saksham Sahaya*” OR “anganwandi worker*” OR “accredited social health activist*” OR “community-based worker*” OR “community health volunteer*” OR “village health guide*” OR “maternal and child health promotion worker*” OR “maternal child health worker*” OR “kader posyandu*” OR behvarz* OR “village health helper*” OR “colaborador voluntario*” OR “nutrition volunteers*” OR “village drug-kit manager*” OR brigadistas* OR “female community health volunteer*” OR “Agente Comunitario de Salud*” OR “nutrition worker*” OR “community reproductive health worker*” OR “community drug distributor*” OR “community</p>	<p>Program OR programs OR programme OR programmes OR initiative* OR project OR projects</p>	<p>“Maternal child health care”/de OR “Maternal Welfare” OR “child health” OR “child care” OR “child welfare” OR “maternal-child health services” OR “child health services” OR “maternal child health” OR “maternal newborn child health”</p>	<p>Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussia* OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR Brazil OR Bulgaria OR Burkina Faso OR “Burkina Fasso” OR “Upper Volta” OR Burundi OR Urundi OR Cambodia OR “Khmer Republic” OR Kampuchea OR Cameroon OR Camerons OR Cameron OR Camerons OR “Cape Verde” OR “Central African Republic” OR Chad OR Chile OR China OR Colombia OR Comoros OR “Comoro Islands” OR Comores OR “Congo” OR Zaire OR “Costa Rica” OR “Cote d’Ivoire” OR “Ivory Coast” OR Croatia OR Cuba OR Cyprus OR Czechoslovakia OR “Czech Republic” OR Slovakia OR “Slovak Republic” OR Djibouti OR “French Somaliland” OR Dominica OR “Dominican Republic” OR “East Timor” OR “East Timur” OR “Timor Leste” OR Ecuador OR Egypt OR “United Arab Republic” OR “El Salvador” OR Eritrea OR Estonia OR Ethiopia OR Fiji OR Gabon OR “Gabonese Republic” OR Gambia OR Gaza OR “Georgia Republic” OR “Georgian Republic” OR Ghana OR Gold Coast OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR “Isle of Man” OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR “Kyrgyz Republic” OR Kirghz OR Kirgizstan OR Lao PDR OR Laos OR Latvia OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Lithuania OR Macedonia OR Madagascar OR “Malagasy Republic” OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR “Marshall Islands” OR Mauritania OR Mauritius OR “Agalega Islands” OR Mexico OR Micronesia OR “Middle East” OR Moldova OR Moldovia OR Moldovan OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia</p>

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Community health worker	Program	MCH	LMIC
volunteer*” OR “community health advocate*” OR “lay health visitor*” OR “Promotoras de Salud”			OR Nepal OR “Netherlands Antilles” OR “New Caledonia” OR Nicaragua OR Niger OR Nigeria OR “Northern Mariana Islands” OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR Poland OR Portugal OR “Puerto Rico” OR Romania OR Rumania OR Roumania OR Russia OR Russian OR Rwanda OR Ruanda OR “Saint Kitts” OR St Kitts OR Nevis OR “Saint Lucia” OR “St Lucia” OR “Saint Vincent” OR “St Vincent” OR Grenadines OR Samoa OR “Samoan Islands” OR “Navigator Island” OR “Navigator Islands” OR Sao Tome OR “Saudi Arabia” OR Senegal OR Serbia OR Montenegro OR Seychelles OR “Sierra Leone” OR Slovenia OR Sri Lanka” OR Ceylon OR “Solomon Islands” OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadjhikistan OR Tadjikistan OR Tadjhik OR Tanzania OR Thailand OR Togo OR “Togolese Republic” OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uruguay OR USSR OR “Soviet Union” OR “Union of Soviet Socialist Republics” OR Uzbekistan OR Uzbek OR Vanuatu OR “New Hebrides” OR Venezuela OR Vietnam OR Viet Nam OR West Bank OR Yemen OR Yugoslavia OR Zambia OR Zimbabwe OR Rhodesia OR “Developing Country” OR Africa OR Asia OR Caribbean OR “West Indies” OR “South America” OR “Latin America” OR “Central America” OR “Developing Countr*”

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Appendix II: Data Charting Form

Scoping Review Title: Application of Primary Health Care Principles in National Community Health Worker Programs in Low- and Middle –Income Countries?	
Data charted by:	
Date of data charting:	
Study Details and Characteristics	
Study citation details (author, year, title, journal, volume, issue, pages)	
Country of origin	
Study objective / aim	
Type of Study	Qualitative / Quantitative
Methods:	
Study Setting:	
CHW Program Details	
Name of the CHW Program	
Objective of the CHW Program	
Year the program started	
End date	
Implemented by	
Funded by	
Details / Results charted from the Study (in relation to the concept of the scoping review)	
Which PHC principle is reflected in the reported objective of the national program?	<ul style="list-style-type: none"> • Universal access / Equity • Community participation • Intersectoral collaboration • Appropriateness
How are they implementing the PHC principle (s)?	
Stated outcome / achievement of the CHW program with reference to PHC principle (s)	
Key findings of the article	
Characteristics of CHWs	
Key role of CHWs stated	
Nomenclature of CHWs	
Gender	
Employment status	
Pre-service training	
Catchment area	
Additional notes:	

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	
Limitations	20	Discuss the limitations of the scoping review process.	
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: 10.7326/M18-0850.



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3 1 **Title of the article:** Application of Primary Health Care Principles in National
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5 2 Community Health Worker Programs in low- and Middle -Income Countries: A Scoping
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7 3 Review
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27 **Abstract**

28 **Objective:** To identify which PHC principles are reflected in the implementation of
29 national CHW programs and how they may contribute to the outcomes of these
30 programs in the context of low-and middle-income countries (LMICs).

31 **Design:** Scoping review

32 **Data sources:** A systematic search was conducted through PubMed, CINAHL,
33 EMBASE and Scopus databases.

34 **Eligibility Criteria:** The review only considered published primary studies on national
35 programs, projects or initiatives utilising the services of CHWs in LMICs focused on
36 maternal and child health. We included only English language studies. Excluded were
37 programs operated by non-government organisations, study protocols, reviews,
38 commentaries, opinion papers, editorials and conference proceedings.

39 **Data extraction and Synthesis:** We reviewed the application of four PHC principles
40 (universal health coverage, community participation, intersectoral coordination and
41 appropriateness) in the CHW program's objectives, implementation and stated
42 outcomes. Data extraction was undertaken systematically in an excel spreadsheet
43 while the findings were synthesised in a narrative manner. The quality appraisal of the
44 selected studies was not performed in this scoping review.

45 **Results:** From 1,280 papers published between 1983 and 2019, 26 met the inclusion
46 criteria. These 26 papers included 14 CHW programs from 13 LMICs. Universal health
47 coverage and community participation were the two commonly reported PHC
48 principles, while intersectoral coordination was generally missing. Similarly, the
49 cultural acceptability aspect of the principle of appropriateness was present in all
50 programs as these programs select CHWs from within the communities. Other
51 aspects, particularly effectiveness, were not evident.

52 **Conclusion:** The implementation of PHC principles across national CHW programs
53 in LMICs is patchy. For comprehensiveness and improved health outcomes, programs
54 need to incorporate all attributes of PHC principles. Future research may focus on how
55 to incorporate more attributes of PHC principles while implementing national CHW
56 programs in LMICs. Better documentation and publications of CHW program
57 implementation are also needed.

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Keywords: Primary Health Care, Community Health Worker; Community Health Program; Low-and Middle-Income Countries.

Strengths and limitations of the study

- CHW programs in developing and lower middle income countries are an essential aspect of the strategy to achieve health for all and sustainable development goals, and this scoping review can be considered as an important step towards reviewing national community health worker programs in LMICs applying the lens of primary health care principles
- Four bibliographic databases were searched using a basic search strategy that was modified as per the database requirement.
- The studies were heterogeneous in their methods and outcomes assessed and that posed a challenge in comparing primary health care principles
- The generalisability of the results of this study is limited to larger national-level programs in developing and lower- and middle-income countries only.

73 BACKGROUND

74 Primary Health Care (PHC), as an approach to a reorientation of health services and
75 provision of universal health care, has remained the benchmark for most countries'
76 discourse on health since the PHC approach was mobilized by the Alma Ata Health
77 for All (HFA) declaration for comprehensive, evidence-based responses to local health
78 needs with reference to the social context.¹ PHC is a whole-of-society approach to
79 health and aims to attain the highest possible level and distribution of health and well-
80 being by providing an accessible and wide range of services, including health
81 promotion; disease prevention, treatment and rehabilitation; and palliative care.¹

82 'Health for All' requires that health systems respond to the challenges of a changing
83 world and growing expectations for better performance. PHC includes the key
84 elements needed to improve health security, through a focus on community
85 engagement, preventative collective action, access to good quality medicines, rational
86 prescribing, and a core set of essential public health functions, including surveillance
87 and early response.¹ A PHC approach achieves this by strengthening community-
88 based initiatives and building resilience.

89 Across a wide variety of settings in low-, middle-, and high-income countries, PHC-
90 oriented health systems have consistently produced better health outcomes,
91 enhanced equity, and improved efficiency.¹ In Brazil, for example, enrolment in the
92 family health strategy has been linked to a higher likelihood of regular care, better
93 access to medication, and improved patient satisfaction. Hence, PHC has been rightly
94 advocated as the key to achieving HFA and the 2018 Astana Declaration reiterated
95 the importance of this approach for achieving Universal Health Coverage (UHC).^{2 3}

96 PHC, as an approach to achieve HFA goals,' was built on the principles of equity in
97 access to health services and the right of people to participate in decisions about their
98 own health care.¹ These principles i.e. 'equity' and 'community empowerment'
99 underpin preventive and promotive health services, appropriate technology, and
100 intersectoral collaboration.⁴ Evidence suggests that if countries have explicitly
101 organised their health systems around PHC principles, it has led to improved health
102 outcomes. For example, in Portugal, by 2008, the life expectancy at birth increased
103 9.2 years more than it was 30 years ago. In Congo, the case-fatality rate after
104 caesarean section dropped from 7% to less than 3% from 1985 to 2000. In, Iran, the

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3 105 under-five child mortality reduced from 80 per 1000 to less than 20 per 1000 in rural
4 106 areas from 1980 to 2000.⁵

7 107 PHC's emphasis on community-based services is an important way to ensure access,
8 108 even in rural, remote areas and for disadvantaged populations. With limited resources
9 109 and geographical and epidemiological context, it is a challenge for health care systems
10 110 in LMICs to reach out to the whole populations. Therefore, as part of the PHC
11 111 approach and with a view to its principle of community empowerment, CHW programs
12 112 were envisioned as a way to reach a wider population for essential health needs and
13 113 to achieve HFA. National CHW programs were implemented by many governments
14 114 from 1978.⁶⁻¹⁰ Established under the PHC principles, these programs were expected
15 115 to encompass and promote them and in doing so achieve improvements in health
16 116 outcomes.¹¹ The focus of this study is 'strengthening community-based initiatives' part
17 117 of the PHC approach i.e. CHW programs that operate at the interface between
18 118 communities and the primary care level of the health system.

21 119 National CHW programs, as vehicles to incorporate PHC principles into healthcare
22 120 provision, have contributed significantly in reducing under-five child mortality in
23 121 Brazil¹², Indonesia¹², and Nepal¹³. In Indonesia, immunization coverage also
24 122 improved many-fold with an increase in community health workers. These examples
25 123 demonstrate a clear link and need for incorporating PHC principles when implementing
26 124 CHW programs. Over decades of implementation CHW programs have also faced
27 125 various challenges including the loss of the PHC movement.^{14 15} Though, the PHC
28 126 principles are evident in the program design and policies of the CHW programs in
29 127 various countries.¹⁶⁻²⁰ There is not widespread/comprehensive evidence of the extent
30 128 to which PHC principles are systematically applied across the national CHW
31 129 programs. This study aims to identify the PHC principles in the implementation of these
32 130 programs in the context of LMICs and to understand their contribution to the outcomes
33 131 of those programs.

34 132 **METHODS**

35 133 A systematic scoping review was conducted using a predefined protocol²¹ and
36 134 reported as per the Preferred Reporting Items for Systematic Reviews and Meta-
37 135 analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.²² The databases
38 136 searched in September 2019 were PubMed (MEDLINE), CINAHL (EBSCOhost),

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3 137 EMBASE (Elsevier) and Scopus (Elsevier). The review only considered published
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5 138 primary studies on programs, projects or initiatives utilising the services of CHWs in
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7 139 LMICs. We focused on the national level CHW programs defined as any CHW
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9 140 program that is operated or implemented by the government of a specific country, on
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11 141 multiple sites (jurisdictions/provinces/regions) within a country and has been functional
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13 142 for a minimum of three years. We considered national CHW programs with a maternal
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15 143 and child health (MCH) focus as it is a national priority in the majority of LMICs.

16 144 Papers published only in the English language from October 1978 to September 2019
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18 145 were considered as 1978 was the year of the Alma-Ata declaration that promoted the
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20 146 establishment of national-level CHW programs under the PHC principles. Excluded
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22 147 were study protocols, narrative reviews, commentaries, text and opinion papers,
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24 148 viewpoints, editorials, conference proceedings/abstracts, correspondences,
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26 149 systematic and scoping reviews and the papers on the CHW programs operated by a
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28 150 non-government organisation (NGOs). Papers were also excluded if they involved
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30 151 health professionals other than CHWs such as midwives, nurses and traditional birth
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32 152 attendants. Papers were not excluded based on the unavailability of the abstract.

33 153 The search strategy, including all identified keywords and index terms, was adapted
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35 154 for each included database (appendix I – logic grid). The search terms used included
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37 155 “community health worker”, “Program”, “Maternal and Child Health” and “Low-and
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39 156 Middle-Income Countries”. The results of the search are presented in the PRISMA-
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41 157 ScR flow diagram in the results section.

42 158 Following the search, all identified records were collated and uploaded into Covidence
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44 159 software²³ and duplicates removed. Two authors (SP and ZL) independently screened
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46 160 titles and abstracts and then matched the full texts selected during screening against
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48 161 the inclusion criteria. The reference lists of relevant papers were also searched for
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50 162 additional studies. Papers meeting the inclusion criteria were included in the review
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52 163 for data charting. In scoping reviews, the data extraction process is referred to as
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54 164 charting the results.²⁴ SP and ZL completed data charting using a pre-developed data
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56 165 charting form. Key attributes of the data charting form included the country of origin,
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58 166 study objective, design and key findings, name of the CHW program, objective, and
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60 167 reflection of PHC principle/s in program objective, implementation activities, and stated
60 168 outcomes along with the selection process of CHWs (appendix II). The data charting

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3 169 form was pilot tested and modified accordingly. The operational definition of the PHC
4 170 principles used as reference in this scoping review are as follows:

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7 171 1. Universal Health Coverage: all people receive the health services they need,
8 172 including public health services designed to promote better health, prevent illness,
9 173 and to provide treatment, rehabilitation and palliative care of sufficient quality to be
10 174 effective, while at the same time ensuring that the use of these services does not
11 175 expose the user to financial hardship.^{2 25}
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14 176 2. Community Participation: Active community involvement in defining health
15 177 problems and needs, developing solutions and implementing and evaluating
16 178 programs.²
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19 179 3. Intersectoral Coordination: The linkage between health and development.²
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22 180 4. Appropriateness: Services should be effective, culturally acceptable, affordable and
23 181 manageable.²
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26 182 We examined the included studies in light of all or any of the sub-attribute of the above-
27 183 listed four PHC principles and reported accordingly. The evidence is reported if it was
28 184 mentioned explicitly in the article or inferred by the researchers reflecting the
29 185 implementation of PHC principles even if the evidence was about only one aspect of
30 186 a principle. The relevant evidence is extracted and explained in the results section.

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32
33 187 There was no quality assessment conducted of the included studies. The findings were
34 188 synthesised in a tabular and narrative manner. The conceptual framework, including
35 189 definitions of the four principles, for collating and summarizing the data is presented
36 190 in the published protocol.²¹
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39 191 **Patient and public involvement**

40 192 We did not involve patients or the public in this scoping review.

41 193 **RESULTS**

42 194 **Search Results**

43 195 We identified 1,280 citations through database searches. After removing duplicates
44 196 and screening out non-relevant abstracts, we assessed 281 full-text papers for
45 197 eligibility. 263 of those 281 were excluded as these did not meet the eligibility criteria.
46 198 In total, 18 papers^{17-20 26-39}, published from 1983 to 2019 met the eligibility criteria
47 199 (Figure 1). Eight⁴⁰⁻⁴⁷ papers were further included from the reference lists of the
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3 200 included studies, making a total of 26 papers.
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5 201 Of the 26 papers, two studies were conducted in western Asia^{17 35}, 12 studies were
6 202 conducted in South Asia^{18 27 29 31 33 37 38 40-44} and one study in South East Asia.²⁸ Seven
7 203 studies were conducted in Africa ranging from the Horn of Africa^{19 30 45 46}, Central
8 204 Africa²⁰, Western Africa³² and South Africa³⁹. Two studies were conducted in South
9 205 America^{34 47}, one in Central America³⁶ and one study was conducted in the
10 206 Caribbean.²⁶ Altogether, these 26 studies covered 14 CHW programs from 13 LMICs.
11
12 207 Fourteen of the 26 included studies were quantitative^{19 26 28 31 32 34-36 40 42 43 45-47} and 12
13 208 studies were qualitative.^{17 18 20 27 29 30 33 37-39 41 44} Supplementary table 1 provides an
14 209 overview of the included studies outlining the key objective/s, methods and findings as
15 210 reported by the authors.
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26 212 Figure 1: PRISMA flowchart for study selection and inclusion process
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29 214 **Application of PHC Principles**

30 215 The PHC principles were applied to a varied extent in the objective/s, implementation,
31 216 and outcome of the national CHW programs reviewed in this study (Table 1). The
32 217 evidence found in the objective, implementation, or the outcome of the included
33 218 studies related to the application of the four PHC principles is organised in
34 219 supplementary table 2.
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220 Table 1: Application of primary health care principles as reflected in the national community health worker programs

Serial No.	Country / CHWP / year commenced	PHC Principle/s observed in the CHWP Objective	PHC Principle/s observed in the implementation of the CHWP	PHC Principle/s observed in the stated outcome/achievement of the CHWP
1.	IRAN / Women Health Volunteers Program / 1992 ¹⁷	Community Participation	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation - Intersectoral coordination
2.	IRAN / Primary Health Care Network – EPI / 1983 ³⁵	Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Appropriateness
3.	PAKISTAN / National Program for Family Planning & Primary Health Care / 1994 ^{27 33}	Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation
4.	INDIA / Accredited Social Health Activist (ASHA) Program / 2005 ^{31 37 38}	- Universal Health Coverage - Appropriateness	- Universal Health Coverage - Community Participation	- Universal Health Coverage
5.	BANGLADESH / National MCH and Family Planning Program / 1976 ²⁹	Not reported	- Universal Health Coverage - Community Participation	Not reported
6.	NEPAL / Female Community Health Volunteer Program / 1988 ¹⁸	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation	Not reported
7.	CAMBODIA / Village Malaria Worker Project as part of National Malaria Control Program / 2001 ²⁸	Not reported	- Universal Health Coverage - Community Participation*	- Universal Health Coverage
8.	ETHIOPIA / Health Extension Program / 2003 ^{19 30}	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation - Appropriateness

Serial No.	Country / CHWP / year commenced	PHC Principle/s observed in the CHWP Objective	PHC Principle/s observed in the implementation of the CHWP	PHC Principle/s observed in the stated outcome/achievement of the CHWP
9.	RWANDA / RapidSMS program / 2013 ²⁰	- Universal Health Coverage - Appropriateness	- Universal Health Coverage - Community Participation - Appropriateness	- Appropriateness (use of technology, acceptability)
10.	NIGER / Rural Health Improvement Program / 1970s ³²	- Universal Health Coverage	- Universal Health Coverage	Not reported
11.	SOUTH AFRICA / ward-based outreach teams (WBOT) - national CHW program / 2011 ³⁹	- Universal Health Coverage	- Universal Health Coverage - Community Participation	- Appropriateness
12.	BRAZIL / Family Health Program (Programa de Saude da Familia, PSF) / 1994 ³⁴	- Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage
13.	EL SAVADOR / Rural Health Aide Program / 1976 ³⁶	- Universal Health Coverage	- Universal Health Coverage - Community Participation*	- Universal Health Coverage
14.	JAMAICA / Community Health Aide program / 1978 ²⁶	- Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage

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222 CHWP = Community Health Worker Program, PHC = Primary Health Care

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3 223 'Universal health coverage' and 'community participation' were the two commonly
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5 224 reflected PHC principles in the national CHW programs across their objective/s,
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7 225 implementation and outcomes. 'Intersectoral coordination' was only mentioned in the
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9 226 outcome of Iran's Women Health Volunteers (WHV) program.¹⁷ The objective of two
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11 227 CHW programs not reported in the papers reviewed.^{28 29} In addition, studies from
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13 228 Nepal^{18 44}, Bangladesh²⁹, and Niger³² did not report on the outcomes of the CHW
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15 229 programs.

20 230 *Universal Health Coverage (UHC)*

21 231 We reviewed the national CHW programs for the application of this fundamental PHC
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23 232 principle in terms of coverage and access, equity and comprehensiveness. UHC was
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25 233 reflected in the objective of 11 CHW programs^{18-20 26 27 32 34-37 39} and in the
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27 234 implementation of 14^{17-20 26-29 32 34-37 39} programs through the service provision by
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29 235 CHWs in the MCH and family planning domain. These 14 programs reported
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31 236 improvements in the scope [population coverage] and range [comprehensiveness] of
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33 237 health services provided. For example, an outcome of the CHW program in Iran was
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35 238 increased utilisation of MCH care services as a result of the active follow-up by
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37 239 CHWs.¹⁷ The increase in immunisation coverage of children in the rural areas was
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39 240 also attributed to the 'active' approach and vigilance of CHWs and vaccinators serving
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41 241 the PHC network of Iran.³⁵ In Pakistan the CHW program was claimed to be
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43 242 contributing to the increasing utilisation of antenatal care and family planning.²⁷ In
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45 243 Rwanda, mHealth was reported as improving communication between CHWs and
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47 244 community members leading to better use of the health services.²⁰

48 245 The concept of 'care according to need' was reflected in the objective of Pakistan's
49
50 246 CHW program that focuses on the provision of care in underserved areas.²⁷ Service
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52 247 provision to ethnic minorities was one of the focus areas of Nepal's CHW program.¹⁸

53 248 *Community Participation*

54 249 Only three¹⁷⁻¹⁹ of the 14 CHW programs included in this review incorporated
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56 250 community participation in their program objective. In terms of implementation, 10
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58 251 programs^{17 18 20 27-31 35 36} reflected community participation as they engaged CHWs
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60 252 from within the local communities to provide care to the local population. Moreover,
253 253 the selection of CHWs from the local community they serve facilitated their access to

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3 254 households, development of good relationships and high acceptability in the
4 255 community.^{27 30 32} Three programs^{32 34 39} did not mention the selection process of
5 256 CHWs while in Jamaica it was not mandatory to select CHWs from within the local
6 257 community.²⁶

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10 258 Examples of other activities reflecting the process of community participation² beyond
11 259 the selection of CHWs were reported only in Ethiopia's Health Extension Program.³⁰ In
12 260 this program the performance of health centres was evaluated by the community
13 261 quarterly and the CHWs were monitored by the community volunteers.³⁰

18 262 *Intersectoral Coordination*

19 263 PHC ought to involve the health sector and all related sectors and aspects of national
20 264 and community development that have an impact on health.^{2 48} Intersectoral
21 265 coordination was not reflected in the objective/s or implementation of any CHW
22 266 program and only in the outcome of one¹⁷ program. The WHV Program of Iran
23 267 explicitly described the intersectoral link between health and education sectors for
24 268 transmitting health messages to the people.¹⁷ The Accredited Social Health Activist
25 269 (ASHA) program from India, while not reporting intersectoral collaboration directly, did
26 270 report actions to enhance the role of women by creating opportunities by working with
27 271 other sectors to empower women.³⁸

35 272 *Appropriateness*

36 273 The final PHC principle assessed in this review was appropriateness: i.e. services that
37 274 are effective, culturally acceptable and financially affordable. The included studies
38 275 reflected one or another of these attributes but none reported all three attributes of
39 276 appropriateness. For example, the concept of appropriateness was reflected explicitly
40 277 in the objective of India's ASHA program (to provide affordable and quality health care)
41 278 but did not mention cultural appropriateness.³¹ The RapidSMS program of Rwanda
42 279 reported the cultural acceptability of technology (phone messaging services) and its
43 280 affordability considering that almost all populations had access to a mobile phone.²⁰

51 281 **DISCUSSION**

52 282 This study has provided insights into the application of PHC principles in the
53 283 implementation of national CHW programs. PHC principles do not appear to be
54 284 applied with the rigor and regularity as one would expect considering the emphasis

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3 285 laid on these during conceptualisation of this significant public health movement called
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5 286 'PHC'.
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8 287 Our results show that 'UHC' and 'community participation' were the most common
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10 288 PHC principles reflected in the national CHW programs. In contrast, intersectoral
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12 289 coordination was stated in the outcome of only one of the 14 CHW programs¹⁷ while
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14 290 none of the studies described the programs with reference to all three attributes of
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16 291 appropriateness (effective, culturally acceptable and financially affordable).
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18 292 'Enhanced coverage' attribute of UHC was most commonly reflected by the national
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20 293 CHW programs. There is limited evidence in the reviewed 26 papers on the
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22 294 implementation of other two attributes, i.e., coverage on the basis of need (equity) and
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24 295 comprehensiveness. This finding complements the fact that soon after Alma-Ata,
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26 296 selective PHC was proposed as an interim strategy for disease control in LMICs.^{49 50}
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28 297 Many vertical programs utilised CHWs under different names and with different roles⁵¹
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30 298 resulting in a fragmented and disease-specific approach operating within the context
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32 299 of fragile health systems of LMICs. CHWs however, are not a "panacea for weak health
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34 300 systems." They require well-structured support from the formal health systems with
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36 301 which national CHW programs are linked. Therefore, achieving UHC requires
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38 302 strengthening of health systems with effective integration of comprehensive CHW
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40 303 programs in LMICs as PHC can only work when a country has the structures, skills
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42 304 and data to ensure that all people are covered.¹⁵
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44 305 This review found that the implementation of community participation was patchy, and
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46 306 when it was employed it mainly reflected in the selection of CHWs from the local
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48 307 community. This is not surprising as after the Alma-Ata declaration several
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50 308 governments started CHW programs as a means for people's participation with local
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52 309 lay people trained to administer basic first-line healthcare in their communities.^{7 15}
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54 310 While CHWs' position as community members themselves may provide a 'natural link'
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56 311 between them and the community, it may also appear to safeguard trust in^{30 32} and
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58 312 respect for them from the community side and enhanced self-esteem from the CHW
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60 313 side.³⁰ A higher level of community participation where the community is given a stake
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315 316 in the evaluation and redefining of services was evident only in the Ethiopian CHW
program.³⁰ A successful CHW program requires the support and ownership of the
community through their active involvement in the entire process of defining health

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3 317 problems and needs, developing solutions, implementing and evaluating the program,
4 318 as well as establishing a supportive social and policy environment for community
5 319 participation at national, district, and local levels.⁵² CHW programs often struggle to
6 320 be successful when not part of a broader community engagement process which
7 321 requires explicit methods for involving individuals and communities, clearly defined
8 322 roles and responsibilities, training of policymakers and adequate funding.⁵² Recent
9 323 WHO guidelines have explicitly recommended ways to select CHWs, engage and
10 324 mobilize the community and this can be achieved if there is a supportive social and
11 325 policy environment.⁵³ With little or no evidence as noted by this scoping review on
12 326 community involvement in needs assessment, the design of programs and evaluation
13 327 may indicate that invoking community participation is a challenge for these programs.¹⁵
14 328 Community participation is a context-dependent, gradual process that is less
15 329 controllable and less measurable, thereby making it harder to track.⁵⁴ There is a need
16 330 for robust program evaluations of community participation activities that measure long-
17 331 term outcomes and provide support for the CHW programs to broaden their scope of
18 332 community participation. Moreover, CHW programs need to give attention to the
19 333 experiences of CHWs themselves to address the feelings of powerlessness, and
20 334 frustrations expressed by CHWs about how organisational processual and relational
21 335 arrangements hindered them from achieving the desired impact. CHW programs
22 336 should systematically identify disempowering organisational arrangements and take
23 337 steps to remedy these.⁵⁵

24 338 The operational problems related to partnerships working (intersectoral,
25 339 interinstitutional, interdisciplinary and professional/lay partnerships) were highlighted
26 340 in the early implementation years of these programs in LMICs.⁵⁶ Our review informs
27 341 that this is still the case.¹⁷ This finding corresponds with the fact that working
28 342 relationships between partners have often proved difficult,^{54 56} as each sector has its
29 343 priorities.⁵⁴ Though some of the CHW programs reflect that the CHWs do understand
30 344 how various actors relate to each other, and where their interests lie. And how they
31 345 “use this understanding in particular situations to provide an interpretation of the
32 346 situation and frame courses of action that appeal to existing interests and identities,”
33 347 inducing cooperation amongst a range of phenomena.⁵⁷

34 348 The PHC literature reports that community participation and intersectoral coordination
35 349 are the two most weakly implemented principles.^{15 54} Our review findings also support

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3 350 this evidence. National CHW programs ought to view these principles as two pillars
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5 351 that help achieve the universal health coverage of services that are appropriate for the
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7 352 community and their context.

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9 353 By its nature, the provision of MCH services to women by female CHWs who are also
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11 354 selected from within the local community tends to make it culturally acceptable and
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13 355 meet the principle of appropriateness. However, CHW programs need to incorporate
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15 356 'appropriateness' more explicitly in their objectives and then diligently pursue this in
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17 357 program implementation and outcomes, which may contribute to addressing the
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19 358 current lack of evidence on the effectiveness of these programs.⁵⁸

20 359 Based on the findings of this scoping review it can also be inferred that if the CHW
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22 360 programs follow PHC principles they can be better positioned to help in current
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24 361 pandemic response and prevent future infectious outbreaks/epidemics by increasing
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26 362 access to health products and services, distributing health information, increasing
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28 363 social mobilization, completing surveillance activities and reducing the burden of
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30 364 formal health care system.⁵⁹

31 365 The review has a number of limitations. Firstly, it relied solely on the information
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33 366 reported in the papers to assess the application of PHC principles within the programs.
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35 367 Many papers did not clearly articulate these principles or provide sufficient descriptions
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37 368 of the program to allow an assessment to be made. As such the reviewers needed to
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39 369 interpret the evidence about principles in how the program was implemented. These
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41 370 principles may be delineated elsewhere, for example program reports or funding
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43 371 agreements. Therefore, it is likely that we underestimated the application of PHC
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45 372 principles in these programs. However, the very fact that the research papers that we
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47 373 reviewed failed to document the implementation of those principles, illustrates less
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49 374 than the adequate emphasis on the application of these principles in national CHW
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51 375 programs.

52 376 Secondly, we reviewed the CHW programs identified only through the search of peer-
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54 377 reviewed published journal articles and there may be CHW programs that apply the
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56 378 PHC principles but are not published in peer-reviewed journals in a way to be captured
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58 379 in our search. This scoping review can be considered as a first step towards reviewing
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60 380 national CHW programs in LMICs applying the lens of PHC principles. Future studies

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3 381 on the analysis of non-peer-reviewed publications or 'grey' literature may produce
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5 382 further evidence on this phenomenon.
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7 383 **CONCLUSION**
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10 384 This scoping review informs that the application of PHC principles across national
11 385 CHW programs in LMICs is patchy. For comprehensiveness and improved health
12 386 outcomes, programs need to incorporate all attributes of PHC principles. The findings
13 387 also point to the limited research and published studies on this important topic. Better
14 388 documentation and publications of program implementation with reference to PHC
15 389 principles are needed. Further research is needed to identify reasons for this
16 390 inadequate emphasis on historic PHC principles, and to find out what other principles
17 391 are adhered to by the current CHW programs. Future research may also focus on how
18 392 to incorporate more attributes of the PHC principles while implementing national CHW
19 393 programs in LMICs.
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10
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12
13 399 search, adjudicated and appraised studies, charted and analysed data and drafted the
14
15 400 manuscript. ZL was involved in the screening and data charting of the articles and
16
17 401 review of the manuscript. CL and AM were involved in the conceptualisation and
18
19 402 design of the scoping review, provided continuous supervision and feedback during
20
21 403 the conduct of the scoping review and reviewed all the drafts and provided
22
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27
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31 409 available data sources therefore, a formal ethics approval was not required.

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33 410 **Competing interests** None declared

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35 411 **Patient consent for publication** Not applicable

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37 412 **Data availability statement** All data relevant to the study are included in the article
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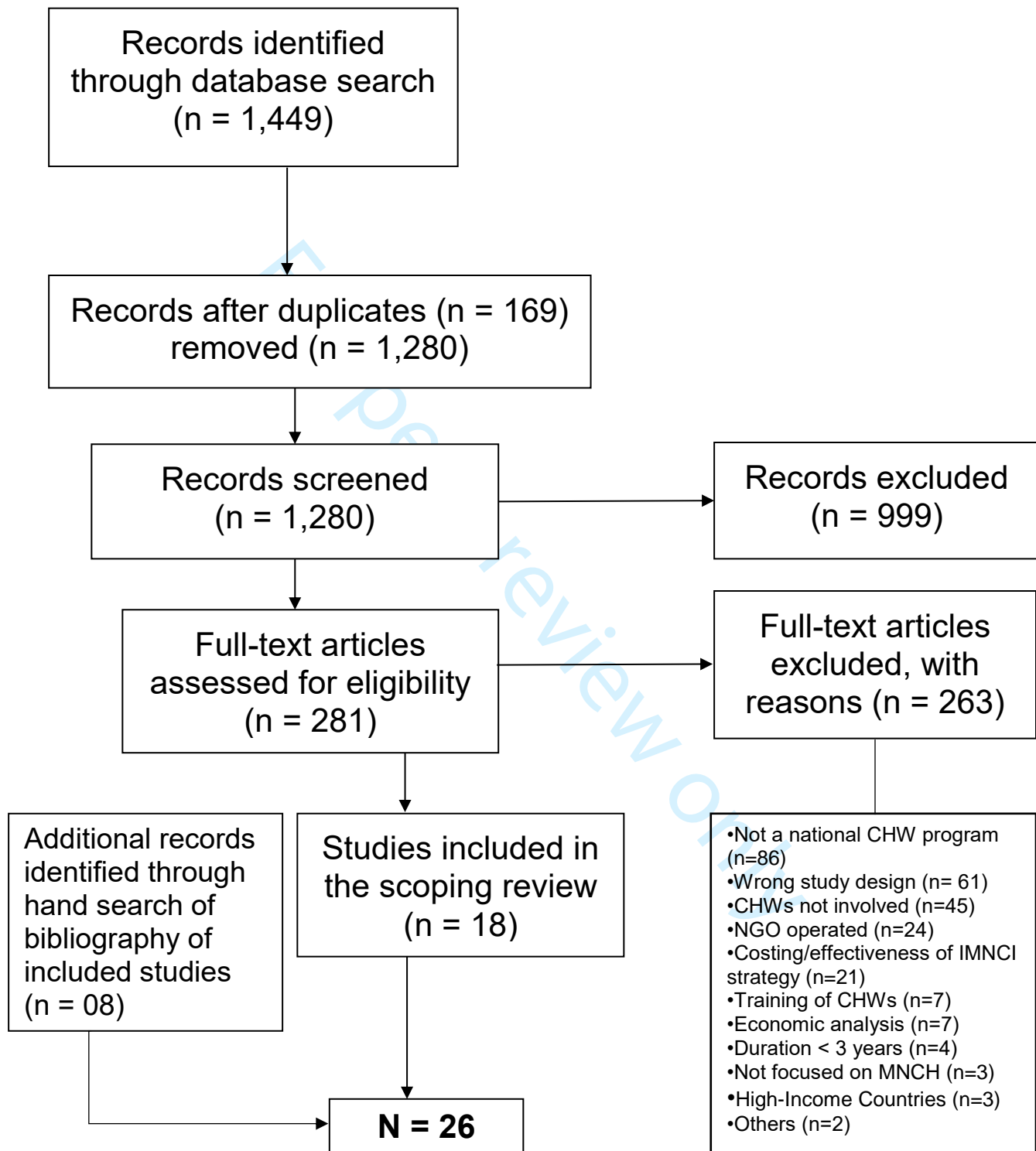


Figure 1: PRISMA flowchart for study selection and inclusion process

Supplementary Table 1: Key characteristics of included studies as reported by the authors

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Damari 2018 / IRAN ¹⁷	To evaluate the national Iranian Women Health Volunteers program	Qualitative <ul style="list-style-type: none"> • Document review • One FGD • Semi-structured questionnaires filled by 44 key informants 	Achievements: increased community participation, increasing health literacy, increased coverage and utilization of health services.
Nasseri 1991 / IRAN ³⁵	To determine the impact of PHC services on immunisation activities in areas where the two services are integrated	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey 	Higher coverage in rural areas is attributed to active approach of CHWs and vaccinators.
Memon 2016 / PAKISTAN ³³	To explore community barriers in accessing MCH services in 10 remote and rural districts of Pakistan	Qualitative <ul style="list-style-type: none"> • Sixty FGDs with mothers and fathers of children under five and CHWs - 20 each group 	Better awareness was seen among community caregivers for antenatal care and family planning services in the CHW-covered areas.
Hafeez 2011 / PAKISTAN ²⁷	To assess the contribution of the LHWP in enhancing coverage and access of health care services as well as towards improvement of health indicators	Qualitative <ul style="list-style-type: none"> • Document review • Interviews, formal and informal interactions and discussions with all the stakeholders • Performance validation exercises in the field • Feedback from community being served by the program 	The LHWP has led to a development of a very well-placed cadre that links first-level care facilities to the community, thus improving the delivery of PHC services. The health indicators are significantly better than the national average in the areas served by the CHWs.
Douthwaite 2005 / PAKISTAN ⁴²	To assess the impact of the LHWP on the uptake of modern contraceptive methods	Quantitative <ul style="list-style-type: none"> • Secondary data analysis from the 2002 national evaluation of the LHWP 	The study provides strong evidence that the LHWP has succeeded in integrating family planning into the doorstep provision of preventive health care and in increasing the use of modern reversible methods in rural areas.
Afsar 2005 / PAKISTAN ⁴¹	To assess the strengths and weaknesses of the LHWP from the Lady Health Workers perspective	Qualitative <ul style="list-style-type: none"> • 20 key informant interviews with CHWs (n=14), CHW Supervisors (n=4) and 2 medical officers (District 	Major strengths: provision of services at the grassroots level, reinforcement of health messages and the community acceptability of workers. Weaknesses: contract-based job, low salaries, irregularity of payment, no career development, and poor logistical support.

Author and year of publication / Country	Key objective of the study	Methods	Main findings
		Coordinator and District Health Education Officer)	
Afsar 2003 / PAKISTAN ⁴⁰	To estimate the proportion of patients who were referred and to identify the factors associated with unsuccessful referral in Karachi, Pakistan	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey of 347 patients 	A high referral rate (55%) by CHWs was found in this study; 76.4% (n=265) were successful and 23.6% (n=82) were unsuccessful referrals. Key factors for unsuccessful referral: never referred before, never visited the referral site before, no knowledge of who to meet at the referral site, and failure of CHW to follow up.
Kohli 2015 / INDIA ⁴³	To assess the knowledge and practices for maternal health care delivery among Accredited Social Health Activist workers in North-East district of Delhi, India	Quantitative <ul style="list-style-type: none"> • Descriptive cross-sectional study (n = 55) 	CHWs' knowledge is good but practices about maternal health were not adequate due to the number of problems faced by them which need to be addressed through skill-based training in terms of good communication and problem solving. Monitoring should be made an integral part of CHW working in the field to ensure that knowledge is converted into practices as well.
Kosec 2015 / INDIA ³¹	To understand predictors of essential health and nutrition service delivery in Bihar, India	Quantitative <ul style="list-style-type: none"> • Secondary data analysis of a 2012 cross-sectional survey of 6,002 households in 400 randomly selected villages in 1 district of Bihar state • Primary data collection from 382 CHWs 	CHWs who maintained records of pregnant women were significantly associated with households receiving such information. Incentivizing frontline workers and helping them organize their work is associated with greater receipt of services by households.
Saprii 2015 / INDIA ³⁷	To explore stakeholders' perceptions and experiences of the CHW scheme in strengthening maternal health	Qualitative (exploratory study) <ul style="list-style-type: none"> • Eighteen in-depth interviews and 3 FGDs with CHWs, key stakeholders and community members 	CHWs are valued for their contribution towards maternal health education and for their ability to provide basic biomedical care, but their role as social activists is much less visible as envisioned in the CHW operational guidelines

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Ved 2019 / INDIA ³⁸	To examine how the program is seeking to address gender inequalities facing CHWs, from the program's policy origins to recent adaptations	Qualitative <ul style="list-style-type: none"> • Document review • 12 key informant interviews 	The value of community embeddedness for CHW programs is widely recognized as a mechanism to ensure program relevance to local needs and secure community ownership, support, and recognition of CHWs
Koblinsky 1989 / BANGLADESH ²⁹	To identify and examine organizational constraints to quality care and to provide a feasible strategy for program managers to overcome those barriers	Qualitative <ul style="list-style-type: none"> • Observations • FGDs – number not reported in the study 	Only brief, interactions are possible if CHWs are to complete their rounds in the three-month period mandated by the government. The CHWs compensate for the pressure of their workload by skipping visits with some of the women in their area, by visiting even fewer during the monsoon season, and by neglecting to provide valuable information about family planning or health with some of the women they do visit
Panday 2019 / NEPAL ¹⁸	To explore use of MCH care services delivered by CHWs and the reasons for the underutilisation of these services	Qualitative <ul style="list-style-type: none"> • Interviews and FGDs with 34 CHWs, 26 service users and 11 health workers 	Perceived factors that discourage the use of healthcare services by ethnic minority groups are; <ol style="list-style-type: none"> 1.Lack of knowledge among service users - related to CHWs' inability to communicate health messages; 2.Lack of trust in volunteers; 3.Traditional beliefs and healthcare practices; 4. Low decision-making power of women –

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Panday 2017 / NEPAL ⁴⁴	To explore the role and experience of CHWs in maternal healthcare provision	Qualitative <ul style="list-style-type: none"> Interviews with 20 CHWs, 26 service users and 11 health workers Four FGDs with 18 CHWs 	<ul style="list-style-type: none"> All study participants acknowledged the contribution of CHWs in basic maternity care in villages With support available to CHWs from the local health centres (regular training and access to medical supplies), CHWs were able to assist with childbirth, distribute medicines, and administer pregnancy tests. Whereas such activities were not reported in the other region where such support was not available to CHWs. Key challenge: lack of monetary incentives
Hasegawa 2013 / CAMBODIA ²⁸	To identify determinants of caregivers' Village Malaria Workers service utilization for childhood illness and caregivers' knowledge of malaria management	Quantitative <ul style="list-style-type: none"> Cross-sectional survey with CHWs and primary caregivers of children under five years 	<ul style="list-style-type: none"> Among the caregivers, 23% in M villages (villages with only malaria control services) and 52% in M+C villages (with both malaria and child health services) utilized CHW services for childhood illnesses. Determinants of caregivers' utilization of CHWs in M villages included their VMWs' length of experience (AOR = 11.80, 95% confidence interval [CI] = 4.46-31.19) and CHWs' service quality (AOR = 2.04, CI = 1.01-4.11). In M+C villages, CHWs' length of experience (AOR = 2.44, CI = 1.52-3.94) and caregivers' wealth index (AOR = 0.35, CI = 0.18-0.68) were associated with VMW service utilization. Better service quality of VMWs (AOR = 3.21, CI = 1.34-7.66) and caregivers' literacy (AOR = 9.91, CI = 4.66-21.05) were positively associated with caregivers' knowledge of malaria management.
Negussie 2017 / ETHIOPIA ¹⁹	To assess the contribution made by the CHWs in MCH care service delivery in Dale district, southern Ethiopia	Quantitative <ul style="list-style-type: none"> Cross-sectional survey with 613 mothers of reproductive age (15-49), having at least one under-five child 	<ul style="list-style-type: none"> Overall service coverage of antenatal care (four and more visits), delivery and postnatal care services were low in the district as compared to the national status; and the input from the CHWs, in this regard, was unsatisfactory. The number of home visits was also inadequate for the necessary support of the mothers.

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
			<ul style="list-style-type: none"> Mothers who listen to the radio and who had received information about the MCH services by CHWs were more likely to utilize MCH services.
Kok 2015 / ETHIOPIA ³⁰	To identify facilitators of and barriers to interpersonal relationships between CHWs and actors in the community and health sector	Qualitative <ul style="list-style-type: none"> Fourteen FGDs and 44 interviews in 2013 with CHWs, traditional birth attendants, health professionals and community members 	<ul style="list-style-type: none"> CHWs were selected by their communities, which enhanced trust and engagement between them Program design elements facilitating relationships: support for CHWs activities from the community and health sector, monitoring and accountability structures (community and health sector), referral, supervision and training (health sector)
Medhanyie 2012 / ETHIOPIA ⁴⁵	To investigate the role of CHWs in improving utilization of maternal health services by rural women	Quantitative <ul style="list-style-type: none"> Cross-sectional survey with 725 women with under-five children 	<ul style="list-style-type: none"> CHWs have contributed substantially to the improvement in women's utilization of family planning, antenatal care and HIV testing.
Admassie 2009 / ETHIOPIA ⁴⁶	To evaluate the short-term and intermediate-term effects of the Ethiopian HEP on MCH indicators	Quantitative <ul style="list-style-type: none"> Program evaluation using a propensity score matching method and village, facility and household surveys 	<ul style="list-style-type: none"> HEP has significantly increased the proportion of children fully and individually vaccinated Women in the HEP villages appeared to make their first contact with a skilled health service provider significantly earlier during pregnancy; very little effect is detected on other prenatal and postnatal care services. HEP has not reduced the incidence and duration of diarrhoea and respiratory diseases among under-five children
Musabyimana 2018 / RWANDA ²⁰	To explore perceptions of healthcare officials, providers, and beneficiaries on the impact of the RapidSMS program	Qualitative <ul style="list-style-type: none"> 10 FGDs with 93 participants In-depth interviews with 56 beneficiaries and 36 CHWs 	The effectiveness of use of mobile phones to remind of the appointments for improved access to midwifery services at the health facilities was found to be limited. Indirectly, it alerts to the emerging role of contemporary technologies in community health program.
Magnani 1996 / NIGER ³²	To assess the impact of differential access to health services through the comparison of service use patterns and under-five mortality levels among villages provided different levels of health services	Quantitative <ul style="list-style-type: none"> Secondary data analysis of National Morbidity and Mortality Survey – 1985 on 974 women of reproductive age 	<ul style="list-style-type: none"> Children residing in villages proximate to health dispensaries were approximately 32% less likely to have died during the study period than children living further away.

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
Wilford 2018 / SOUTH AFRICA ³⁹	To explore the quality of CHW household visits providing MCH services	Qualitative <ul style="list-style-type: none"> • 30 observations [a CHW visit to a mother or pregnant woman was observed by a field worker, followed by an in-depth interview with the participating women and CHWs] • 15 in-depth interviews with mothers/pregnant women and 15 in-depth interviews with CHWs 	<ul style="list-style-type: none"> • Mothers receiving the services were satisfied with CHW visits and appreciated that CHWs understood their life experiences and provided relevant and accessible advice and support. • CHWs expressed concern of not having the required knowledge to undertake all activities in the household, and requested training and support from supervisors during household visits
Mues 2012 / BRAZIL ³⁴	To assess factors influencing perspectives on Brazil's national family health program and perceptions about PSF accessibility among frequent users (primary caretakers of children under 5)	Quantitative <ul style="list-style-type: none"> • Cross-sectional household survey of 253 households with at least one child 5 years or younger and covered by the PSF 	<ul style="list-style-type: none"> • Most caretakers of young children were satisfied. However, less than half of the caretakers perceived the PSF units as being accessible • about a quarter of households in the Vespasiano PSF coverage area were not receiving an agent home visit once a month
Aquino 2009 / BRAZIL ⁴⁷	To evaluate the effects of the implementation of the CHW Program on infant mortality rates in Brazilian municipalities from 1996 to 2004	Quantitative – ecological and longitudinal approach <ul style="list-style-type: none"> • Secondary data analysis from 1991 and 2000 national census and data from Brazilian MoH of 721 municipalities 	A statistically significant negative association between CHW program coverage and infant mortality rate was found after controlling for potential confounders.
Rubin 1983 / EL SAVADOR ³⁶	To evaluate the health service impact of the Rural Health Aide Program in El Salvador	Quantitative <ul style="list-style-type: none"> • Survey of 363 respondents in cantons served by CHWs for one year and 169 in cantons served by CHWs for two years 	Compared to villagers of cantons served by CHWs for one year, those in cantons served by CHWs for 2 years were: <ul style="list-style-type: none"> - more likely to be visited by their CHW & to visit their CHW - more likely to visit their health centres after referral by their CHW - more likely to have their children vaccinated
Ennever 1990 / JAMAICA ²⁶	<ul style="list-style-type: none"> • To describe the activities of CHWs currently employed, and their perceptions about supervision and management 	Quantitative <ul style="list-style-type: none"> • Survey of 415 CHWs currently employed and 134 CHWs who had left the service 	<ul style="list-style-type: none"> • Currently employed CHWs continued to perform duties in the community & in health centres with emphasis on the MCH services and the management of diabetics and hypertensives.

Author and year of publication / Country	Key objective of the study	Methods	Main findings
	<ul style="list-style-type: none"> To describe the current employment status of CHWs who had left the service between 1982 and 1986, and use of the skills they had learned as CHWs. 		<ul style="list-style-type: none"> Previously employed CHWs unemployed though many continued to use their skills on a voluntary basis.

CHW = Community Health Worker, FGD = Focus Group Discussion, HEP = Health Extension Program (Ethiopia) LHWP = Lady Health Worker Program (Pakistan), MCH = Maternal and Child Health, PSF = Programa de Saude da Familia (Family Health Program, Brazil)

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Supplementary Table 2: Evidence for the application of primary health care principles as reflected in the national community health worker programs

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
1.	IRAN / Women Health Volunteers Program / 1992 ¹⁷	<u>Principle observed:</u> - Community Participation as the program aims to increase community involvement in health related activities in order to empower them	<u>Principles observed:</u> - UHC - Community Participation* <ul style="list-style-type: none"> • The CHWs encouraged and actively followed up on individuals to visit health centres at their required time especially those who needed special care --- thus contributing to increased service utilisation • CHWs delivering health messages to families and distributing educational materials reflect one aspect of comprehensiveness as part of universal health coverage • CHWs are selected from the local community - Community Participation and appropriateness 	<u>Principles observed:</u> - UHC - Community Participation* - Intersectoral coordination <ul style="list-style-type: none"> - The active follow up by WHV increased utilization of health services – contributing to universal health coverage • The experts and stakeholders believed that CHW program increased people's participation and created self-esteem and self-reliance in people – However, the evidence on how it achieved this is not available in this study • The WHV network connects MoH, medical universities and health centers to the people – Intersectoral coordination
2.	IRAN / Primary Health Care Network – EPI / 1983 ³⁵	<u>Principle observed:</u> - UHC <ul style="list-style-type: none"> • As the program aimed to increase immunisation coverage in Iranian children to 90% by their first birthday 	<u>Principles observed:</u> - UHC - Community Participation* <ul style="list-style-type: none"> • CHWS were involved in provision of general preventive services for all the individuals in their coverage area – Comprehensiveness, Universal health coverage • CHWs were also expected to provide basic therapeutic measures for minor illnesses and refer other cases to their immediate Rural Health Centre – universal health coverage • CHWs were selected from the same area in which they work – community participation 	<u>Principle observed:</u> - UHC - Appropriateness <ul style="list-style-type: none"> • Immunisation coverage of children improved significantly in 1987 as compared to 1984 especially for BCG (56.3%) - universal health coverage • Mothers in rural areas with PHC services receive much better MCH care, advice and attention in comparison to mothers in other rural and most urban areas – appropriateness

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
3.	PAKISTAN / National Program for Family Planning & Primary Health Care / 1994 ^{27 33}	<u>Principle observed:</u> - UHC as the program aimed to increase utilisation of promotive, preventive and curative services at the community level particularly for women and children in poor and underserved areas – comprehensiveness & equity	<u>Principles observed:</u> - UHC - Community Participation* • CHWs were involved in health education and community mobilization along with provision of immunization, family planning services, basic curative care to the community at the doorstep and referral of patients to the appropriate health facility - reflecting universal health coverage	<u>Principles observed:</u> - UHC - Community Participation* • Increased utilisation of antenatal care and family planning - universal health coverage • Improved infant mortality rate, maternal mortality ratio and contraceptive prevalence rate in CHW covered areas as compared to national average - universal health coverage • Cultural acceptability of CHWs, unlimited access to households and free interaction with local women – community participation and appropriateness
4.	INDIA / Accredited Social Health Activist (ASHA) Program / 2005 ^{31 37 38}	<u>Principles observed:</u> - UHC through accessible care to rural population especially vulnerable groups - Appropriateness via provision of affordable and quality health care	<u>Principles observed:</u> - UHC via CHWs as 'service extension and link workers' - Community Participation as CHWs are selected from the local communities	<u>Principles observed:</u> - UHC as CHWs were motivating women for antenatal care and hospital delivery through home visits • Women empowerment – as CHWs have reported an increased sense of empowerment and personal growth, in part through their belief in the social value of their work. • Additionally, becoming a CHW enabled rural women to gain knowledge, status as a role model, and exposure beyond the village, as well as to access a limited amount of remuneration
5.	BANGLADESH / National MCH and Family Planning Program / 1976 ²⁹	Not reported	<u>Principles observed:</u> - UHC - Community Participation* • CHWs were utilised for health education and extending immunisation and family planning services at the household level. They also provided referral for antenatal, perinatal, and	Not reported

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
			postnatal care. – comprehensiveness as part of universal health coverage	
6.	NEPAL / Female Community Health Volunteer Program / 1988 ¹⁸	<u>Principles observed:</u> - UHC via low cost health service provision in remote areas - Community Participation via increase in local women's participation in health promotion	<u>Principles observed:</u> - Community Participation* - UHC via provision of MCH care by CHWs in rural communities	Not reported
7.	CAMBODIA / Village Malaria Worker Project as part of National Malaria Control Program / 2001 ²⁸	Not reported	<u>Principles observed:</u> - UHC - Community Participation* • Malaria prevention, diagnosis and treatment services to remote villages by CHWs – universal health coverage - Management of minor childhood illness, prescribing and providing basic medications, referral and health promotion – comprehensiveness as part of universal health coverage	<u>Principle observed:</u> - UHC • 15,898 children received child health services from village Malaria Workers in 2011
8.	ETHIOPIA / Health Extension Program / 2003 ¹⁹ ³⁰	<u>Principles observed:</u> - UHC - Community Participation • To improve access and utilization of health care particularly for	<u>Principles observed:</u> - UHC - Community Participation • CHWs providing antenatal and postnatal care, family planning and immunization services and conducting clean and safe deliveries - Universal Health Coverage	<u>Principles observed:</u> - UHC - Community Participation • Increased use of health post for antenatal care, family planning, delivery and other illnesses such as diarrhoea – reflecting universal health coverage

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		<p>children and mothers in rural communities – Universal Health Coverage</p> <ul style="list-style-type: none"> To improve the health status of families with their full participation, using local technologies & the community's skill & knowledge - Community Participation 	<ul style="list-style-type: none"> Quarterly evaluation of health centers performance by the community during facility or public forums. Monitoring of CHWs by the <i>kebele</i> (lowest administrative unit) administration at the health post level. Need based adjustment of maternal health education – Community Participation 	<ul style="list-style-type: none"> Statistically significant increase in the proportion of children fully and individually vaccinated against tuberculosis, polio, diphtheria-tetanus-tetanus, and measles in the program villages. Mothers reported that CHWs were available at health posts during their last visit for MCH services Mothers also indicated that they had gotten a complete explanation of their own/child's health condition from the CHWs Moreover, CHWs were understanding, friendly and helpful thus assured a "natural link" between them and the community - appropriateness Community members reported that HEWs being female was important to them, as they prefer to discuss maternal health issues amongst women - appropriateness
9.	RWANDA / RapidSMS program / 2013 ²⁰	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - UHC - Appropriateness To improve access to antenatal, PNC, institutional delivery and emergency obstetric care To facilitate communication between CHWs and the broader health system, including the ambulance system, 	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - UHC - Community Participation* - Appropriateness – use of technology The RapidSMS system sent automatic reminders to CHWs for clinical appointments, delivery, and post-natal care visits, with the intent of increasing timely access and utilization Provision of a quick link to emergency obstetric care through so-called Red Alerts and creation of a database of clinical records on maternal care delivery – use of technology for increasing access to health care 	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - Appropriateness (use of technology, acceptability) <p>RapidSMS was well accepted by most CHWs and community members – acceptability aspect of appropriateness principle</p> <ul style="list-style-type: none"> mHealth appeared to have helped improve communication and potentially service use Claims that mHealth has contributed to maternal mortality reduction are not substantiated considering the difficulties that were highlighted by the respondents

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		health facilities, and MoH officials		
10.	NIGER / Rural Health Improvement Program / 1970s ³²	<u>Principle observed:</u> - UHC – as the program aimed to extend the coverage of PHC services throughout rural Niger	<u>Principle observed:</u> - UHC – By upgrading existing health dispensaries and deploying trained village health teams to unserved villages to deliver PHC services	Not reported
11.	SOUTH AFRICA / ward-based outreach teams (WBOT) - national CHW program / 2011 ³⁹	<u>Principle observed:</u> - UHC – via improving health outcomes by providing home and community-based health services	<u>Principle observed:</u> - UHC - Community Participation* • Universal health coverage via CHWs providing treatment support and home-based care in underserved rural areas. Core MCH activities include visiting all mothers during pregnancy, antenatal education and support. Moreover, CHWs are linked in with local PHC clinics	<u>Principle observed:</u> - Appropriateness as CHWs were trusted, accessible and able to understand the mother's situation
12.	BRAZIL / Family Health Program (Programa de Saude da Familia, PSF) / 1994 ³⁴	<u>Principle observed:</u> - UHC – as the organizational principles include universality and equity	<u>Principle observed:</u> - UHC - Community Participation* - Universal health coverage via provision of promotive, preventive and basic curative services by CHWs to mothers and children	<u>Principle observed:</u> - UHC – as the growth of the CHW program was associated with a decrease in infant and child mortality rates • Caretakers who reported that their agent made at least one home visit per month were significantly more likely to have received care for child diarrhoea from an agent
13.	EL SAVADOR / Rural Health Aide Program / 1976 ³⁶	<u>Principle observed:</u> - UHC – via provision of PHC and family planning services	<u>Principle observed:</u> - UHC - Community Participation* • Health education by CHWs for rural families • Provision of family planning supplies to women	<u>Principle observed:</u> - UHC • Appropriately trained PHC workers promote contact between rural populations and the health care system

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
			<ul style="list-style-type: none"> • Provision of systematic treatment of minor illnesses; administration of prescribed intramuscular injections; dispensing of antiparasitic medication; and performance of simple first-aid measures • Promotion of registration of births and deaths 	<ul style="list-style-type: none"> • To the extent that this improves the health status of the population, particularly in the area of MCH, we might expect to see better health indices in rural populations served by these workers than in populations without them
14.	JAMAICA / Community Health Aide program / 1978 ²⁶	<u>Principle observed:</u> - UHC as the program aimed to train local women to provide basic health care and health education to families.	<u>Principles observed:</u> - UHC – CHWs encouraging for immunization and family planning, weighing babies and testing urine - Community Participation*	<u>Principle observed:</u> - UHC <ul style="list-style-type: none"> • CHWs have been functioning in both health centre and community, encouraging people to utilize the services and assisting in some of the less technical duties such as weighing babies and testing urine

UHC = Universal Health Coverage

Appendix I: Logic grids for information sources

PubMed

Search	Query	Records retrieved
#1	“community health workers”[mh] OR community health worker*[tiab] OR community health aide*[tiab] OR village health worker*[tiab] OR barefoot doctor*[tiab] OR family planning personnel*[tiab] OR health extension worker*[tiab] OR lady health worker*[tiab] OR community health agent*[tiab] OR Shasthyo Sebika*[tiab] OR community nutrition worker*[tiab] OR maternal health worker*[tiab] OR voluntary Malaria workers*[tiab] OR village malaria worker*[tiab] OR Raedat*[tiab] OR postnatal support worker*[tiab] OR mental health worker*[tiab] OR mother coordinator*[tiab] OR rural health worker*[tiab] OR village health promoter*[tiab] OR accompagnateur*[tiab] OR Saksham Sahaya*[tiab] OR anganwadi worker*[tiab] OR accredited social health activist*[tiab] OR community-based worker*[tiab] OR community health volunteer*[tiab] OR village health guide*[tiab] OR maternal and child health promotion worker*[tiab] OR maternal child health worker*[tiab] OR kader posyandu*[tiab] OR behvarz*[tiab] OR village health helper*[tiab] OR colaborador voluntario*[tiab] OR nutrition volunteers*[tiab] OR village drug-kit manager*[tiab] OR brigadistas*[tiab] OR female community health volunteer*[tiab] OR Agente Comunitario de Salud*[tiab] OR nutrition worker*[tiab] OR community reproductive health worker*[tiab] OR community drug distributor*[tiab] OR community volunteer*[tiab] OR community health advocate*[tiab] OR lay health visitor*[tiab] OR Promotoras de Salud[tiab]	174984
#2	Program[tiab] OR programs[tiab] OR programme[tiab] OR programmes[tiab] OR initiative*[tiab] OR project[tiab] OR projects[tiab]	959578
#3	“Maternal health”[mh] OR “Maternal Welfare”[mh] OR “child health”[mh] OR “child care”[mh] OR “child welfare”[mh] OR “maternal-child health services”[mh] OR “child health services”[mh:noexp] OR maternal child health[tiab] OR maternal newborn child health[tiab]	71349

Search	Query	Records retrieved
#4	((developing country[tw] OR developing countries[tw] OR developing nation[tw] OR developing nations[tw] OR developing population[tw] OR developing populations[tw] OR developing world[tw] OR less developed country[tw] OR less developed countries[tw] OR less developed nation[tw] OR less developed nations[tw] OR less developed population[tw] OR less developed populations[tw] OR less developed world[tw] OR lesser developed country[tw] OR lesser developed countries[tw] OR lesser developed nation[tw] OR lesser developed nations[tw] OR lesser developed population[tw] OR lesser developed populations[tw] OR lesser developed world[tw] OR under developed country[tw] OR under developed countries[tw] OR under developed nation[tw] OR under developed nations[tw] OR under developed population[tw] OR under developed populations[tw] OR under developed world[tw] OR underdeveloped country[tw] OR underdeveloped countries[tw] OR underdeveloped nation[tw] OR underdeveloped nations[tw] OR underdeveloped population[tw] OR underdeveloped populations[tw] OR underdeveloped world[tw] OR middle income country[tw] OR middle income countries[tw] OR middle income nation[tw] OR middle income nations[tw] OR middle income population[tw] OR middle income populations[tw] OR low income country[tw] OR low income countries[tw] OR low income nation[tw] OR low income nations[tw] OR low income population[tw] OR low income populations[tw] OR lower income country[tw] OR lower income countries[tw] OR lower income nation[tw] OR lower income nations[tw] OR lower income population[tw] OR lower income populations[tw] OR underserved country[tw] OR underserved countries[tw] OR underserved nation[tw] OR underserved nations[tw] OR underserved population[tw] OR underserved populations[tw] OR underserved world[tw] OR under served country[tw] OR under served countries[tw] OR under served nation[tw] OR under served nations[tw] OR under served population[tw] OR under served populations[tw] OR under served world[tw] OR deprived country[tw] OR deprived countries[tw] OR deprived nation[tw] OR deprived nations[tw] OR deprived population[tw] OR deprived populations[tw] OR deprived world[tw] OR poor country[tw] OR poor countries[tw] OR poor nation[tw] OR poor nations[tw] OR poor population[tw] OR poor populations[tw] OR poor world[tw] OR poorer country[tw] OR poorer countries[tw] OR poorer nation[tw] OR poorer nations[tw] OR poorer population[tw] OR poorer populations[tw] OR poorer world[tw] OR developing economy[tw] OR developing economies[tw] OR less developed economy[tw] OR less developed economies[tw] OR lesser developed economy[tw] OR lesser developed economies[tw] OR under developed economy[tw] OR under developed economies[tw] OR underdeveloped economy[tw] OR underdeveloped economies[tw] OR middle income economy[tw] OR middle income economies[tw] OR low income economy[tw] OR low income economies[tw] OR lower income economy[tw] OR lower income economies[tw] OR low gdp[tw] OR low gnp[tw] OR low gross domestic[tw] OR low gross national[tw] OR lower gdp[tw] OR lower gnp[tw] OR lower gross domestic[tw] OR lower gross national[tw] OR lmic[tw] OR lmic[tw] OR (Africa[tw] OR Asia[tw] OR Caribbean[tw] OR West Indies[tw] OR South America[tw] OR Latin America[tw] OR Central America[tw] OR Afghanistan[tw] OR Albania[tw] OR Algeria[tw] OR Angola[tw] OR Antigua[tw] OR Barbuda[tw] OR Argentina[tw] OR Armenia[tw] OR Armenian[tw] OR Aruba[tw] OR Azerbaijan[tw] OR Bahrain[tw] OR Bangladesh[tw] OR Barbados[tw] OR Benin[tw] OR Belarus[tw] OR Byelorussian[tw] OR Belarus[tw] OR Belorussian[tw] OR Belorussia[tw] OR Belize[tw] OR Bhutan[tw] OR Bolivia[tw] OR Bosnia[tw] OR Herzegovina[tw] OR Hercegovina[tw] OR Botswana[tw] OR Brasil[tw] OR Brazil[tw] OR Bulgaria[tw] OR Burkina Faso[tw] OR Burkina Fasso[tw] OR Upper Volta[tw] OR Burundi[tw] OR Urundi[tw] OR Cambodia[tw] OR Khmer Republic[tw] OR Kampuchea[tw] OR Cameroon[tw] OR Cameroons[tw] OR Cameron[tw] OR Camerons[tw] OR Cape Verde[tw] OR Central African Republic[tw] OR Chad[tw] OR Chile[tw] OR China[tw] OR Colombia[tw] OR Comoros[tw] OR Comoro Islands[tw] OR Comores[tw] OR Mayotte[tw] OR Congo[tw] OR Zaire[tw] OR Costa Rica[tw] OR Cote d'Ivoire[tw] OR Ivory Coast[tw] OR Croatia[tw] OR Cuba[tw] OR Cyprus[tw] OR Czechoslovakia[tw] OR Czech Republic[tw] OR Slovakia[tw] OR Slovak Republic[tw] OR Djibouti[tw] OR French Somaliland[tw] OR Dominica[tw] OR Dominican	1903167

Search	Query	Records retrieved
	Republic[tw] OR East Timor[tw] OR East Timur[tw] OR Timor Leste[tw] OR Ecuador[tw] OR Egypt[tw] OR United Arab Republic[tw] OR El Salvador[tw] OR Eritrea[tw] OR Estonia[tw] OR Ethiopia[tw] OR Fiji[tw] OR Gabon[tw] OR Gabonese Republic[tw] OR Gambia[tw] OR Gaza[tw] OR Georgia Republic[tw] OR Georgian Republic[tw] OR Ghana[tw] OR Gold Coast[tw] OR Greece[tw] OR Grenada[tw] OR Guatemala[tw] OR Guinea[tw] OR Guam[tw] OR Guiana[tw] OR Guyana[tw] OR Haiti[tw] OR Honduras[tw] OR Hungary[tw] OR India[tw] OR Maldives[tw] OR Indonesia[tw] OR Iran[tw] OR Iraq[tw] OR Isle of Man[tw] OR Jamaica[tw] OR Jordan[tw] OR Kazakhstan[tw] OR Kazakh[tw] OR Kenya[tw] OR Kiribati[tw] OR Korea[tw] OR Kosovo[tw] OR Kyrgyzstan[tw] OR Kirghizia[tw] OR Kyrgyz Republic[tw] OR Kirghiz[tw] OR Kirgizstan[tw] OR Lao PDR[tw] OR Laos[tw] OR Latvia[tw] OR Lebanon[tw] OR Lesotho[tw] OR Basutoland[tw] OR Liberia[tw] OR Libya[tw] OR Lithuania[tw] OR (Macedonia[tw] OR Madagascar[tw] OR Malagasy Republic[tw] OR Malaysia[tw] OR Malaya[tw] OR Malay[tw] OR Sabah[tw] OR Sarawak[tw] OR Malawi[tw] OR Nyasaland[tw] OR Mali[tw] OR Malta[tw] OR Marshall Islands[tw] OR Mauritania[tw] OR Mauritius[tw] OR Agalega Islands[tw] OR Mexico[tw] OR Micronesia[tw] OR Middle East[tw] OR Moldova[tw] OR Moldovia[tw] OR Moldovian[tw] OR Mongolia[tw] OR Montenegro[tw] OR Morocco[tw] OR Oman[tw] OR Orfn[tw] OR Mozambique[tw] OR Myanmar[tw] OR Myanma[tw] OR Burma[tw] OR Namibia[tw] OR Nepal[tw] OR Netherlands Antilles[tw] OR New Caledonia[tw] OR Nicaragua[tw] OR Niger[tw] OR Nigeria[tw] OR Northern Mariana Islands[tw] OR Oman[tw] OR Muscat[tw] OR Pakistan[tw] OR Palau[tw] OR Palestine[tw] OR Panama[tw] OR Paraguay[tw] OR Peru[tw] OR Philippines[tw] OR Philipines[tw] OR Phillipines[tw] OR Phillippines[tw] OR Poland[tw] OR Portugal[tw] OR Puerto Rico[tw] OR Romania[tw] OR Rumania[tw] OR Roumania[tw] OR Russia[tw] OR Russian[tw] OR Rwanda[tw] OR Ruanda[tw] OR Saint Kitts[tw] OR St Kitts[tw] OR Nevis[tw] OR Saint Lucia[tw] OR St Lucia[tw] OR Saint Vincent[tw] OR St Vincent[tw] OR Grenadines[tw] OR Samoa[tw] OR Samoan Islands[tw] OR Navigator Island[tw] OR Navigator Islands[tw] OR Sao Tome[tw] OR Saudi Arabia[tw] OR Senegal[tw] OR Serbia[tw] OR Montenegro[tw] OR Seychelles[tw] OR Sierra Leone[tw] OR Slovenia[tw] OR Sri Lanka[tw] OR Ceylon[tw] OR Solomon Islands[tw] OR Somalia[tw] OR Sudan[tw] OR Suriname[tw] OR Surinam[tw] OR Swaziland[tw] OR Syria[tw] OR Tajikistan[tw] OR Tadhikistan[tw] OR Tadjikistan[tw] OR Tadhik[tw] OR Tanzania[tw] OR Thailand[tw] OR Togo[tw] OR Togolese Republic[tw] OR Tonga[tw] OR Trinidad[tw] OR Tobago[tw] OR Tunisia[tw] OR Turkey[tw] OR Turkmenistan[tw] OR Turkmen[tw] OR Uganda[tw] OR Ukraine[tw] OR Uruguay[tw] OR USSR[tw] OR Soviet Union[tw] OR Union of Soviet Socialist Republics[tw] OR Uzbekistan[tw] OR Uzbek OR Vanuatu[tw] OR New Hebrides[tw] OR Venezuela[tw] OR Vietnam[tw] OR Viet Nam[tw] OR West Bank[tw] OR Yemen[tw] OR Yugoslavia[tw] OR Zambia[tw] OR Zimbababwe[tw] OR Rhodesia[tw] OR (Developing Countries[Mesh:noexp] OR Africa[Mesh:noexp] OR Africa, Northern[Mesh:noexp] OR Africa South of the Sahara[Mesh:noexp] OR Africa, Central[Mesh:noexp] OR Africa, Eastern[Mesh:noexp] OR Africa, Southern[Mesh:noexp] OR Africa, Western[Mesh:noexp] OR Asia[Mesh:noexp] OR Asia, Central[Mesh:noexp] OR Asia, Southeastern[Mesh:noexp] OR Asia, Western[Mesh:noexp] OR Caribbean Region[Mesh:noexp] OR West Indies[Mesh:noexp] OR South America[Mesh:noexp] OR Latin America[Mesh:noexp] OR Central America[Mesh:noexp] OR Afghanistan[Mesh:noexp] OR Albania[Mesh:noexp] OR Algeria[Mesh:noexp] OR American Samoa[Mesh:noexp] OR Angola[Mesh:noexp] OR "Antigua and Barbuda"[Mesh:noexp] OR Argentina[Mesh:noexp] OR Armenia[Mesh:noexp] OR Azerbaijan[Mesh:noexp] OR Bahrain[Mesh:noexp] OR Bangladesh[Mesh:noexp] OR Barbados[Mesh:noexp] OR Benin[Mesh:noexp] OR Byelarus[Mesh:noexp] OR Belize[Mesh:noexp] OR Bhutan[Mesh:noexp] OR Bolivia[Mesh:noexp] OR Bosnia-Herzegovina[Mesh:noexp] OR Botswana[Mesh:noexp] OR Brazil[Mesh:noexp] OR Bulgaria[Mesh:noexp] OR Burkina Faso[Mesh:noexp] OR Burundi[Mesh:noexp] OR Cambodia[Mesh:noexp] OR Cameroon[Mesh:noexp] OR Cape Verde[Mesh:noexp] OR Central African Republic[Mesh:noexp] OR Chad[Mesh:noexp] OR Chile[Mesh:noexp] OR China[Mesh:noexp] OR Colombia[Mesh:noexp] OR Comoros[Mesh:noexp] OR Congo[Mesh:noexp] OR Costa Rica[Mesh:noexp] OR	

Search	Query	Records retrieved
	Cote d'Ivoire[Mesh:noexp] OR Croatia[Mesh:noexp] OR Cuba[Mesh:noexp] OR Cyprus[Mesh:noexp] OR Czechoslovakia[Mesh:noexp] OR Czech Republic[Mesh:noexp] OR Slovakia[Mesh:noexp] OR Djibouti[Mesh:noexp] OR "Democratic Republic of the Congo"[Mesh:noexp] OR Dominica[Mesh:noexp] OR Dominican Republic[Mesh:noexp] OR East Timor[Mesh:noexp] OR Ecuador[Mesh:noexp] OR Egypt[Mesh:noexp] OR El Salvador[Mesh:noexp] OR Eritrea[Mesh:noexp] OR Estonia[Mesh:noexp] OR Ethiopia[Mesh:noexp] OR Fiji[Mesh:noexp] OR Gabon[Mesh:noexp] OR Gambia[Mesh:noexp] OR "Georgia (Republic)"[Mesh:noexp] OR Ghana[Mesh:noexp] OR Greece[Mesh:noexp] OR Grenada[Mesh:noexp] OR Guatemala[Mesh:noexp] OR Guinea[Mesh:noexp] OR Guinea-Bissau[Mesh:noexp] OR Guam[Mesh:noexp] OR Guyana[Mesh:noexp] OR Haiti[Mesh:noexp] OR Honduras[Mesh:noexp] OR Hungary[Mesh:noexp] OR India[Mesh:noexp] OR Indonesia[Mesh:noexp] OR Iran[Mesh:noexp] OR Iraq[Mesh:noexp] OR Jamaica[Mesh:noexp] OR Jordan[Mesh:noexp] OR Kazakhstan[Mesh:noexp] OR Kenya[Mesh:noexp] OR Korea[Mesh:noexp] OR Kosovo[Mesh:noexp] OR Kyrgyzstan[Mesh:noexp] OR Laos[Mesh:noexp] OR Latvia[Mesh:noexp] OR Lebanon[Mesh:noexp] OR Lesotho[Mesh:noexp] OR Liberia[Mesh:noexp] OR Libya[Mesh:noexp] OR Lithuania[Mesh:noexp] OR Macedonia[Mesh:noexp] OR Madagascar[Mesh:noexp] OR Malaysia[Mesh:noexp] OR Malawi[Mesh:noexp] OR Mali[Mesh:noexp] OR Malta[Mesh:noexp] OR Mauritania[Mesh:noexp] OR Mauritius[Mesh:noexp] OR Mexico[Mesh:noexp] OR Micronesia[Mesh:noexp] OR Middle East[Mesh:noexp] OR Moldova[Mesh:noexp] OR Mongolia[Mesh:noexp] OR Montenegro[Mesh:noexp] OR Morocco[Mesh:noexp] OR Mozambique[Mesh:noexp] OR Myanmar[Mesh:noexp] OR Namibia[Mesh:noexp] OR Nepal[Mesh:noexp] OR Netherlands Antilles[Mesh:noexp] OR New Caledonia[Mesh:noexp] OR Nicaragua[Mesh:noexp] OR Niger[Mesh:noexp] OR Nigeria[Mesh:noexp] OR Oman[Mesh:noexp] OR Pakistan[Mesh:noexp] OR Palau[Mesh:noexp] OR Panama[Mesh:noexp] OR Papua New Guinea[Mesh:noexp] OR Paraguay[Mesh:noexp] OR Peru[Mesh:noexp] OR Philippines[Mesh:noexp] OR Poland[Mesh:noexp] OR Portugal[Mesh:noexp] OR Puerto Rico[Mesh:noexp] OR Romania[Mesh:noexp] OR Russia[Mesh:noexp] OR "Russia (Pre-1917)"[Mesh:noexp] OR Rwanda[Mesh:noexp] OR "Saint Kitts and Nevis"[Mesh:noexp] OR Saint Lucia[Mesh:noexp] OR "Saint Vincent and the Grenadines"[Mesh:noexp] OR Samoa[Mesh:noexp] OR Saudi Arabia[Mesh:noexp] OR Senegal[Mesh:noexp] OR Serbia[Mesh:noexp] OR Montenegro[Mesh:noexp] OR Seychelles[Mesh:noexp] OR Sierra Leone[Mesh:noexp] OR Slovenia[Mesh:noexp] OR Sri Lanka[Mesh:noexp] OR Somalia[Mesh:noexp] OR South Africa[Mesh:noexp] OR Sudan[Mesh:noexp] OR Suriname[Mesh:noexp] OR Swaziland[Mesh:noexp] OR Syria[Mesh:noexp] OR Tajikistan[Mesh:noexp] OR Tanzania[Mesh:noexp] OR Thailand[Mesh:noexp] OR Togo[Mesh:noexp] OR Tonga[Mesh:noexp] OR "Trinidad and Tobago"[Mesh:noexp] OR Tunisia[Mesh:noexp] OR Turkey[Mesh:noexp] OR Turkmenistan[Mesh:noexp] OR Uganda[Mesh:noexp] OR Ukraine[Mesh:noexp] OR Uruguay[Mesh:noexp] OR USSR[Mesh:noexp] OR Uzbekistan[Mesh:noexp] OR Vanuatu[Mesh:noexp] OR Venezuela[Mesh:noexp] OR Vietnam[Mesh:noexp] OR Yemen[Mesh:noexp] OR Yugoslavia[Mesh:noexp] OR Zambia[Mesh:noexp] OR Zimbabwe[Mesh:noexp])	
#5	#1 AND #2 AND #3 AND #4	956
Limited to 1978 onwards in English language only		863

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CINAHL

Community health worker	Program	MCH	LMIC
MH “community health workers” OR MH “rural health personnel” OR TX “community health worker*” OR TX “community health aide*” OR TX “village health worker*” OR TX “barefoot doctor*” OR TX “family planning personnel*” OR TX “health extension worker*” OR TX “lady health worker*” OR TX “community health agent*” OR TX “Shasthyo Sebika*” OR TX “community nutrition worker*” OR TX “maternal health worker*” OR TX “voluntary Malaria worker*” OR TX “village malaria worker*” OR TX “Raedat” OR TX “postnatal support worker*” OR TX “mental health worker*” OR TX “mother coordinator*” OR TX “rural health worker*” OR TX “village health promoter*” OR TX accompagnateur* OR TX “Saksham Sahaya*” OR TX “anganwandi worker*” OR TX “accredited social health activist*” OR TX “community-based worker*” OR TX “community health volunteer*” OR TX “village health guide*” OR TX “maternal and child health promotion worker*” OR TX “maternal child health worker*” OR TX “kader posyandu*” OR TX behvarz* OR TX “village health helper*” OR TX “colaborador voluntario*” OR TX “nutrition volunteers*” OR TX “village drug-kit manager*” OR TX brigadistas* OR TX “female community health volunteer*” OR TX “Agente Comunitario de Salud*” OR TX “nutrition worker*” OR TX “community reproductive health worker*” OR TX “community drug distributor*” OR TX “community volunteer*”	TX Program OR TX programs OR TX programme OR TX programmes OR TX initiative* OR TX project OR TX projects	MH “Maternal-Child Health” OR TX “maternal-child health”	MH “low and middle income countries” OR MH “developing countries” OR TX Afghanistan OR TX Albania OR TX Algeria OR TX Angola OR TX Antigua OR TX Barbuda OR TX Argentina OR TX Armenia OR TX Armenian OR TX Aruba OR TX Azerbaijan OR TX Bahrain OR TX Bangladesh OR TX Barbados OR TX Benin OR TX Byelarus OR TX Byelorussian OR TX Belarus OR TX Belorussian OR TX Belorussia OR TX Belize OR TX Bhutan OR TX Bolivia OR TX Bosnia OR TX Herzegovina OR TX Hercegovina OR TX Botswana OR TX Brasil OR TX Brazil OR TX Bulgaria OR TX Burkina Faso OR TX Burkina Fasso OR TX Upper Volta OR TX Burundi OR TX Urundi OR TX Cambodia OR TX Khmer Republic OR TX Kampuchea OR TX Cameroon OR TX Camerouns OR TX Cameron OR TX Camerons OR TX Cape Verde OR TX “Central Africa Republic” OR TX Chad OR TX Chile OR TX China OR TX Colombia OR TX Comoros OR TX “Comoro Islands” OR TX Comores OR TX Mayotte OR TX Congo OR TX Zaire OR TX “Costa Rica” OR TX “Cote d'Ivoire” OR TX “Ivory Coast” OR TX Croatia OR TX Cuba OR TX Cyprus OR TX Czechoslovakia OR TX “Czech Republic” OR TX Slovakia OR TX “Slovak Republic” OR TX Djibouti OR TX “French Somaliland” OR TX Dominica OR TX “Dominican Republic” OR TX “East Timor” OR TX “East Timur” OR TX “Timor Leste” OR TX Ecuador OR TX Egypt OR TX “United Arab Republic” OR TX “El Salvador” OR TX Eritrea OR TX Estonia OR TX Ethiopia OR TX Fiji OR TX Gabon OR TX “Gabonese Republic” OR TX Gambia OR TX Gaza OR TX “Georgia Republic” OR TX “Georgian Republic” OR TX Ghana OR TX “Gold Coast” OR TX Greece OR TX Grenada OR TX Guatemala OR TX Guinea OR TX Guam OR TX Guiana OR TX Guyana OR TX Haiti OR TX Honduras OR TX Hungary OR TX India OR TX Maldives OR TX Indonesia OR TX Iran OR TX Iraq OR TX “Isle of Man” OR TX Jamaica OR TX Jordan OR TX Kazakhstan OR TX Kazakh OR TX Kenya OR TX Kiribati OR TX Korea OR TX Kosovo OR TX Kyrgyzstan OR TX Kirghizia OR TX “Kyrgyz Republic” OR TX Kirghiz OR TX Kirgizstan OR TX “Lao PDR” OR TX Laos OR TX Latvia OR TX Lebanon OR

Community health worker	Program	MCH	LMIC
OR TX "community health advocate*" OR TX "lay health visitor*" OR TX "Promotoras de Salud"			TX Lesotho OR TX Basutoland OR TX Liberia OR TX Libya OR TX Lithuania OR TX Macedonia OR TX Madagascar OR TX "Malagasy Republic" OR TX Malaysia OR TX Malaya OR TX Malay OR TX Sabah OR TX Sarawak OR TX Malawi OR TX Nyasaland OR TX Mali OR TX Malta OR TX "Marshall Islands" OR TX Mauritania OR TX Mauritius OR TX "Agalga Islands" OR TX Mexico OR TX Micronesia OR TX "Middle East" OR TX Moldova OR TX Moldavia OR TX Moldovan OR TX Mongolia OR TX Montenegro OR TX Morocco OR TX Ifni OR TX Mozambique OR TX Myanmar OR TX Myanma OR TX Burma OR TX Namibia OR TX Nepal OR TX "Netherlands Antilles" OR TX "New Caledonia" OR TX Nicaragua OR TX Niger OR TX Nigeria OR TX "Northern Mariana Islands" OR TX Oman OR TX Muscat OR TX Pakistan OR TX Palau OR TX Palestine OR TX Panama OR TX Paraguay OR TX Peru OR TX Philippines OR TX Philipines OR TX Phillipines OR TX Phillipines OR TX Poland OR TX Portugal OR TX "Puerto Rico" OR TX Romania OR TX Rumania OR TX Roumania OR TX Russia OR TX Russian OR TX Rwanda OR TX Ruanda OR TX "Saint Kitts" OR TX "St Kitts" OR TX Nevis OR TX "Saint Lucia" OR TX "St Lucia" OR TX "Saint Vincent" OR TX "St Vincent" OR TX Grenadines OR TX Samoa OR TX "Samoan Islands" OR TX "Navigator Island" OR TX "Navigator Islands" OR TX "Sao Tome" OR TX "Saudi Arabia" OR TX Senegal OR TX Serbia OR TX Montenegro OR TX Seychelles OR TX "Sierra Leone" OR TX Slovenia OR TX "Sri Lanka" OR TX Ceylon OR TX "Solomon Islands" OR TX Somalia OR TX Sudan OR TX Suriname OR TX Surinam OR TX Swaziland OR TX Syria OR TX Tajikistan OR TX Tadzshikistan OR TX Tadjikistan OR TX Tadzshik OR TX Tanzania OR TX Thailand OR TX Togo OR TX "Togolese Republic" OR TX Tonga OR TX Trinidad OR TX Tobago OR TX Tunisia OR TX Turkey OR TX Turkmenistan OR TX Turkmen OR TX Uganda OR TX Ukraine OR TX Uruguay OR TX USSR OR TX "Soviet Union" OR TX "Union of Soviet Socialist Republics" OR TX Uzbekistan OR TX Uzbek OR TX Vanuatu OR TX "New Hebrides" OR TX Venezuela OR TX Vietnam OR TX "Viet Nam" OR TX "West Bank" OR TX Yemen OR TX Yugoslavia OR TX Zambia OR TX Zimbabwe OR TX Rhodesia

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EMBASE

Community health worker	Program	MCH	LMIC
"Health Auxiliary"/de OR "community health worker*":ti,ab OR "community health aide*":ti,ab OR "village health worker*":ti,ab OR "barefoot doctor*":ti,ab OR "family planning personnel*":ti,ab OR "health extension worker*":ti,ab OR "lady health worker*":ti,ab OR "community health agent*":ti,ab OR "Shasthyo Sebika*":ti,ab OR "community nutrition worker*":ti,ab OR "maternal health worker*":ti,ab OR "voluntary Malaria worker*":ti,ab OR "village malaria worker*":ti,ab OR Raedat*:ti,ab OR "postnatal support worker*":ti,ab OR "mental health worker*":ti,ab OR "mother coordinator*":ti,ab OR "rural health worker*":ti,ab OR "village health promoter*":ti,ab OR accompagnateur*:ti,ab OR "Saksham Sahaya*":ti,ab OR "anganwandi worker*":ti,ab OR "accredited social health activist*":ti,ab OR "community- based worker*":ti,ab OR "community health volunteer*":ti,ab OR "village health guide*":ti,ab OR "maternal and child health promotion worker*":ti,ab OR "maternal child health worker*":ti,ab OR "kader posyandu*":ti,ab OR behvarz*:ti,ab OR "village health helper*":ti,ab OR "colaborador	Program:ti,ab OR programs:ti,ab OR programme:ti,ab OR programmes:ti,a b OR initiative*:ti,ab OR project:ti,ab OR projects:ti,ab	"Maternal child health care"/de OR "Maternal Welfare":ti,ab OR "child health":ti,ab OR "child care":ti,ab OR "child welfare":ti,ab OR "maternal-child health services":ti,ab OR "child health services":ti,ab OR "maternal child health":ti,ab OR "maternal newborn child health":ti,ab	Afghanistan:ti,ab OR Albania:ti,ab OR Algeria:ti,ab OR Angola:ti,ab OR Antigua:ti,ab OR Barbuda:ti,ab OR Argentina:ti,ab OR Armenia:ti,ab OR Armenian:ti,ab OR Aruba:ti,ab OR Azerbaijan:ti,ab OR Bahrain:ti,ab OR Bangladesh:ti,ab OR Barbados:ti,ab OR Benin:ti,ab OR Byelarus:ti,ab OR Byelorussian:ti,ab OR Belarus:ti,ab OR Belorussian:ti,ab OR Belorussia:ti,ab OR Belize:ti,ab OR Bhutan:ti,ab OR Bolivia:ti,ab OR Bosnia:ti,ab OR Herzegovina:ti,ab OR Hercegovina:ti,ab OR Botswana:ti,ab OR Brasil:ti,ab OR Brazil:ti,ab OR Bulgaria:ti,ab OR Burkina Faso:ti,ab OR "Burkina Fasso":ti,ab OR "Upper Volta":ti,ab OR Burundi:ti,ab OR Urundi:ti,ab OR Cambodia:ti,ab OR "Khmer Republic":ti,ab OR Kampuchea:ti,ab OR Cameroon:ti,ab OR Camerons:ti,ab OR Cameroon:ti,ab OR Camerons:ti,ab OR "Cape Verde":ti,ab OR "Central African Republic":ti,ab OR Chad:ti,ab OR Chile:ti,ab OR China:ti,ab OR Colombia:ti,ab OR Comoros:ti,ab OR "Comoro Islands":ti,ab OR Comores:ti,ab OR Mayotte:ti,ab OR Congo:ti,ab OR Zaire:ti,ab OR "Costa Rica":ti,ab OR "Cote d Ivoire":ti,ab OR "Ivory Coast":ti,ab OR Croatia:ti,ab OR Cuba:ti,ab OR Cyprus:ti,ab OR Czechoslovakia:ti,ab OR "Czech Republic":ti,ab OR Slovakia:ti,ab OR "Slovak Republic":ti,ab OR Djibouti:ti,ab OR "French Somaliland":ti,ab OR Dominica:ti,ab OR "Dominican Republic":ti,ab OR "East Timor":ti,ab OR "East Timur":ti,ab OR "Timor Leste":ti,ab OR Ecuador:ti,ab OR Egypt:ti,ab OR "United Arab Republic":ti,ab OR "El Salvador":ti,ab OR Eritrea:ti,ab OR Estonia:ti,ab OR Ethiopia:ti,ab OR Fiji:ti,ab OR Gabon:ti,ab OR "Gabonese Republic":ti,ab OR Gambia:ti,ab OR Gaza:ti,ab OR "Georgia Republic":ti,ab OR "Georgian Republic":ti,ab OR Ghana:ti,ab OR Gold Coast:ti,ab OR Greece:ti,ab OR Grenada:ti,ab OR Guatemala:ti,ab OR Guinea:ti,ab OR Guam:ti,ab OR Guiana:ti,ab OR Guyana:ti,ab OR Haiti:ti,ab OR Honduras:ti,ab OR Hungary:ti,ab OR India:ti,ab OR Maldives:ti,ab OR Indonesia:ti,ab OR Iran:ti,ab OR Iraq:ti,ab OR "Isle of Man":ti,ab OR Jamaica:ti,ab OR Jordan:ti,ab OR Kazakhstan:ti,ab OR Kazakh:ti,ab OR Kenya:ti,ab OR Kiribati:ti,ab OR Korea:ti,ab OR Kosovo:ti,ab OR Kyrgyzstan:ti,ab OR Kirghizia:ti,ab OR "Kyrgyz Republic":ti,ab OR Kirghiz:ti,ab OR Kirgizstan:ti,ab OR Lao PDR:ti,ab OR Laos:ti,ab OR Latvia:ti,ab OR Lebanon:ti,ab OR Lesotho:ti,ab OR Basutoland:ti,ab OR Liberia:ti,ab OR Libya:ti,ab OR Lithuania:ti,ab OR Macedonia:ti,ab OR Madagascar:ti,ab OR "Malagasy Republic":ti,ab OR Malaysia:ti,ab OR Malaya:ti,ab OR Malay:ti,ab OR

Community health worker	Program	MCH	LMIC
voluntario*:ti,ab OR "nutrition volunteers*":ti,ab OR "village drug-kit manager*":ti,ab OR brigadistas*:ti,ab OR "female community health volunteer*":ti,ab OR "Agente Comunitario de Salud*":ti,ab OR "nutrition worker*":ti,ab OR "community reproductive health worker*":ti,ab OR "community drug distributor*":ti,ab OR "community volunteer*":ti,ab OR "community health advocate*":ti,ab OR "lay health visitor*":ti,ab OR "Promotoras de Salud":ti,ab			Sabah:ti,ab OR Sarawak:ti,ab OR Malawi:ti,ab OR Nyasaland:ti,ab OR Mali:ti,ab OR Malta:ti,ab OR "Marshall Islands":ti,ab OR Mauritania:ti,ab OR Mauritius:ti,ab OR "Agalega Islands":ti,ab OR Mexico:ti,ab OR Micronesia:ti,ab OR "Middle East":ti,ab OR Moldova:ti,ab OR Moldavia:ti,ab OR Moldovan:ti,ab OR Mongolia:ti,ab OR Montenegro:ti,ab OR Morocco:ti,ab OR Ifni:ti,ab OR Mozambique:ti,ab OR Myanmar:ti,ab OR Myanma:ti,ab OR Burma:ti,ab OR Namibia:ti,ab OR Nepal:ti,ab OR "Netherlands Antilles":ti,ab OR "New Caledonia":ti,ab OR Nicaragua:ti,ab OR Niger:ti,ab OR Nigeria:ti,ab OR "Northern Mariana Islands":ti,ab OR Oman:ti,ab OR Muscat:ti,ab OR Pakistan:ti,ab OR Palau:ti,ab OR Palestine:ti,ab OR Panama:ti,ab OR Paraguay:ti,ab OR Peru:ti,ab OR Philippines:ti,ab OR Philipines:ti,ab OR Phillipines:ti,ab OR Phillippines:ti,ab OR Poland:ti,ab OR Portugal:ti,ab OR "Puerto Rico":ti,ab OR Romania:ti,ab OR Rumania:ti,ab OR Roumania:ti,ab OR Russia:ti,ab OR Russian:ti,ab OR Rwanda:ti,ab OR Ruanda:ti,ab OR "Saint Kitts":ti,ab OR St Kitts:ti,ab OR Nevis:ti,ab OR "Saint Lucia":ti,ab OR "St Lucia":ti,ab OR "Saint Vincent":ti,ab OR "St Vincent":ti,ab OR Grenadines:ti,ab OR Samoa:ti,ab OR "Samoa Island":ti,ab OR "Navigator Island":ti,ab OR "Navigator Islands":ti,ab OR Sao Tome:ti,ab OR "Saudi Arabia":ti,ab OR Senegal:ti,ab OR Serbia:ti,ab OR Montenegro:ti,ab OR Seychelles:ti,ab OR "Sierra Leone":ti,ab OR Slovenia:ti,ab OR "Sri Lanka":ti,ab OR Ceylon:ti,ab OR "Solomon Islands":ti,ab OR Somalia:ti,ab OR Sudan:ti,ab OR Suriname:ti,ab OR Surinam:ti,ab OR Swaziland:ti,ab OR Syria:ti,ab OR Tajikistan:ti,ab OR Tadjikistan:ti,ab OR Tadjik:ti,ab OR Tanzania:ti,ab OR Thailand:ti,ab OR Togo:ti,ab OR "Toguese Republic":ti,ab OR Tonga:ti,ab OR Trinidad:ti,ab OR Tobago:ti,ab OR Tunisia:ti,ab OR Turkey:ti,ab OR Turkmenistan:ti,ab OR Turkmen:ti,ab OR Uganda:ti,ab OR Ukraine:ti,ab OR Uruguay:ti,ab OR USSR:ti,ab OR "Soviet Union":ti,ab OR "Union of Soviet Socialist Republics":ti,ab OR Uzbekistan:ti,ab OR Uzbek OR Vanuatu:ti,ab OR "New Hebrides":ti,ab OR Venezuela:ti,ab OR Vietnam:ti,ab OR Viet Nam:ti,ab OR West Bank:ti,ab OR Yemen:ti,ab OR Yugoslavia:ti,ab OR Zambia:ti,ab OR Zimbabwe:ti,ab OR Rhodesia:ti,ab OR "Developing Country"/de OR Africa/exp OR Asia/exp OR Caribbean/exp OR "West Indies"/exp OR "South America"/exp OR "Latin America"/exp OR "Central America"/exp OR "Developing Countr*":ti,ab

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SCOPUS

Community health worker	Program	MCH	LMIC
<p>"Health Auxiliary" OR "community health worker*" OR "community health aide*" OR "village health worker*" OR "barefoot doctor*" OR "family planning personnel*" OR "health extension worker*" OR "lady health worker*" OR "community health agent*" OR "Shasthyo Sebika*" OR "community nutrition worker*" OR "maternal health worker*" OR "voluntary Malaria worker*" OR "village malaria worker*" OR Raedat* OR "postnatal support worker*" OR "mental health worker*" OR "mother coordinator*" OR "rural health worker*" OR "village health promoter*" OR accompagnateur* OR "Saksham Sahaya*" OR "anganwadi worker*" OR "accredited social health activist*" OR "community-based worker*" OR "community health volunteer*" OR "village health guide*" OR "maternal and child health promotion worker*" OR "maternal child health worker*" OR "kader posyandu*" OR behvarz* OR "village health helper*" OR "colaborador voluntario*" OR "nutrition volunteers*" OR "village drug-kit manager*" OR brigadistas* OR "female community health volunteer*" OR "Agente Comunitario de Salud*" OR "nutrition worker*" OR "community reproductive health worker*" OR "community drug distributor*" OR "community</p>	<p>Program OR programs OR programme OR programmes OR initiative* OR project OR projects</p>	<p>"Maternal child health care"/de OR "Maternal Welfare" OR "child health" OR "child care" OR "child welfare" OR "maternal-child health services" OR "child health services" OR "maternal child health" OR "maternal newborn child health"</p>	<p>Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussia* OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR Brazil OR Bulgaria OR Burkina Faso OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Camerons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR "Congo" OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus OR Czechoslovakia OR "Czech Republic" OR Slovakia OR "Slovak Republic" OR Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Estonia OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR "Georgia Republic" OR "Georgian Republic" OR Ghana OR Gold Coast OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR "Isle of Man" OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghz OR Kirgizstan OR Lao PDR OR Laos OR Latvia OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Lithuania OR Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovan OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia</p>

Community health worker	Program	MCH	LMIC
volunteer*” OR “community health advocate*” OR “lay health visitor*” OR “Promotoras de Salud”			OR Nepal OR “Netherlands Antilles” OR “New Caledonia” OR Nicaragua OR Niger OR Nigeria OR “Northern Mariana Islands” OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR Poland OR Portugal OR “Puerto Rico” OR Romania OR Rumania OR Roumania OR Russia OR Russian OR Rwanda OR Ruanda OR “Saint Kitts” OR St Kitts OR Nevis OR “Saint Lucia” OR “St Lucia” OR “Saint Vincent” OR “St Vincent” OR Grenadines OR Samoa OR “Samoan Islands” OR “Navigator Island” OR “Navigator Islands” OR Sao Tome OR “Saudi Arabia” OR Senegal OR Serbia OR Montenegro OR Seychelles OR “Sierra Leone” OR Slovenia OR Sri Lanka” OR Ceylon OR “Solomon Islands” OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhiistan OR Tadjikistan OR Tadjik OR Tanzania OR Thailand OR Togo OR “Togolese Republic” OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uruguay OR USSR OR “Soviet Union” OR “Union of Soviet Socialist Republics” OR Uzbekistan OR Uzbek OR Vanuatu OR “New Hebrides” OR Venezuela OR Vietnam OR Viet Nam OR West Bank OR Yemen OR Yugoslavia OR Zambia OR Zimbabwe OR Rhodesia OR “Developing Country” OR Africa OR Asia OR Caribbean OR “West Indies” OR “South America” OR “Latin America” OR “Central America” OR “Developing Countr*”

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Appendix II: Data Charting Form

Scoping Review Title: Application of Primary Health Care Principles in National Community Health Worker Programs in Low- and Middle –Income Countries?	
Data charted by:	
Date of data charting:	
Study Details and Characteristics	
Study citation details (author, year, title, journal, volume, issue, pages)	
Country of origin	
Study objective / aim	
Type of Study	Qualitative / Quantitative
Methods:	
Study Setting:	
CHW Program Details	
Name of the CHW Program	
Objective of the CHW Program	
Year the program started	
End date	
Implemented by	
Funded by	
Details / Results charted from the Study (in relation to the concept of the scoping review)	
Which PHC principle is reflected in the reported objective of the national program?	<ul style="list-style-type: none"> • Universal access / Equity • Community participation • Intersectoral collaboration • Appropriateness
How are they implementing the PHC principle (s)?	
Stated outcome / achievement of the CHW program with reference to PHC principle (s)	
Key findings of the article	
Characteristics of CHWs	
Key role of CHWs stated	
Nomenclature of CHWs	
Gender	
Employment status	
Pre-service training	
Catchment area	
Additional notes:	

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	



SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	
Limitations	20	Discuss the limitations of the scoping review process.	
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: 10.7326/M18-0850.



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BMJ Open

Application of Primary Health Care Principles in National Community Health Worker Programs in Low- and Middle - Income Countries: A Scoping Review

Journal:	<i>BMJ Open</i>
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Primary Subject Heading:	Public health
Secondary Subject Heading:	Public health, Health policy
Keywords:	PRIMARY CARE, Human resource management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH

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3 1 **Title of the article:** Application of Primary Health Care Principles in National
4 2 Community Health Worker Programs in low- and Middle -Income Countries: A Scoping
5 3 Review
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9 4

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3 27 **Abstract**
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5 28 **Objective:** To identify which PHC principles are reflected in the implementation of
6 national community health worker (CHW) programs and how they may contribute to
7 the outcomes of these programs in the context of low-and middle-income countries
8 (LMICs).
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13 32 **Design:** Scoping review
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15 33 **Data sources:** A systematic search was conducted through PubMed, CINAHL,
16 EMBASE and Scopus databases.
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19 35 **Eligibility Criteria:** The review considered published primary studies on national
20 programs, projects or initiatives utilising the services of CHWs in LMICs focused on
21 maternal and child health. We included only English language studies. Excluded were
22 programs operated by non-government organisations, study protocols, reviews,
23 commentaries, opinion papers, editorials and conference proceedings.
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28 40 **Data extraction and Synthesis:** We reviewed the application of four PHC principles
29 (universal health coverage, community participation, intersectoral coordination and
30 appropriateness) in the CHW program's objectives, implementation and stated
31 outcomes. Data extraction was undertaken systematically in an excel spreadsheet
32 while the findings were synthesised in a narrative manner. The quality appraisal of the
33 selected studies was not performed in this scoping review.
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39 46 **Results:** From 1,280 papers published between 1983 and 2019, 26 met the inclusion
40 criteria. These 26 papers included 14 CHW programs from 13 LMICs. Universal health
41 coverage and community participation were the two commonly reported PHC
42 principles, while intersectoral coordination was generally missing. Similarly, the
43 cultural acceptability aspect of the principle of appropriateness was present in all
44 programs as these programs select CHWs from within the communities. Other
45 aspects, particularly effectiveness, were not evident.
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53 53 **Conclusion:** The implementation of PHC principles across national CHW programs
54 in LMICs is patchy. For comprehensiveness and improved health outcomes, programs
55 need to incorporate all attributes of PHC principles. Future research may focus on how
56 to incorporate more attributes of PHC principles while implementing national CHW
57 programs in LMICs. Better documentation and publications of CHW program
58 implementation are also needed.
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Keywords: Primary Health Care, Community Health Worker; Community Health Program; Low-and Middle-Income Countries.

Strengths and limitations of the study

- CHW programs in developing and lower middle income countries are an essential aspect of the strategy to achieve health for all and sustainable development goals, and this scoping review can be considered as an important step towards reviewing national community health worker programs in LMICs applying the lens of primary health care principles
- Four bibliographic databases were searched using a basic search strategy that was modified as per the database requirement.
- The studies were heterogeneous in their methods and outcomes assessed and that posed a challenge in comparing primary health care principles
- The generalisability of the results of this study is limited to larger national-level programs in developing and lower- and middle-income countries only.

74 BACKGROUND

75 Primary Health Care (PHC), as an approach to a reorientation of health services and
76 provision of universal health care, has remained the benchmark for most countries'
77 discourse on health since the PHC approach was mobilized by the Alma Ata Health
78 for All (HFA) declaration for comprehensive, evidence-based responses to local health
79 needs with reference to the social context.¹ PHC is a whole-of-society approach to
80 health and aims to attain the highest possible level and distribution of health and well-
81 being by providing an accessible and wide range of services, including health
82 promotion; disease prevention, treatment and rehabilitation; and palliative care.¹

83 'Health for All' requires that health systems respond to the challenges of a changing
84 world and growing expectations for better performance. PHC includes the key
85 elements needed to improve health security, through a focus on community
86 engagement, preventative collective action, access to good quality medicines, rational
87 prescribing, and a core set of essential public health functions, including surveillance
88 and early response.¹ A PHC approach achieves this by strengthening community-
89 based initiatives and building resilience.

90 Across a wide variety of settings in low-, middle-, and high-income countries, PHC-
91 oriented health systems have consistently produced better health outcomes,
92 enhanced equity, and improved efficiency.¹ In Brazil, for example, enrolment in the
93 family health strategy has been linked to a higher likelihood of regular care, better
94 access to medication, and improved patient satisfaction. Hence, PHC has been rightly
95 advocated as the key to achieving HFA and the 2018 Astana Declaration reiterated
96 the importance of this approach for achieving Universal Health Coverage (UHC).^{2 3}

97 PHC, as an approach to achieve HFA goals,' was built on the principles of equity in
98 access to health services and the right of people to participate in decisions about their
99 own health care.¹ These principles i.e. 'equity' and 'community empowerment'
100 underpin preventive and promotive health services, appropriate technology, and
101 intersectoral collaboration.⁴ Evidence suggests that if countries have explicitly
102 organised their health systems around PHC principles, it has led to improved health
103 outcomes. For example, in Portugal, by 2008, the life expectancy at birth increased
104 9.2 years more than it was 30 years ago. In Congo, the case-fatality rate after
105 caesarean section dropped from 7% to less than 3% from 1985 to 2000. In, Iran, the

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3 106 under-five child mortality reduced from 80 per 1000 to less than 20 per 1000 in rural
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5 107 areas from 1980 to 2000.⁵
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7 108 PHC's emphasis on community-based services is an important way to ensure access,
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9 109 in rural, remote areas and for disadvantaged populations. With limited resources and
10
11 110 geographical and epidemiological context, it is a challenge for health care systems in
12
13 111 LMICs to reach out to the whole population. Therefore, as part of the PHC approach
14
15 112 and with a view to its principle of community empowerment, CHW programs were
16
17 113 envisioned as a way to reach a wider population for essential health needs and to
18
19 114 achieve HFA. National CHW programs were implemented by many governments from
20
21 115 1978, operating at the interface between communities and the primary care level of
22
23 116 the health system.⁶⁻¹⁰ Established under the PHC principles, these programs were
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25 117 expected to encompass and promote them and in doing so achieve improvements in
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27 118 health outcomes.¹¹

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29 119 National CHW programs, as vehicles to incorporate PHC principles into healthcare
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31 120 provision, have contributed significantly in reducing under-five child mortality in
32
33 121 Brazil¹², Indonesia¹², and Nepal¹³. In Indonesia, immunization coverage also
34
35 122 improved many-fold with an increase in community health workers. These examples
36
37 123 demonstrate a clear link and need for incorporating PHC principles when implementing
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39 124 CHW programs. Over decades of implementation CHW programs have also faced
40
41 125 various challenges including the loss of the PHC movement.^{14 15} Though, the PHC
42
43 126 principles are evident in the program design and policies of the CHW programs in
44
45 127 various countries.¹⁶⁻²⁰ There is not widespread/comprehensive evidence of the extent
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47 128 to which PHC principles are systematically applied across the national CHW
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49 129 programs. This study aims to identify the PHC principles in the implementation of these
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51 130 programs in LMICs and to understand their contribution to the outcomes of those
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53 131 programs.
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55 132 **METHODS**

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57 133 A systematic scoping review was conducted using a predefined protocol²¹ and
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59 134 reported as per the Preferred Reporting Items for Systematic Reviews and Meta-
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135 analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.²² The databases
136 searched in September 2019 were PubMed (MEDLINE), CINAHL (EBSCOhost),
137 EMBASE (Elsevier) and Scopus (Elsevier). The review only considered published
138 primary studies on programs, projects or initiatives utilising the services of CHWs in

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3 139 LMICs. We focused on the national level CHW programs defined as any CHW
4 140 program that is operated or implemented by the government of a specific country, on
5 141 multiple sites (jurisdictions/provinces/regions) within a country and has been functional
6 142 for a minimum of three years. We considered national CHW programs with a maternal
7 143 and child health (MCH) focus as it is a national priority in the majority of LMICs.

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13 144 Papers published only in the English language from October 1978 to September 2019
14 145 were considered as 1978 was the year of the Alma-Ata declaration that promoted the
15 146 establishment of national-level CHW programs under the PHC principles. Excluded
16 147 were study protocols, narrative reviews, commentaries, text and opinion papers,
17 148 viewpoints, editorials, conference proceedings/abstracts, correspondences,
18 149 systematic and scoping reviews and the papers on the CHW programs operated by a
19 150 non-government organisation (NGOs). Papers were also excluded if they involved
20 151 health professionals other than CHWs such as midwives, nurses and traditional birth
21 152 attendants. Papers were not excluded based on the unavailability of the abstract.

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29 153 The search strategy, including all identified keywords and index terms, was adapted
30 154 for each included database (appendix I – logic grid). The search terms used included
31 155 “community health worker”, “Program”, “Maternal and Child Health” and “Low-and
32 156 Middle-Income Countries”. The results of the search are presented in the PRISMA-
33 157 ScR flow diagram in the results section.

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39 158 Following the search, all identified records were collated and uploaded into Covidence
40 159 software²³ and duplicates removed. Two authors (SP and ZL) independently screened
41 160 titles and abstracts and then matched the full texts selected during screening against
42 161 the inclusion criteria. The reference lists of relevant papers were also searched for
43 162 additional studies. Papers meeting the inclusion criteria were included in the review
44 163 for data charting. In scoping reviews, the data extraction process is referred to as
45 164 charting the results.²⁴ SP and ZL completed data charting using a pre-developed data
46 165 charting form. Key attributes of the data charting form included the country of origin,
47 166 study objective, design and key findings, name of the CHW program, objective, and
48 167 reflection of PHC principle/s in program objective, implementation activities, and stated
49 168 outcomes along with the selection process of CHWs (appendix II). The data charting
50 169 form was pilot tested and modified accordingly. The operational definition of the PHC
51 170 principles used as reference in this scoping review are as follows:

- 171 1. Universal Health Coverage: all people receive the health services they need,
172 including public health services designed to promote better health, prevent illness,
173 and to provide treatment, rehabilitation and palliative care of sufficient quality to be
174 effective, while at the same time ensuring that the use of these services does not
175 expose the user to financial hardship.^{2 25}
- 176 2. Community Participation: Active community involvement in defining health
177 problems and needs, developing solutions and implementing and evaluating
178 programs.²
- 179 3. Intersectoral Coordination: The linkage between health and development.²
- 180 4. Appropriateness: Services should be effective, culturally acceptable, affordable and
181 manageable.²

182 We examined the included studies in light of all or any of the sub-attribute of the above-
183 listed four PHC principles and reported accordingly. The evidence is reported if it was
184 mentioned explicitly in the article or inferred by the researchers reflecting the
185 implementation of PHC principles even if the evidence was about only one aspect of
186 a principle. The relevant evidence is extracted and reported in the results section.

187 There was no quality assessment conducted of the included studies. The findings were
188 synthesised in a tabular and narrative manner. The conceptual framework, including
189 definitions of the four principles, for collating and summarizing the data is presented
190 in the published protocol.²¹

191 **Patient and public involvement**

192 We did not involve patients or the public in this scoping review.

193 **RESULTS**

194 **Search Results**

195 We identified 1,280 citations through database searches. After removing duplicates
196 and screening out non-relevant abstracts, we assessed 281 full-text papers for
197 eligibility. 263 of those 281 were excluded as these did not meet the eligibility criteria.
198 In total, 18 papers^{17-20 26-39}, published from 1983 to 2019 met the eligibility criteria
199 (Figure 1). Eight⁴⁰⁻⁴⁷ papers were further included from the reference lists of the
200 included studies, making a total of 26 papers.

201 Of the 26 papers, two studies were conducted in western Asia^{17 35}, 12 studies were
202 conducted in South Asia^{18 27 29 31 33 37 38 40-44} and one study in South East Asia.²⁸ Seven

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2
3 203 studies were conducted in Africa ranging from the Horn of Africa^{19 30 45 46}, Central
4 204 Africa²⁰, Western Africa³² and South Africa³⁹. Two studies were conducted in South
5 205 America^{34 47}, one in Central America³⁶ and one study was conducted in the
6 206 Caribbean.²⁶ Altogether, these 26 studies covered 14 CHW programs from 13 LMICs.
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10 207 Fourteen of the 26 included studies were quantitative^{19 26 28 31 32 34-36 40 42 43 45-47} and 12
11 208 studies were qualitative.^{17 18 20 27 29 30 33 37-39 41 44} Supplementary table 1 provides an
12 209 overview of the included studies outlining the key objective/s, methods and findings as
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14 210 reported by the authors.
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20 212 Figure 1: PRISMA flowchart for study selection and inclusion process
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24 214 **Application of PHC Principles**

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26 215 The PHC principles were applied to a varied extent in the objective/s, implementation,
27 216 and outcome of the national CHW programs reviewed in this study (Table 1). The
28 217 evidence found in the objective, implementation, or the outcome of the included
29 218 studies related to the application of the four PHC principles is organised in
30 219 supplementary table 2.
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220 Table 1: Application of primary health care principles as reflected in the national community health worker programs

Serial No.	Country / CHWP / year commenced	PHC Principle/s observed in the CHWP Objective	PHC Principle/s observed in the implementation of the CHWP	PHC Principle/s observed in the stated outcome/achievement of the CHWP
1.	IRAN / Women Health Volunteers Program / 1992 ¹⁷	Community Participation	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation - Intersectoral coordination
2.	IRAN / Primary Health Care Network – EPI / 1983 ³⁵	Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Appropriateness
3.	PAKISTAN / National Program for Family Planning & Primary Health Care / 1994 ^{27 33}	Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation
4.	INDIA / Accredited Social Health Activist (ASHA) Program / 2005 ^{31 37 38}	- Universal Health Coverage - Appropriateness	- Universal Health Coverage - Community Participation	- Universal Health Coverage
5.	BANGLADESH / National MCH and Family Planning Program / 1976 ²⁹	Not reported	- Universal Health Coverage - Community Participation	Not reported
6.	NEPAL / Female Community Health Volunteer Program / 1988 ¹⁸	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation	Not reported
7.	CAMBODIA / Village Malaria Worker Project as part of National Malaria Control Program / 2001 ²⁸	Not reported	- Universal Health Coverage - Community Participation*	- Universal Health Coverage
8.	ETHIOPIA / Health Extension Program / 2003 ^{19 30}	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation	- Universal Health Coverage - Community Participation - Appropriateness

Serial No.	Country / CHWP / year commenced	PHC Principle/s observed in the CHWP Objective	PHC Principle/s observed in the implementation of the CHWP	PHC Principle/s observed in the stated outcome/achievement of the CHWP
9.	RWANDA / RapidSMS program / 2013 ²⁰	- Universal Health Coverage - Appropriateness	- Universal Health Coverage - Community Participation - Appropriateness	- Appropriateness (use of technology, acceptability)
10.	NIGER / Rural Health Improvement Program / 1970s ³²	- Universal Health Coverage	- Universal Health Coverage	Not reported
11.	SOUTH AFRICA / ward-based outreach teams (WBOT) - national CHW program / 2011 ³⁹	- Universal Health Coverage	- Universal Health Coverage - Community Participation	- Appropriateness
12.	BRAZIL / Family Health Program (Programa de Saude da Familia, PSF) / 1994 ³⁴	- Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage
13.	EL SAVADOR / Rural Health Aide Program / 1976 ³⁶	- Universal Health Coverage	- Universal Health Coverage - Community Participation*	- Universal Health Coverage
14.	JAMAICA / Community Health Aide program / 1978 ²⁶	- Universal Health Coverage	- Universal Health Coverage - Community Participation	- Universal Health Coverage

221 CHWP = Community Health Worker Program, PHC = Primary Health Care

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3 222 'Universal health coverage' and 'community participation' were the two commonly
4 223 reflected PHC principles in the national CHW programs across their objective/s,
5 224 implementation and outcomes. 'Intersectoral coordination' was only mentioned in the
6 225 outcome of Iran's Women Health Volunteers (WHV) program.¹⁷ The objective of two
7 226 CHW programs not reported in the papers reviewed.^{28 29} In addition, studies from
8 227 Nepal^{18 44}, Bangladesh²⁹, and Niger³² did not report on the outcomes of the CHW
9 228 programs.

229 *Universal Health Coverage (UHC)*

16 229
17 230 We reviewed the national CHW programs for the application of this fundamental PHC
18 231 principle in terms of coverage and access, equity and comprehensiveness. UHC was
19 232 reflected in the objective of 11 CHW programs^{18-20 26 27 32 34-37 39} and in the
20 233 implementation of 14^{17-20 26-29 32 34-37 39} programs through the service provision by
21 234 CHWs in the MCH and family planning domain. These 14 programs reported
22 235 improvements in the scope [population coverage] and range [comprehensiveness] of
23 236 health services provided. For example, an outcome of the CHW program in Iran was
24 237 increased utilisation of MCH care services as a result of the active follow-up by
25 238 CHWs.¹⁷ The increase in immunisation coverage of children in the rural areas was
26 239 also attributed to the 'active' approach and vigilance of CHWs and vaccinators serving
27 240 the PHC network of Iran.³⁵ In Pakistan the CHW program was claimed to be
28 241 contributing to the increasing utilisation of antenatal care and family planning.²⁷ In
29 242 Rwanda, mHealth was reported as improving communication between CHWs and
30 243 community members leading to better use of the health services.²⁰

31 244 The concept of 'care according to need' was reflected in the objective of Pakistan's
32 245 CHW program that focuses on the provision of care in underserved areas.²⁷ Service
33 246 provision to ethnic minorities was one of the focus areas of Nepal's CHW program.¹⁸

247 *Community Participation*

34 247
35 248 Only three¹⁷⁻¹⁹ of the 14 CHW programs included in this review incorporated
36 249 community participation in their program objective. In terms of implementation, 10
37 250 programs^{17 18 20 27-31 35 36} reflected community participation as they engaged CHWs
38 251 from within the local communities to provide care to the local population. Moreover,
39 252 the selection of CHWs from the local community they serve facilitated their access to
40 253 households, development of good relationships and high acceptability in the
41 254 community.^{27 30 32} Three programs^{32 34 39} did not mention the selection process of

1
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3 255 CHWs while in Jamaica it was not mandatory to select CHWs from within the local
4
5 256 community.²⁶
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7 257 Examples of other activities reflecting the process of community participation² beyond
8
9 258 the selection of CHWs were reported only in Ethiopia's Health Extension Program.³⁰
10
11 259 In this program the performance of health centres was evaluated by the community
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13 260 quarterly and the CHWs were monitored by the community volunteers.³⁰
14

15 261 *Intersectoral Coordination*

16 262 PHC ought to involve the health sector and all related sectors and aspects of national
17
18 263 and community development that have an impact on health.^{2 48} Intersectoral
19
20 264 coordination was not reflected in the objective/s or implementation of any CHW
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22 265 program and only in the outcome of one¹⁷ program. The WHV Program of Iran
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24 266 explicitly described the intersectoral link between health and education sectors for
25
26 267 transmitting health messages to the people.¹⁷ The Accredited Social Health Activist
27
28 268 (ASHA) program from India, while not reporting intersectoral collaboration directly, did
29
30 269 report actions to enhance the role of women by creating opportunities by working with
31
32 270 other sectors to empower women.³⁸
33

32 271 *Appropriateness*

34 272 The final PHC principle assessed in this review was appropriateness: i.e. services that
35
36 273 are effective, culturally acceptable and financially affordable. The included studies
37
38 274 reflected one or another of these attributes but none reported all three attributes of
39
40 275 appropriateness. For example, the concept of appropriateness was reflected explicitly
41
42 276 in the objective of India's ASHA program (to provide affordable and quality health care)
43
44 277 but did not mention cultural appropriateness.³¹ The RapidSMS program of Rwanda
45
46 278 reported the cultural acceptability of technology (phone messaging services) and its
47
48 279 affordability considering that almost all populations had access to a mobile phone.²⁰
49

48 280 **DISCUSSION**

50
51 281 This study has provided insights into the application of PHC principles in the
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53 282 implementation of national CHW programs. PHC principles do not appear to be
54
55 283 applied with the rigor and regularity as one would expect considering the emphasis
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57 284 laid on these during conceptualisation of this significant public health movement called
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59 285 'PHC'.
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3 286 Our results show that 'UHC' and 'community participation' were the most common
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5 287 PHC principles reflected in the national CHW programs. In contrast, intersectoral
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7 288 coordination was stated in the outcome of only one of the 14 CHW programs¹⁷ while
8
9 289 none of the studies described the programs with reference to all three attributes of
10
11 290 appropriateness (effective, culturally acceptable and financially affordable).

12
13 291 'Enhanced coverage' attribute of UHC was most commonly reflected by the national
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15 292 CHW programs. There is limited evidence in the reviewed 26 papers on the
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17 293 implementation of other two attributes, i.e., coverage on the basis of need (equity) and
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19 294 comprehensiveness. This finding complements the fact that soon after Alma-Ata,
20
21 295 selective PHC was proposed as an interim strategy for disease control in LMICs.^{49 50}
22
23 296 Many vertical programs utilised CHWs under different names and with different roles⁵¹
24
25 297 resulting in a fragmented and disease-specific approach operating within the context
26
27 298 of fragile health systems of LMICs. CHWs however, are not a "panacea for weak health
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29 299 systems." They require well-structured support from the formal health systems with
30
31 300 which national CHW programs are linked. Therefore, achieving UHC requires
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33 301 strengthening of health systems with effective integration of comprehensive CHW
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35 302 programs in LMICs as PHC can only work when a country has the structures, skills
36
37 303 and data to ensure that all people are covered.¹⁵

38
39 304 This review found that the implementation of community participation was patchy, and
40
41 305 when it was employed it mainly reflected in the selection of CHWs from the local
42
43 306 community. This is not surprising as after the Alma-Ata declaration several
44
45 307 governments started CHW programs as a means for people's participation with local
46
47 308 lay people trained to administer basic first-line healthcare in their communities.^{7 15}
48
49 309 While CHWs' position as community members themselves may provide a 'natural link'
50
51 310 between them and the community, it may also appear to safeguard trust in^{30 32} and
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53 311 respect for them from the community side and enhanced self-esteem from the CHW
54
55 312 side.³⁰ A higher level of community participation where the community is given a stake
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57 313 in the evaluation and redefining of services was evident only in the Ethiopian CHW
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59 314 program.³⁰ A successful CHW program requires the support and ownership of the
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315 community through their active involvement in the entire process of defining health
316 problems and needs, developing solutions, implementing and evaluating the program,
317 as well as establishing a supportive social and policy environment for community

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3 318 participation at national, district, and local levels.⁵² CHW programs often struggle to
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5 319 be successful when not part of a broader community engagement process which
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7 320 requires explicit methods for involving individuals and communities, clearly defined
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9 321 roles and responsibilities, training of policymakers and adequate funding.⁵² Recent
10
11 322 WHO guidelines have explicitly recommended ways to select CHWs, engage and
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13 323 mobilize the community and this can be achieved if there is a supportive social and
14
15 324 policy environment.⁵³ With little or no evidence as noted by this scoping review on
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17 325 community involvement in needs assessment, the design of programs and evaluation
18
19 326 may indicate that invoking community participation is a challenge for these programs.¹⁵
20
21 327 Community participation is a context-dependent, gradual process that is less
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23 328 controllable and less measurable, thereby making it harder to track.⁵⁴ There is a need
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25 329 for robust program evaluations of community participation activities that measure long-
26
27 330 term outcomes and provide support for the CHW programs to broaden their scope of
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29 331 community participation. Moreover, CHW programs need to give attention to the
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31 332 experiences of CHWs themselves to address the feelings of powerlessness, and
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33 333 frustrations expressed by CHWs about how organisational processual and relational
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35 334 arrangements hindered them from achieving the desired impact. CHW programs
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37 335 should systematically identify disempowering organisational arrangements and take
38
39 336 steps to remedy these.⁵⁵

37 337 The operational problems related to partnerships working (intersectoral,
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39 338 interinstitutional, interdisciplinary and professional/lay partnerships) were highlighted
40
41 339 in the early implementation years of these programs in LMICs.⁵⁶ Our review informs
42
43 340 that this is still the case.¹⁷ This finding corresponds with the fact that working
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45 341 relationships between partners have often proved difficult,^{54 56} as each sector has its
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47 342 priorities.⁵⁴ Though some of the CHW programs reflect that the CHWs do understand
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49 343 how various actors relate to each other, and where their interests lie and how they
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51 344 “use this understanding in particular situations to provide an interpretation of the
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53 345 situation and frame courses of action that appeal to existing interests and identities,”
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55 346 inducing cooperation amongst a range of phenomena.⁵⁷

54 347 The PHC literature reports that community participation and intersectoral coordination
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56 348 are the two most weakly implemented principles.^{15 54} Our review findings also support
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58 349 this evidence. National CHW programs ought to view these principles as two pillars
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3 350 that help achieve the universal health coverage of services that are appropriate for the
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5 351 community and their context.
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7 352 By its nature, the provision of MCH services to women by female CHWs who are also
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9 353 selected from within the local community tends to make it culturally acceptable and
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11 354 meet the principle of appropriateness. However, CHW programs need to incorporate
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13 355 'appropriateness' more explicitly in their objectives and then diligently pursue this in
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15 356 program implementation and outcomes, which may contribute to addressing the
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17 357 current lack of evidence on the effectiveness of these programs.⁵⁸

18 358 Based on the findings of this scoping review it can also be inferred that if the CHW
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20 359 programs follow PHC principles they can be better positioned to help in current
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22 360 pandemic response and prevent future infectious outbreaks/epidemics by increasing
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24 361 access to health products and services, distributing health information, increasing
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26 362 social mobilization, completing surveillance activities and reducing the burden of
27
28 363 formal health care system.⁵⁹

29 364 The review has a number of limitations. Firstly, it relied solely on the information
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31 365 reported in the papers to assess the application of PHC principles within the programs.
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33 366 Many papers did not clearly articulate these principles or provide sufficient descriptions
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35 367 of the program to allow an assessment to be made. As such the reviewers needed to
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37 368 interpret the evidence about principles in how the program was implemented. These
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39 369 principles may be delineated elsewhere, for example program reports or funding
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41 370 agreements. Therefore, it is likely that we underestimated the application of PHC
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43 371 principles in these programs. However, the very fact that the research papers that we
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45 372 reviewed failed to document the implementation of those principles, illustrates less
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47 373 than the adequate emphasis on the application of these principles in national CHW
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49 374 programs.

50 375 Secondly, we reviewed the CHW programs identified only through the search of peer-
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52 376 reviewed published journal articles and there may be CHW programs that apply the
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54 377 PHC principles but are not published in peer-reviewed journals in a way to be captured
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56 378 in our search. This scoping review can be considered as a first step towards reviewing
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58 379 national CHW programs in LMICs applying the lens of PHC principles. Future studies
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60 380 on the analysis of non-peer-reviewed publications or 'grey' literature may produce
381 further evidence on this phenomenon.

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3 382 **CONCLUSION**
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6 383 This scoping review informs that the application of PHC principles across national
7 384 CHW programs in LMICs is patchy. For comprehensiveness and improved health
8 385 outcomes, programs need to incorporate all attributes of PHC principles. The findings
9 386 also point to the limited research and published studies on this important topic. Better
10 387 documentation and publications of program implementation with reference to PHC
11 388 principles are needed. Further research is needed to identify reasons for this
12 389 inadequate emphasis on historic PHC principles, and to find out what other principles
13 390 are adhered to by the current CHW programs. Future research may also focus on how
14 391 to incorporate more attributes of the PHC principles while implementing national CHW
15 392 programs in LMICs.
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8
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12 399 manuscript. ZL was involved in the screening and data charting of the articles and
13 400 review of the manuscript. CL and AM were involved in the conceptualisation and
14 401 design of the scoping review, provided continuous supervision and feedback during
15 402 the conduct of the scoping review and reviewed all the drafts and provided
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24
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27
28

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30 408 available data sources therefore, a formal ethics approval was not required.
31
32

33 409 **Competing interests** None declared
34

35 410 **Patient consent for publication** Not applicable
36

37 411 **Data availability statement** All data relevant to the study are included in the article
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Identification

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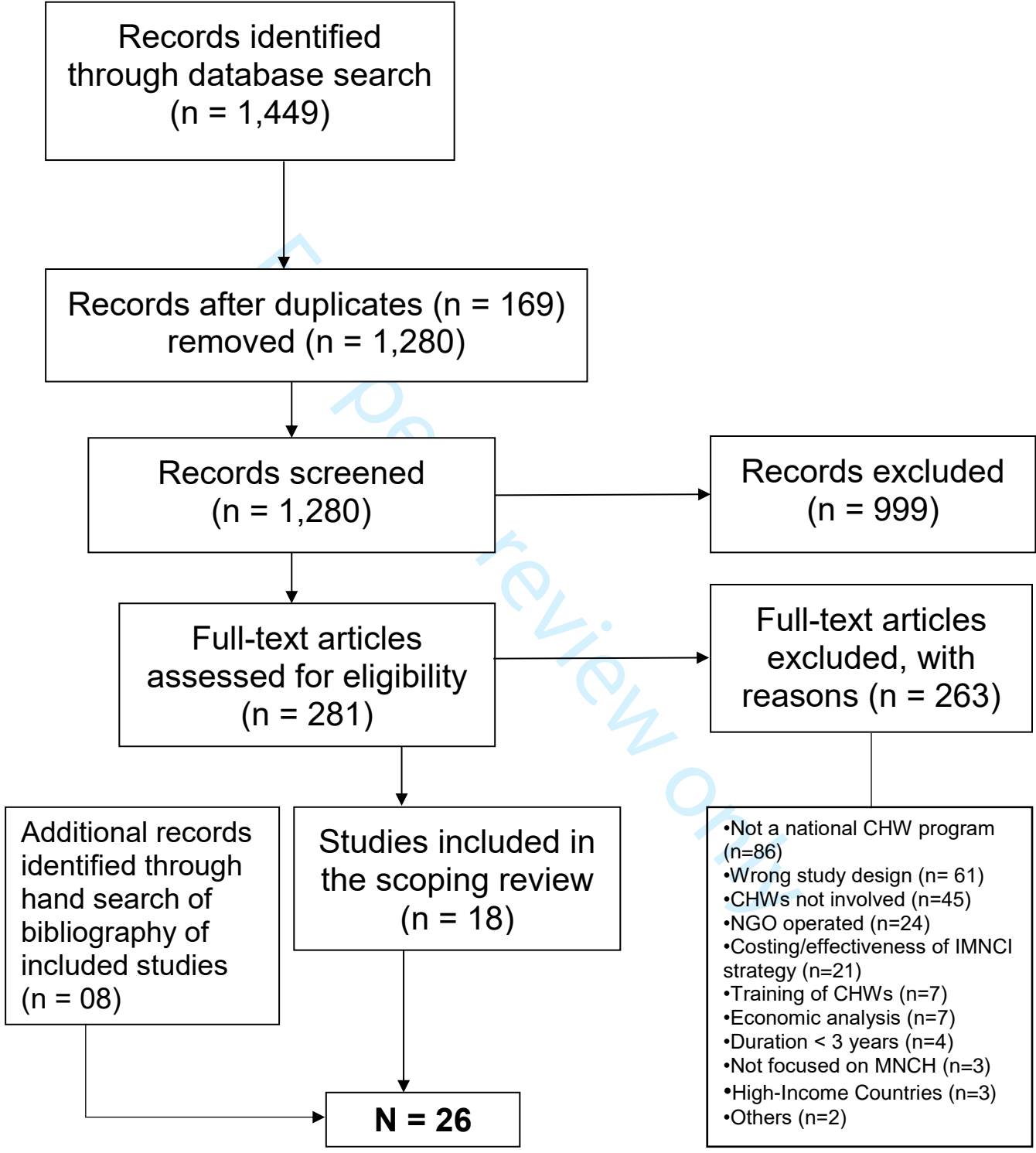


Figure 1: PRISMA flowchart for study selection and inclusion process

Appendix I: Logic grids for information sources

PubMed

Search	Query	Records retrieved
#1	“community health workers”[mh] OR community health worker*[tiab] OR community health aide*[tiab] OR village health worker*[tiab] OR barefoot doctor*[tiab] OR family planning personnel*[tiab] OR health extension worker*[tiab] OR lady health worker*[tiab] OR community health agent*[tiab] OR Shasthyo Sebika*[tiab] OR community nutrition worker*[tiab] OR maternal health worker*[tiab] OR voluntary Malaria workers*[tiab] OR village malaria worker*[tiab] OR Raedat*[tiab] OR postnatal support worker*[tiab] OR mental health worker*[tiab] OR mother coordinator*[tiab] OR rural health worker*[tiab] OR village health promoter*[tiab] OR accompagnateur*[tiab] OR Saksham Sahaya*[tiab] OR anganwadi worker*[tiab] OR accredited social health activist*[tiab] OR community-based worker*[tiab] OR community health volunteer*[tiab] OR village health guide*[tiab] OR maternal and child health promotion worker*[tiab] OR maternal child health worker*[tiab] OR kader posyandu*[tiab] OR behvarz*[tiab] OR village health helper*[tiab] OR colaborador voluntario*[tiab] OR nutrition volunteers*[tiab] OR village drug-kit manager*[tiab] OR brigadistas*[tiab] OR female community health volunteer*[tiab] OR Agente Comunitario de Salud*[tiab] OR nutrition worker*[tiab] OR community reproductive health worker*[tiab] OR community drug distributor*[tiab] OR community volunteer*[tiab] OR community health advocate*[tiab] OR lay health visitor*[tiab] OR Promotoras de Salud[tiab]	174984
#2	Program[tiab] OR programs[tiab] OR programme[tiab] OR programmes[tiab] OR initiative*[tiab] OR project[tiab] OR projects[tiab]	959578
#3	“Maternal health”[mh] OR “Maternal Welfare”[mh] OR “child health”[mh] OR “child care”[mh] OR “child welfare”[mh] OR “maternal-child health services”[mh] OR “child health services”[mh:noexp] OR maternal child health[tiab] OR maternal newborn child health[tiab]	71349

Search	Query	Records retrieved
#4	((developing country[tw] OR developing countries[tw] OR developing nation[tw] OR developing nations[tw] OR developing population[tw] OR developing populations[tw] OR developing world[tw] OR less developed country[tw] OR less developed countries[tw] OR less developed nation[tw] OR less developed nations[tw] OR less developed population[tw] OR less developed populations[tw] OR less developed world[tw] OR lesser developed country[tw] OR lesser developed countries[tw] OR lesser developed nation[tw] OR lesser developed nations[tw] OR lesser developed population[tw] OR lesser developed populations[tw] OR lesser developed world[tw] OR under developed country[tw] OR under developed countries[tw] OR under developed nation[tw] OR under developed nations[tw] OR under developed population[tw] OR under developed populations[tw] OR under developed world[tw] OR underdeveloped country[tw] OR underdeveloped countries[tw] OR underdeveloped nation[tw] OR underdeveloped nations[tw] OR underdeveloped population[tw] OR underdeveloped populations[tw] OR underdeveloped world[tw] OR middle income country[tw] OR middle income countries[tw] OR middle income nation[tw] OR middle income nations[tw] OR middle income population[tw] OR middle income populations[tw] OR low income country[tw] OR low income countries[tw] OR low income nation[tw] OR low income nations[tw] OR low income population[tw] OR low income populations[tw] OR lower income country[tw] OR lower income countries[tw] OR lower income nation[tw] OR lower income nations[tw] OR lower income population[tw] OR lower income populations[tw] OR underserved country[tw] OR underserved countries[tw] OR underserved nation[tw] OR underserved nations[tw] OR underserved population[tw] OR underserved populations[tw] OR underserved world[tw] OR under served country[tw] OR under served countries[tw] OR under served nation[tw] OR under served nations[tw] OR under served population[tw] OR under served populations[tw] OR under served world[tw] OR deprived country[tw] OR deprived countries[tw] OR deprived nation[tw] OR deprived nations[tw] OR deprived population[tw] OR deprived populations[tw] OR deprived world[tw] OR poor country[tw] OR poor countries[tw] OR poor nation[tw] OR poor nations[tw] OR poor population[tw] OR poor populations[tw] OR poor world[tw] OR poorer country[tw] OR poorer countries[tw] OR poorer nation[tw] OR poorer nations[tw] OR poorer population[tw] OR poorer populations[tw] OR poorer world[tw] OR developing economy[tw] OR developing economies[tw] OR less developed economy[tw] OR less developed economies[tw] OR lesser developed economy[tw] OR lesser developed economies[tw] OR under developed economy[tw] OR under developed economies[tw] OR underdeveloped economy[tw] OR underdeveloped economies[tw] OR middle income economy[tw] OR middle income economies[tw] OR low income economy[tw] OR low income economies[tw] OR lower income economy[tw] OR lower income economies[tw] OR low gdp[tw] OR low gnp[tw] OR low gross domestic[tw] OR low gross national[tw] OR lower gdp[tw] OR lower gnp[tw] OR lower gross domestic[tw] OR lower gross national[tw] OR lmic[tw] OR lmic[tw] OR (Africa[tw] OR Asia[tw] OR Caribbean[tw] OR West Indies[tw] OR South America[tw] OR Latin America[tw] OR Central America[tw] OR Afghanistan[tw] OR Albania[tw] OR Algeria[tw] OR Angola[tw] OR Antigua[tw] OR Barbuda[tw] OR Argentina[tw] OR Armenia[tw] OR Armenian[tw] OR Aruba[tw] OR Azerbaijan[tw] OR Bahrain[tw] OR Bangladesh[tw] OR Barbados[tw] OR Benin[tw] OR Belarus[tw] OR Byelorussian[tw] OR Belarus[tw] OR Belorussian[tw] OR Belorussia[tw] OR Belize[tw] OR Bhutan[tw] OR Bolivia[tw] OR Bosnia[tw] OR Herzegovina[tw] OR Hercegovina[tw] OR Botswana[tw] OR Brasil[tw] OR Brazil[tw] OR Bulgaria[tw] OR Burkina Faso[tw] OR Burkina Fasso[tw] OR Upper Volta[tw] OR Burundi[tw] OR Urundi[tw] OR Cambodia[tw] OR Khmer Republic[tw] OR Kampuchea[tw] OR Cameroon[tw] OR Cameroons[tw] OR Cameron[tw] OR Camerons[tw] OR Cape Verde[tw] OR Central African Republic[tw] OR Chad[tw] OR Chile[tw] OR China[tw] OR Colombia[tw] OR Comoros[tw] OR Comoro Islands[tw] OR Comores[tw] OR Mayotte[tw] OR Congo[tw] OR Zaire[tw] OR Costa Rica[tw] OR Cote d'Ivoire[tw] OR Ivory Coast[tw] OR Croatia[tw] OR Cuba[tw] OR Cyprus[tw] OR Czechoslovakia[tw] OR Czech Republic[tw] OR Slovakia[tw] OR Slovak Republic[tw] OR Djibouti[tw] OR French Somaliland[tw] OR Dominica[tw] OR Dominican	1903167

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Search	Query	Records retrieved
	Republic[tw] OR East Timor[tw] OR East Timur[tw] OR Timor Leste[tw] OR Ecuador[tw] OR Egypt[tw] OR United Arab Republic[tw] OR El Salvador[tw] OR Eritrea[tw] OR Estonia[tw] OR Ethiopia[tw] OR Fiji[tw] OR Gabon[tw] OR Gabonese Republic[tw] OR Gambia[tw] OR Gaza[tw] OR Georgia Republic[tw] OR Georgian Republic[tw] OR Ghana[tw] OR Gold Coast[tw] OR Greece[tw] OR Grenada[tw] OR Guatemala[tw] OR Guinea[tw] OR Guam[tw] OR Guiana[tw] OR Guyana[tw] OR Haiti[tw] OR Honduras[tw] OR Hungary[tw] OR India[tw] OR Maldives[tw] OR Indonesia[tw] OR Iran[tw] OR Iraq[tw] OR Isle of Man[tw] OR Jamaica[tw] OR Jordan[tw] OR Kazakhstan[tw] OR Kazakh[tw] OR Kenya[tw] OR Kiribati[tw] OR Korea[tw] OR Kosovo[tw] OR Kyrgyzstan[tw] OR Kirghizia[tw] OR Kyrgyz Republic[tw] OR Kirghiz[tw] OR Kirgizstan[tw] OR Lao PDR[tw] OR Laos[tw] OR Latvia[tw] OR Lebanon[tw] OR Lesotho[tw] OR Basutoland[tw] OR Liberia[tw] OR Libya[tw] OR Lithuania[tw] OR (Macedonia[tw] OR Madagascar[tw] OR Malagasy Republic[tw] OR Malaysia[tw] OR Malaya[tw] OR Malay[tw] OR Sabah[tw] OR Sarawak[tw] OR Malawi[tw] OR Nyasaland[tw] OR Mali[tw] OR Malta[tw] OR Marshall Islands[tw] OR Mauritania[tw] OR Mauritius[tw] OR Agalega Islands[tw] OR Mexico[tw] OR Micronesia[tw] OR Middle East[tw] OR Moldova[tw] OR Moldovia[tw] OR Moldovian[tw] OR Mongolia[tw] OR Montenegro[tw] OR Morocco[tw] OR Oman[tw] OR Orfn[tw] OR Mozambique[tw] OR Myanmar[tw] OR Myanma[tw] OR Burma[tw] OR Namibia[tw] OR Nepal[tw] OR Netherlands Antilles[tw] OR New Caledonia[tw] OR Nicaragua[tw] OR Niger[tw] OR Nigeria[tw] OR Northern Mariana Islands[tw] OR Oman[tw] OR Muscat[tw] OR Pakistan[tw] OR Palau[tw] OR Palestine[tw] OR Panama[tw] OR Paraguay[tw] OR Peru[tw] OR Philippines[tw] OR Philipines[tw] OR Phillipines[tw] OR Phillippines[tw] OR Poland[tw] OR Portugal[tw] OR Puerto Rico[tw] OR Romania[tw] OR Rumania[tw] OR Roumania[tw] OR Russia[tw] OR Russian[tw] OR Rwanda[tw] OR Ruanda[tw] OR Saint Kitts[tw] OR St Kitts[tw] OR Nevis[tw] OR Saint Lucia[tw] OR St Lucia[tw] OR Saint Vincent[tw] OR St Vincent[tw] OR Grenadines[tw] OR Samoa[tw] OR Samoan Islands[tw] OR Navigator Island[tw] OR Navigator Islands[tw] OR Sao Tome[tw] OR Saudi Arabia[tw] OR Senegal[tw] OR Serbia[tw] OR Montenegro[tw] OR Seychelles[tw] OR Sierra Leone[tw] OR Slovenia[tw] OR Sri Lanka[tw] OR Ceylon[tw] OR Solomon Islands[tw] OR Somalia[tw] OR Sudan[tw] OR Suriname[tw] OR Surinam[tw] OR Swaziland[tw] OR Syria[tw] OR Tajikistan[tw] OR Tadjhikistan[tw] OR Tadjikistan[tw] OR Tadjhik[tw] OR Tanzania[tw] OR Thailand[tw] OR Togo[tw] OR Togolese Republic[tw] OR Tonga[tw] OR Trinidad[tw] OR Tobago[tw] OR Tunisia[tw] OR Turkey[tw] OR Turkmenistan[tw] OR Turkmen[tw] OR Uganda[tw] OR Ukraine[tw] OR Uruguay[tw] OR USSR[tw] OR Soviet Union[tw] OR Union of Soviet Socialist Republics[tw] OR Uzbekistan[tw] OR Uzbek OR Vanuatu[tw] OR New Hebrides[tw] OR Venezuela[tw] OR Vietnam[tw] OR Viet Nam[tw] OR West Bank[tw] OR Yemen[tw] OR Yugoslavia[tw] OR Zambia[tw] OR Zimbababwe[tw] OR Rhodesia[tw]) OR (Developing Countries[Mesh:noexp] OR Africa[Mesh:noexp] OR Africa, Northern[Mesh:noexp] OR Africa South of the Sahara[Mesh:noexp] OR Africa, Central[Mesh:noexp] OR Africa, Eastern[Mesh:noexp] OR Africa, Southern[Mesh:noexp] OR Africa, Western[Mesh:noexp] OR Asia[Mesh:noexp] OR Asia, Central[Mesh:noexp] OR Asia, Southeastern[Mesh:noexp] OR Asia, Western[Mesh:noexp] OR Caribbean Region[Mesh:noexp] OR West Indies[Mesh:noexp] OR South America[Mesh:noexp] OR Latin America[Mesh:noexp] OR Central America[Mesh:noexp] OR Afghanistan[Mesh:noexp] OR Albania[Mesh:noexp] OR Algeria[Mesh:noexp] OR American Samoa[Mesh:noexp] OR Angola[Mesh:noexp] OR "Antigua and Barbuda"[Mesh:noexp] OR Argentina[Mesh:noexp] OR Armenia[Mesh:noexp] OR Azerbaijan[Mesh:noexp] OR Bahrain[Mesh:noexp] OR Bangladesh[Mesh:noexp] OR Barbados[Mesh:noexp] OR Benin[Mesh:noexp] OR Byelarus[Mesh:noexp] OR Belize[Mesh:noexp] OR Bhutan[Mesh:noexp] OR Bolivia[Mesh:noexp] OR Bosnia-Herzegovina[Mesh:noexp] OR Botswana[Mesh:noexp] OR Brazil[Mesh:noexp] OR Bulgaria[Mesh:noexp] OR Burkina Faso[Mesh:noexp] OR Burundi[Mesh:noexp] OR Cambodia[Mesh:noexp] OR Cameroon[Mesh:noexp] OR Cape Verde[Mesh:noexp] OR Central African Republic[Mesh:noexp] OR Chad[Mesh:noexp] OR Chile[Mesh:noexp] OR China[Mesh:noexp] OR Colombia[Mesh:noexp] OR Comoros[Mesh:noexp] OR Congo[Mesh:noexp] OR Costa Rica[Mesh:noexp] OR	

Search	Query	Records retrieved
	Cote d'Ivoire[Mesh:noexp] OR Croatia[Mesh:noexp] OR Cuba[Mesh:noexp] OR Cyprus[Mesh:noexp] OR Czechoslovakia[Mesh:noexp] OR Czech Republic[Mesh:noexp] OR Slovakia[Mesh:noexp] OR Djibouti[Mesh:noexp] OR "Democratic Republic of the Congo"[Mesh:noexp] OR Dominica[Mesh:noexp] OR Dominican Republic[Mesh:noexp] OR East Timor[Mesh:noexp] OR Ecuador[Mesh:noexp] OR Egypt[Mesh:noexp] OR El Salvador[Mesh:noexp] OR Eritrea[Mesh:noexp] OR Estonia[Mesh:noexp] OR Ethiopia[Mesh:noexp] OR Fiji[Mesh:noexp] OR Gabon[Mesh:noexp] OR Gambia[Mesh:noexp] OR "Georgia (Republic)"[Mesh:noexp] OR Ghana[Mesh:noexp] OR Greece[Mesh:noexp] OR Grenada[Mesh:noexp] OR Guatemala[Mesh:noexp] OR Guinea[Mesh:noexp] OR Guinea-Bissau[Mesh:noexp] OR Guam[Mesh:noexp] OR Guyana[Mesh:noexp] OR Haiti[Mesh:noexp] OR Honduras[Mesh:noexp] OR Hungary[Mesh:noexp] OR India[Mesh:noexp] OR Indonesia[Mesh:noexp] OR Iran[Mesh:noexp] OR Iraq[Mesh:noexp] OR Jamaica[Mesh:noexp] OR Jordan[Mesh:noexp] OR Kazakhstan[Mesh:noexp] OR Kenya[Mesh:noexp] OR Korea[Mesh:noexp] OR Kosovo[Mesh:noexp] OR Kyrgyzstan[Mesh:noexp] OR Laos[Mesh:noexp] OR Latvia[Mesh:noexp] OR Lebanon[Mesh:noexp] OR Lesotho[Mesh:noexp] OR Liberia[Mesh:noexp] OR Libya[Mesh:noexp] OR Lithuania[Mesh:noexp] OR Macedonia[Mesh:noexp] OR Madagascar[Mesh:noexp] OR Malaysia[Mesh:noexp] OR Malawi[Mesh:noexp] OR Mali[Mesh:noexp] OR Malta[Mesh:noexp] OR Mauritania[Mesh:noexp] OR Mauritius[Mesh:noexp] OR Mexico[Mesh:noexp] OR Micronesia[Mesh:noexp] OR Middle East[Mesh:noexp] OR Moldova[Mesh:noexp] OR Mongolia[Mesh:noexp] OR Montenegro[Mesh:noexp] OR Morocco[Mesh:noexp] OR Mozambique[Mesh:noexp] OR Myanmar[Mesh:noexp] OR Namibia[Mesh:noexp] OR Nepal[Mesh:noexp] OR Netherlands Antilles[Mesh:noexp] OR New Caledonia[Mesh:noexp] OR Nicaragua[Mesh:noexp] OR Niger[Mesh:noexp] OR Nigeria[Mesh:noexp] OR Oman[Mesh:noexp] OR Pakistan[Mesh:noexp] OR Palau[Mesh:noexp] OR Panama[Mesh:noexp] OR Papua New Guinea[Mesh:noexp] OR Paraguay[Mesh:noexp] OR Peru[Mesh:noexp] OR Philippines[Mesh:noexp] OR Poland[Mesh:noexp] OR Portugal[Mesh:noexp] OR Puerto Rico[Mesh:noexp] OR Romania[Mesh:noexp] OR Russia[Mesh:noexp] OR "Russia (Pre-1917)"[Mesh:noexp] OR Rwanda[Mesh:noexp] OR "Saint Kitts and Nevis"[Mesh:noexp] OR Saint Lucia[Mesh:noexp] OR "Saint Vincent and the Grenadines"[Mesh:noexp] OR Samoa[Mesh:noexp] OR Saudi Arabia[Mesh:noexp] OR Senegal[Mesh:noexp] OR Serbia[Mesh:noexp] OR Montenegro[Mesh:noexp] OR Seychelles[Mesh:noexp] OR Sierra Leone[Mesh:noexp] OR Slovenia[Mesh:noexp] OR Sri Lanka[Mesh:noexp] OR Somalia[Mesh:noexp] OR South Africa[Mesh:noexp] OR Sudan[Mesh:noexp] OR Suriname[Mesh:noexp] OR Swaziland[Mesh:noexp] OR Syria[Mesh:noexp] OR Tajikistan[Mesh:noexp] OR Tanzania[Mesh:noexp] OR Thailand[Mesh:noexp] OR Togo[Mesh:noexp] OR Tonga[Mesh:noexp] OR "Trinidad and Tobago"[Mesh:noexp] OR Tunisia[Mesh:noexp] OR Turkey[Mesh:noexp] OR Turkmenistan[Mesh:noexp] OR Uganda[Mesh:noexp] OR Ukraine[Mesh:noexp] OR Uruguay[Mesh:noexp] OR USSR[Mesh:noexp] OR Uzbekistan[Mesh:noexp] OR Vanuatu[Mesh:noexp] OR Venezuela[Mesh:noexp] OR Vietnam[Mesh:noexp] OR Yemen[Mesh:noexp] OR Yugoslavia[Mesh:noexp] OR Zambia[Mesh:noexp] OR Zimbabwe[Mesh:noexp])	
#5	#1 AND #2 AND #3 AND #4	956
	Limited to 1978 onwards in English language only	863

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CINAHL

Community health worker	Program	MCH	LMIC
MH “community health workers” OR MH “rural health personnel” OR TX “community health worker*” OR TX “community health aide*” OR TX “village health worker*” OR TX “barefoot doctor*” OR TX “family planning personnel*” OR TX “health extension worker*” OR TX “lady health worker*” OR TX “community health agent*” OR TX “Shasthyo Sebika*” OR TX “community nutrition worker*” OR TX “maternal health worker*” OR TX “voluntary Malaria worker*” OR TX “village malaria worker*” OR TX “Raedat” OR TX “postnatal support worker*” OR TX “mental health worker*” OR TX “mother coordinator*” OR TX “rural health worker*” OR TX “village health promoter*” OR TX accompagnateur* OR TX “Saksham Sahaya*” OR TX “anganwandi worker*” OR TX “accredited social health activist*” OR TX “community-based worker*” OR TX “community health volunteer*” OR TX “village health guide*” OR TX “maternal and child health promotion worker*” OR TX “maternal child health worker*” OR TX “kader posyandu*” OR TX behvarz* OR TX “village health helper*” OR TX “colaborador voluntario*” OR TX “nutrition volunteers*” OR TX “village drug-kit manager*” OR TX brigadistas* OR TX “female community health volunteer*” OR TX “Agente Comunitario de Salud*” OR TX “nutrition worker*” OR TX “community reproductive health worker*” OR TX “community drug distributor*” OR TX “community volunteer*”	TX Program OR TX programs OR TX programme OR TX programmes OR TX initiative* OR TX project OR TX projects	MH “Maternal-Child Health” OR TX “maternal-child health”	MH “low and middle income countries” OR MH “developing countries” OR TX Afghanistan OR TX Albania OR TX Algeria OR TX Angola OR TX Antigua OR TX Barbuda OR TX Argentina OR TX Armenia OR TX Armenian OR TX Aruba OR TX Azerbaijan OR TX Bahrain OR TX Bangladesh OR TX Barbados OR TX Benin OR TX Byelarus OR TX Byelorussian OR TX Belarus OR TX Belorussian OR TX Belorussia OR TX Belize OR TX Bhutan OR TX Bolivia OR TX Bosnia OR TX Herzegovina OR TX Hercegovina OR TX Botswana OR TX Brasil OR TX Brazil OR TX Bulgaria OR TX Burkina Faso OR TX Burkina Fasso OR TX Upper Volta OR TX Burundi OR TX Urundi OR TX Cambodia OR TX Khmer Republic OR TX Kampuchea OR TX Cameroon OR TX Camerouns OR TX Cameron OR TX Camerons OR TX Cape Verde OR TX “Central Africa Republic” OR TX Chad OR TX Chile OR TX China OR TX Colombia OR TX Comoros OR TX “Comoro Islands” OR TX Comores OR TX Mayotte OR TX Congo OR TX Zaire OR TX “Costa Rica” OR TX “Cote d'Ivoire” OR TX “Ivory Coast” OR TX Croatia OR TX Cuba OR TX Cyprus OR TX Czechoslovakia OR TX “Czech Republic” OR TX Slovakia OR TX “Slovak Republic” OR TX Djibouti OR TX “French Somaliland” OR TX Dominica OR TX “Dominican Republic” OR TX “East Timor” OR TX “East Timur” OR TX “Timor Leste” OR TX Ecuador OR TX Egypt OR TX “United Arab Republic” OR TX “El Salvador” OR TX Eritrea OR TX Estonia OR TX Ethiopia OR TX Fiji OR TX Gabon OR TX “Gabonese Republic” OR TX Gambia OR TX Gaza OR TX “Georgia Republic” OR TX “Georgian Republic” OR TX Ghana OR TX “Gold Coast” OR TX Greece OR TX Grenada OR TX Guatemala OR TX Guinea OR TX Guam OR TX Guiana OR TX Guyana OR TX Haiti OR TX Honduras OR TX Hungary OR TX India OR TX Maldives OR TX Indonesia OR TX Iran OR TX Iraq OR TX “Isle of Man” OR TX Jamaica OR TX Jordan OR TX Kazakhstan OR TX Kazakh OR TX Kenya OR TX Kiribati OR TX Korea OR TX Kosovo OR TX Kyrgyzstan OR TX Kirghizia OR TX “Kyrgyz Republic” OR TX Kirghiz OR TX Kirgizstan OR TX “Lao PDR” OR TX Laos OR TX Latvia OR TX Lebanon OR

Community health worker	Program	MCH	LMIC
OR TX "community health advocate*" OR TX "lay health visitor*" OR TX "Promotoras de Salud"			TX Lesotho OR TX Basutoland OR TX Liberia OR TX Libya OR TX Lithuania OR TX Macedonia OR TX Madagascar OR TX "Malagasy Republic" OR TX Malaysia OR TX Malaya OR TX Malay OR TX Sabah OR TX Sarawak OR TX Malawi OR TX Nyasaland OR TX Mali OR TX Malta OR TX "Marshall Islands" OR TX Mauritania OR TX Mauritius OR TX "Agalga Islands" OR TX Mexico OR TX Micronesia OR TX "Middle East" OR TX Moldova OR TX Moldovia OR TX Moldovan OR TX Mongolia OR TX Montenegro OR TX Morocco OR TX Ifni OR TX Mozambique OR TX Myanmar OR TX Myanma OR TX Burma OR TX Namibia OR TX Nepal OR TX "Netherlands Antilles" OR TX "New Caledonia" OR TX Nicaragua OR TX Niger OR TX Nigeria OR TX "Northern Mariana Islands" OR TX Oman OR TX Muscat OR TX Pakistan OR TX Palau OR TX Palestine OR TX Panama OR TX Paraguay OR TX Peru OR TX Philippines OR TX Philipines OR TX Phillipines OR TX Phillipines OR TX Poland OR TX Portugal OR TX "Puerto Rico" OR TX Romania OR TX Rumania OR TX Roumania OR TX Russia OR TX Russian OR TX Rwanda OR TX Ruanda OR TX "Saint Kitts" OR TX "St Kitts" OR TX Nevis OR TX "Saint Lucia" OR TX "St Lucia" OR TX "Saint Vincent" OR TX "St Vincent" OR TX Grenadines OR TX Samoa OR TX "Samoan Islands" OR TX "Navigator Island" OR TX "Navigator Islands" OR TX "Sao Tome" OR TX "Saudi Arabia" OR TX Senegal OR TX Serbia OR TX Montenegro OR TX Seychelles OR TX "Sierra Leone" OR TX Slovenia OR TX "Sri Lanka" OR TX Ceylon OR TX "Solomon Islands" OR TX Somalia OR TX Sudan OR TX Suriname OR TX Surinam OR TX Swaziland OR TX Syria OR TX Tajikistan OR TX Tadzshikistan OR TX Tadjikistan OR TX Tadzshik OR TX Tanzania OR TX Thailand OR TX Togo OR TX "Togolese Republic" OR TX Tonga OR TX Trinidad OR TX Tobago OR TX Tunisia OR TX Turkey OR TX Turkmenistan OR TX Turkmen OR TX Uganda OR TX Ukraine OR TX Uruguay OR TX USSR OR TX "Soviet Union" OR TX "Union of Soviet Socialist Republics" OR TX Uzbekistan OR TX Uzbek OR TX Vanuatu OR TX "New Hebrides" OR TX Venezuela OR TX Vietnam OR TX "Viet Nam" OR TX "West Bank" OR TX Yemen OR TX Yugoslavia OR TX Zambia OR TX Zimbabwe OR TX Rhodesia

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EMBASE

Community health worker	Program	MCH	LMIC
"Health Auxiliary"/de OR "community health worker*":ti,ab OR "community health aide*":ti,ab OR "village health worker*":ti,ab OR "barefoot doctor*":ti,ab OR "family planning personnel*":ti,ab OR "health extension worker*":ti,ab OR "lady health worker*":ti,ab OR "community health agent*":ti,ab OR "Shasthyo Sebika*":ti,ab OR "community nutrition worker*":ti,ab OR "maternal health worker*":ti,ab OR "voluntary Malaria worker*":ti,ab OR "village malaria worker*":ti,ab OR Raedat*:ti,ab OR "postnatal support worker*":ti,ab OR "mental health worker*":ti,ab OR "mother coordinator*":ti,ab OR "rural health worker*":ti,ab OR "village health promoter*":ti,ab OR accompagnateur*:ti,ab OR "Saksham Sahaya*":ti,ab OR "anganwandi worker*":ti,ab OR "accredited social health activist*":ti,ab OR "community- based worker*":ti,ab OR "community health volunteer*":ti,ab OR "village health guide*":ti,ab OR "maternal and child health promotion worker*":ti,ab OR "maternal child health worker*":ti,ab OR "kader posyandu*":ti,ab OR behvarz*:ti,ab OR "village health helper*":ti,ab OR "colaborador	Program:ti,ab OR programs:ti,ab OR programme:ti,ab OR programmes:ti,ab OR initiative*:ti,ab OR project:ti,ab OR projects:ti,ab	"Maternal child health care"/de OR "Maternal Welfare":ti,ab OR "child health":ti,ab OR "child care":ti,ab OR "child welfare":ti,ab OR "maternal-child health services":ti,ab OR "child health services":ti,ab OR "maternal child health":ti,ab OR "maternal newborn child health":ti,ab	Afghanistan:ti,ab OR Albania:ti,ab OR Algeria:ti,ab OR Angola:ti,ab OR Antigua:ti,ab OR Barbuda:ti,ab OR Argentina:ti,ab OR Armenia:ti,ab OR Armenian:ti,ab OR Aruba:ti,ab OR Azerbaijan:ti,ab OR Bahrain:ti,ab OR Bangladesh:ti,ab OR Barbados:ti,ab OR Benin:ti,ab OR Byelarus:ti,ab OR Byelorussian:ti,ab OR Belarus:ti,ab OR Belorussian:ti,ab OR Belorussia:ti,ab OR Belize:ti,ab OR Bhutan:ti,ab OR Bolivia:ti,ab OR Bosnia:ti,ab OR Herzegovina:ti,ab OR Hercegovina:ti,ab OR Botswana:ti,ab OR Brasil:ti,ab OR Brazil:ti,ab OR Bulgaria:ti,ab OR Burkina Faso:ti,ab OR "Burkina Fasso":ti,ab OR "Upper Volta":ti,ab OR Burundi:ti,ab OR Urundi:ti,ab OR Cambodia:ti,ab OR "Khmer Republic":ti,ab OR Kampuchea:ti,ab OR Cameroon:ti,ab OR Camerouns:ti,ab OR Cameron:ti,ab OR Camerons:ti,ab OR "Cape Verde":ti,ab OR "Central African Republic":ti,ab OR Chad:ti,ab OR Chile:ti,ab OR China:ti,ab OR Colombia:ti,ab OR Comoros:ti,ab OR "Comoro Islands":ti,ab OR Comores:ti,ab OR Mayotte:ti,ab OR Congo:ti,ab OR Zaire:ti,ab OR "Costa Rica":ti,ab OR "Cote d Ivoire":ti,ab OR "Ivory Coast":ti,ab OR Croatia:ti,ab OR Cuba:ti,ab OR Cyprus:ti,ab OR Czechoslovakia:ti,ab OR "Czech Republic":ti,ab OR Slovakia:ti,ab OR "Slovak Republic":ti,ab OR Djibouti:ti,ab OR "French Somaliland":ti,ab OR Dominica:ti,ab OR "Dominican Republic":ti,ab OR "East Timor":ti,ab OR "East Timur":ti,ab OR Timor Leste":ti,ab OR Ecuador:ti,ab OR Egypt:ti,ab OR "United Arab Republic":ti,ab OR "El Salvador":ti,ab OR Eritrea:ti,ab OR Estonia:ti,ab OR Ethiopia:ti,ab OR Fiji:ti,ab OR Gabon:ti,ab OR "Gabonese Republic":ti,ab OR Gambia:ti,ab OR Gaza:ti,ab OR "Georgia Republic":ti,ab OR "Georgian Republic":ti,ab OR Ghana:ti,ab OR Gold Coast:ti,ab OR Greece:ti,ab OR Grenada:ti,ab OR Guatemala:ti,ab OR Guinea:ti,ab OR Guam:ti,ab OR Guiana:ti,ab OR Guyana:ti,ab OR Haiti:ti,ab OR Honduras:ti,ab OR Hungary:ti,ab OR India:ti,ab OR Maldives:ti,ab OR Indonesia:ti,ab OR Iran:ti,ab OR Iraq:ti,ab OR "Isle of Man":ti,ab OR Jamaica:ti,ab OR Jordan:ti,ab OR Kazakhstan:ti,ab OR Kazakh:ti,ab OR Kenya:ti,ab OR Kiribati:ti,ab OR Korea:ti,ab OR Kosovo:ti,ab OR Kyrgyzstan:ti,ab OR Kirghizia:ti,ab OR "Kyrgyz Republic":ti,ab OR Kirghiz:ti,ab OR Kirgizstan:ti,ab OR Lao PDR:ti,ab OR Laos:ti,ab OR Latvia:ti,ab OR Lebanon:ti,ab OR Lesotho:ti,ab OR Basutoland:ti,ab OR Liberia:ti,ab OR Libya:ti,ab OR Lithuania:ti,ab OR Macedonia:ti,ab OR Madagascar:ti,ab OR "Malagasy Republic":ti,ab OR Malaysia:ti,ab OR Malaya:ti,ab OR Malay:ti,ab OR

Community health worker	Program	MCH	LMIC
voluntario*:ti,ab OR "nutrition volunteers*":ti,ab OR "village drug-kit manager*":ti,ab OR brigadistas*:ti,ab OR "female community health volunteer*":ti,ab OR "Agente Comunitario de Salud*":ti,ab OR "nutrition worker*":ti,ab OR "community reproductive health worker*":ti,ab OR "community drug distributor*":ti,ab OR "community volunteer*":ti,ab OR "community health advocate*":ti,ab OR "lay health visitor*":ti,ab OR "Promotoras de Salud":ti,ab			Sabah:ti,ab OR Sarawak:ti,ab OR Malawi:ti,ab OR Nyasaland:ti,ab OR Mali:ti,ab OR Malta:ti,ab OR "Marshall Islands":ti,ab OR Mauritania:ti,ab OR Mauritius:ti,ab OR "Agalega Islands":ti,ab OR Mexico:ti,ab OR Micronesia:ti,ab OR "Middle East":ti,ab OR Moldova:ti,ab OR Moldavia:ti,ab OR Moldovan:ti,ab OR Mongolia:ti,ab OR Montenegro:ti,ab OR Morocco:ti,ab OR Ifni:ti,ab OR Mozambique:ti,ab OR Myanmar:ti,ab OR Myanma:ti,ab OR Burma:ti,ab OR Namibia:ti,ab OR Nepal:ti,ab OR "Netherlands Antilles":ti,ab OR "New Caledonia":ti,ab OR Nicaragua:ti,ab OR Niger:ti,ab OR Nigeria:ti,ab OR "Northern Mariana Islands":ti,ab OR Oman:ti,ab OR Muscat:ti,ab OR Pakistan:ti,ab OR Palau:ti,ab OR Palestine:ti,ab OR Panama:ti,ab OR Paraguay:ti,ab OR Peru:ti,ab OR Philippines:ti,ab OR Philipines:ti,ab OR Phillipines:ti,ab OR Phillippines:ti,ab OR Poland:ti,ab OR Portugal:ti,ab OR "Puerto Rico":ti,ab OR Romania:ti,ab OR Rumania:ti,ab OR Roumania:ti,ab OR Russia:ti,ab OR Russian:ti,ab OR Rwanda:ti,ab OR Ruanda:ti,ab OR "Saint Kitts":ti,ab OR St Kitts:ti,ab OR Nevis:ti,ab OR "Saint Lucia":ti,ab OR "St Lucia":ti,ab OR "Saint Vincent":ti,ab OR "St Vincent":ti,ab OR Grenadines:ti,ab OR Samoa:ti,ab OR "Samoa Island":ti,ab OR "Navigator Island":ti,ab OR "Navigator Islands":ti,ab OR Sao Tome:ti,ab OR "Saudi Arabia":ti,ab OR Senegal:ti,ab OR Serbia:ti,ab OR Montenegro:ti,ab OR Seychelles:ti,ab OR "Sierra Leone":ti,ab OR Slovenia:ti,ab OR "Sri Lanka":ti,ab OR Ceylon:ti,ab OR "Solomon Islands":ti,ab OR Somalia:ti,ab OR Sudan:ti,ab OR Suriname:ti,ab OR Surinam:ti,ab OR Swaziland:ti,ab OR Syria:ti,ab OR Tajikistan:ti,ab OR Tadjikistan:ti,ab OR Tadjik:ti,ab OR Tanzania:ti,ab OR Thailand:ti,ab OR Togo:ti,ab OR "Togolese Republic":ti,ab OR Tonga:ti,ab OR Trinidad:ti,ab OR Tobago:ti,ab OR Tunisia:ti,ab OR Turkey:ti,ab OR Turkmenistan:ti,ab OR Turkmen:ti,ab OR Uganda:ti,ab OR Ukraine:ti,ab OR Uruguay:ti,ab OR USSR:ti,ab OR "Soviet Union":ti,ab OR "Union of Soviet Socialist Republics":ti,ab OR Uzbekistan:ti,ab OR Uzbek OR Vanuatu:ti,ab OR "New Hebrides":ti,ab OR Venezuela:ti,ab OR Vietnam:ti,ab OR Viet Nam:ti,ab OR West Bank:ti,ab OR Yemen:ti,ab OR Yugoslavia:ti,ab OR Zambia:ti,ab OR Zimbabwe:ti,ab OR Rhodesia:ti,ab OR "Developing Country"/de OR Africa/exp OR Asia/exp OR Caribbean/exp OR "West Indies"/exp OR "South America"/exp OR "Latin America"/exp OR "Central America"/exp OR "Developing Countr*":ti,ab

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SCOPUS

Community health worker	Program	MCH	LMIC
<p>"Health Auxiliary" OR "community health worker*" OR "community health aide*" OR "village health worker*" OR "barefoot doctor*" OR "family planning personnel*" OR "health extension worker*" OR "lady health worker*" OR "community health agent*" OR "Shasthyo Sebika*" OR "community nutrition worker*" OR "maternal health worker*" OR "voluntary Malaria worker*" OR "village malaria worker*" OR Raedat* OR "postnatal support worker*" OR "mental health worker*" OR "mother coordinator*" OR "rural health worker*" OR "village health promoter*" OR accompagnateur* OR "Saksham Sahaya*" OR "anganwadi worker*" OR "accredited social health activist*" OR "community-based worker*" OR "community health volunteer*" OR "village health guide*" OR "maternal and child health promotion worker*" OR "maternal child health worker*" OR "kader posyandu*" OR behvarz* OR "village health helper*" OR "colaborador voluntario*" OR "nutrition volunteers*" OR "village drug-kit manager*" OR brigadistas* OR "female community health volunteer*" OR "Agente Comunitario de Salud*" OR "nutrition worker*" OR "community reproductive health worker*" OR "community drug distributor*" OR "community</p>	<p>Program OR programs OR programme OR programmes OR initiative* OR project OR projects</p>	<p>"Maternal child health care"/de OR "Maternal Welfare" OR "child health" OR "child care" OR "child welfare" OR "maternal-child health services" OR "child health services" OR "maternal child health" OR "maternal newborn child health"</p>	<p>Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussia* OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR Brazil OR Bulgaria OR Burkina Faso OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Camerons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR "Congo" OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus OR Czechoslovakia OR "Czech Republic" OR Slovakia OR "Slovak Republic" OR Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Estonia OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR "Georgia Republic" OR "Georgian Republic" OR Ghana OR Gold Coast OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR "Isle of Man" OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghz OR Kirgizstan OR Lao PDR OR Laos OR Latvia OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Lithuania OR Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovan OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia</p>

Community health worker	Program	MCH	LMIC
volunteer* OR "community health advocate*" OR "lay health visitor*" OR "Promotoras de Salud"			OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR Poland OR Portugal OR "Puerto Rico" OR Romania OR Rumania OR Roumania OR Russia OR Russian OR Rwanda OR Ruanda OR "Saint Kitts" OR St Kitts OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR Sao Tome OR "Saudi Arabia" OR Senegal OR Serbia OR Montenegro OR Seychelles OR "Sierra Leone" OR Slovenia OR Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadjhikistan OR Tadjikistan OR Tadjhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uruguay OR USSR OR "Soviet Union" OR "Union of Soviet Socialist Republics" OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR Viet Nam OR West Bank OR Yemen OR Yugoslavia OR Zambia OR Zimbabwe OR Rhodesia OR "Developing Country" OR Africa OR Asia OR Caribbean OR "West Indies" OR "South America" OR "Latin America" OR "Central America" OR "Developing Countr*"

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Appendix II: Data Charting Form

Scoping Review Title: Application of Primary Health Care Principles in National Community Health Worker Programs in Low- and Middle –Income Countries?	
Data charted by:	
Date of data charting:	
Study Details and Characteristics	
Study citation details (author, year, title, journal, volume, issue, pages)	
Country of origin	
Study objective / aim	
Type of Study	Qualitative / Quantitative
Methods:	
Study Setting:	
CHW Program Details	
Name of the CHW Program	
Objective of the CHW Program	
Year the program started	
End date	
Implemented by	
Funded by	
Details / Results charted from the Study (in relation to the concept of the scoping review)	
Which PHC principle is reflected in the reported objective of the national program?	<ul style="list-style-type: none"> • Universal access / Equity • Community participation • Intersectoral collaboration • Appropriateness
How are they implementing the PHC principle (s)?	
Stated outcome / achievement of the CHW program with reference to PHC principle (s)	
Key findings of the article	
Characteristics of CHWs	
Key role of CHWs stated	
Nomenclature of CHWs	
Gender	
Employment status	
Pre-service training	
Catchment area	
Additional notes:	

Supplementary Table 1: Key characteristics of included studies as reported by the authors

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Damari 2018 / IRAN ¹⁷	To evaluate the national Iranian Women Health Volunteers program	Qualitative <ul style="list-style-type: none"> • Document review • One FGD • Semi-structured questionnaires filled by 44 key informants 	Achievements: increased community participation, increasing health literacy, increased coverage and utilization of health services.
Nasseri 1991 / IRAN ³⁵	To determine the impact of PHC services on immunisation activities in areas where the two services are integrated	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey 	Higher coverage in rural areas is attributed to active approach of CHWs and vaccinators.
Memon 2016 / PAKISTAN ³³	To explore community barriers in accessing MCH services in 10 remote and rural districts of Pakistan	Qualitative <ul style="list-style-type: none"> • Sixty FGDs with mothers and fathers of children under five and CHWs - 20 each group 	Better awareness was seen among community caregivers for antenatal care and family planning services in the CHW-covered areas.
Hafeez 2011 / PAKISTAN ²⁷	To assess the contribution of the LHWP in enhancing coverage and access of health care services as well as towards improvement of health indicators	Qualitative <ul style="list-style-type: none"> • Document review • Interviews, formal and informal interactions and discussions with all the stakeholders • Performance validation exercises in the field • Feedback from community being served by the program 	The LHWP has led to a development of a very well-placed cadre that links first-level care facilities to the community, thus improving the delivery of PHC services. The health indicators are significantly better than the national average in the areas served by the CHWs.
Douthwaite 2005 / PAKISTAN ⁴²	To assess the impact of the LHWP on the uptake of modern contraceptive methods	Quantitative <ul style="list-style-type: none"> • Secondary data analysis from the 2002 national evaluation of the LHWP 	The study provides strong evidence that the LHWP has succeeded in integrating family planning into the doorstep provision of preventive health care and in increasing the use of modern reversible methods in rural areas.
Afsar 2005 / PAKISTAN ⁴¹	To assess the strengths and weaknesses of the LHWP from the Lady Health Workers perspective	Qualitative <ul style="list-style-type: none"> • 20 key informant interviews with CHWs (n=14), CHW Supervisors (n=4) and 2 medical officers (District 	Major strengths: provision of services at the grassroots level, reinforcement of health messages and the community acceptability of workers. Weaknesses: contract-based job, low salaries, irregularity of payment, no career development, and poor logistical support.

Author and year of publication / Country	Key objective of the study	Methods	Main findings
		Coordinator and District Health Education Officer)	
Afsar 2003 / PAKISTAN ⁴⁰	To estimate the proportion of patients who were referred and to identify the factors associated with unsuccessful referral in Karachi, Pakistan	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey of 347 patients 	A high referral rate (55%) by CHWs was found in this study; 76.4% (n=265) were successful and 23.6% (n=82) were unsuccessful referrals. Key factors for unsuccessful referral: never referred before, never visited the referral site before, no knowledge of who to meet at the referral site, and failure of CHW to follow up.
Kohli 2015 / INDIA ⁴³	To assess the knowledge and practices for maternal health care delivery among Accredited Social Health Activist workers in North-East district of Delhi, India	Quantitative <ul style="list-style-type: none"> • Descriptive cross-sectional study (n = 55) 	CHWs' knowledge is good but practices about maternal health were not adequate due to the number of problems faced by them which need to be addressed through skill-based training in terms of good communication and problem solving. Monitoring should be made an integral part of CHW working in the field to ensure that knowledge is converted into practices as well.
Kosec 2015 / INDIA ³¹	To understand predictors of essential health and nutrition service delivery in Bihar, India	Quantitative <ul style="list-style-type: none"> • Secondary data analysis of a 2012 cross-sectional survey of 6,002 households in 400 randomly selected villages in 1 district of Bihar state • Primary data collection from 382 CHWs 	CHWs who maintained records of pregnant women were significantly associated with households receiving such information. Incentivizing frontline workers and helping them organize their work is associated with greater receipt of services by households.
Saprii 2015 / INDIA ³⁷	To explore stakeholders' perceptions and experiences of the CHW scheme in strengthening maternal health	Qualitative (exploratory study) <ul style="list-style-type: none"> • Eighteen in-depth interviews and 3 FGDs with CHWs, key stakeholders and community members 	CHWs are valued for their contribution towards maternal health education and for their ability to provide basic biomedical care, but their role as social activists is much less visible as envisioned in the CHW operational guidelines

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Ved 2019 / INDIA ³⁸	To examine how the program is seeking to address gender inequalities facing CHWs, from the program's policy origins to recent adaptations	Qualitative <ul style="list-style-type: none"> • Document review • 12 key informant interviews 	The value of community embeddedness for CHW programs is widely recognized as a mechanism to ensure program relevance to local needs and secure community ownership, support, and recognition of CHWs
Koblinsky 1989 / BANGLADESH ²⁹	To identify and examine organizational constraints to quality care and to provide a feasible strategy for program managers to overcome those barriers	Qualitative <ul style="list-style-type: none"> • Observations • FGDs – number not reported in the study 	Only brief, interactions are possible if CHWs are to complete their rounds in the three-month period mandated by the government. The CHWs compensate for the pressure of their workload by skipping visits with some of the women in their area, by visiting even fewer during the monsoon season, and by neglecting to provide valuable information about family planning or health with some of the women they do visit
Panday 2019 / NEPAL ¹⁸	To explore use of MCH care services delivered by CHWs and the reasons for the underutilisation of these services	Qualitative <ul style="list-style-type: none"> • Interviews and FGDs with 34 CHWs, 26 service users and 11 health workers 	Perceived factors that discourage the use of healthcare services by ethnic minority groups are; <ol style="list-style-type: none"> 1. Lack of knowledge among service users - related to CHWs' inability to communicate health messages; 2. Lack of trust in volunteers; 3. Traditional beliefs and healthcare practices; 4. Low decision-making power of women –

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
Panday 2017 / NEPAL ⁴⁴	To explore the role and experience of CHWs in maternal healthcare provision	Qualitative <ul style="list-style-type: none"> • Interviews with 20 CHWs, 26 service users and 11 health workers • Four FGDs with 18 CHWs 	<ul style="list-style-type: none"> • All study participants acknowledged the contribution of CHWs in basic maternity care in villages • With support available to CHWs from the local health centres (regular training and access to medical supplies), CHWs were able to assist with childbirth, distribute medicines, and administer pregnancy tests. Whereas such activities were not reported in the other region where such support was not available to CHWs. • Key challenge: lack of monetary incentives
Hasegawa 2013 / CAMBODIA ²⁸	To identify determinants of caregivers' Village Malaria Workers service utilization for childhood illness and caregivers' knowledge of malaria management	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey with CHWs and primary caregivers of children under five years 	<ul style="list-style-type: none"> • Among the caregivers, 23% in M villages (villages with only malaria control services) and 52% in M+C villages (with both malaria and child health services) utilized CHW services for childhood illnesses. • Determinants of caregivers' utilization of CHWs in M villages included their VMWs' length of experience (AOR = 11.80, 95% confidence interval [CI] = 4.46-31.19) and CHWs' service quality (AOR = 2.04, CI = 1.01-4.11). • In M+C villages, CHWs' length of experience (AOR = 2.44, CI = 1.52-3.94) and caregivers' wealth index (AOR = 0.35, CI = 0.18-0.68) were associated with VMW service utilization. • Better service quality of VMWs (AOR = 3.21, CI = 1.34-7.66) and caregivers' literacy (AOR = 9.91, CI = 4.66-21.05) were positively associated with caregivers' knowledge of malaria management.

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
Negussie 2017 / ETHIOPIA ¹⁹	To assess the contribution made by the CHWs in MCH care service delivery in Dale district, southern Ethiopia	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey with 613 mothers of reproductive age (15-49), having at least one under-five child 	<ul style="list-style-type: none"> • Overall service coverage of antenatal care (four and more visits), delivery and postnatal care services were low in the district as compared to the national status; and the input from the CHWs, in this regard, was unsatisfactory. • The number of home visits was also inadequate for the necessary support of the mothers. • Mothers who listen to the radio and who had received information about the MCH services by CHWs were more likely to utilize MCH services.
Kok 2015 / ETHIOPIA ³⁰	To identify facilitators of and barriers to interpersonal relationships between CHWs and actors in the community and health sector	Qualitative <ul style="list-style-type: none"> • Fourteen FGDs and 44 interviews in 2013 with CHWs, traditional birth attendants, health professionals and community members 	<ul style="list-style-type: none"> • CHWs were selected by their communities, which enhanced trust and engagement between them • Program design elements facilitating relationships: support for CHWs activities from the community and health sector, monitoring and accountability structures (community and health sector), referral, supervision and training (health sector)
Medhanyie 2012 / ETHIOPIA ⁴⁵	To investigate the role of CHWs in improving utilization of maternal health services by rural women	Quantitative <ul style="list-style-type: none"> • Cross-sectional survey with 725 women with under-five children 	<ul style="list-style-type: none"> • CHWs have contributed substantially to the improvement in women's utilization of family planning, antenatal care and HIV testing.
Admassie 2009 / ETHIOPIA ⁴⁶	To evaluate the short-term and intermediate-term effects of the Ethiopian HEP on MCH indicators	Quantitative <ul style="list-style-type: none"> • Program evaluation using a propensity score matching method and village, facility and household surveys 	<ul style="list-style-type: none"> • HEP has significantly increased the proportion of children fully and individually vaccinated • Women in the HEP villages appeared to make their first contact with a skilled health service provider significantly earlier during pregnancy; very little effect is detected on other prenatal and postnatal care services. • HEP has not reduced the incidence and duration of diarrhoea and respiratory diseases among under-five children
Musabyimana 2018 / RWANDA ²⁰	To explore perceptions of healthcare officials, providers, and beneficiaries on the impact of the RapidSMS program	Qualitative <ul style="list-style-type: none"> • 10 FGDs with 93 participants • In-depth interviews with 56 beneficiaries and 36 CHWs 	The effectiveness of use of mobile phones to remind of the appointments for improved access to midwifery services at the health facilities was found to be limited. Indirectly, it alerts to the emerging role of contemporary technologies in community health program.

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Author and year of publication / Country	Key objective of the study	Methods	Main findings
Magnani 1996 / NIGER ³²	To assess the impact of differential access to health services through the comparison of service use patterns and under-five mortality levels among villages provided different levels of health services	Quantitative <ul style="list-style-type: none"> Secondary data analysis of National Morbidity and Mortality Survey – 1985 on 974 women of reproductive age 	<ul style="list-style-type: none"> Children residing in villages proximate to health dispensaries were approximately 32% less likely to have died during the study period than children living further away.
Wilford 2018 / SOUTH AFRICA ³⁹	To explore the quality of CHW household visits providing MCH services	Qualitative <ul style="list-style-type: none"> 30 observations [a CHW visit to a mother or pregnant woman was observed by a field worker, followed by an in-depth interview with the participating women and CHWs] 15 in-depth interviews with mothers/pregnant women and 15 in-depth interviews with CHWs 	<ul style="list-style-type: none"> Mothers receiving the services were satisfied with CHW visits and appreciated that CHWs understood their life experiences and provided relevant and accessible advice and support. CHWs expressed concern of not having the required knowledge to undertake all activities in the household, and requested training and support from supervisors during household visits
Mues 2012 / BRAZIL ³⁴	To assess factors influencing perspectives on Brazil's national family health program and perceptions about PSF accessibility among frequent users (primary caretakers of children under 5)	Quantitative <ul style="list-style-type: none"> Cross-sectional household survey of 253 households with at least one child 5 years or younger and covered by the PSF 	<ul style="list-style-type: none"> Most caretakers of young children were satisfied. However, less than half of the caretakers perceived the PSF units as being accessible about a quarter of households in the Vespasiano PSF coverage area were not receiving an agent home visit once a month
Aquino 2009 / BRAZIL ⁴⁷	To evaluate the effects of the implementation of the CHW Program on infant mortality rates in Brazilian municipalities from 1996 to 2004	Quantitative – ecological and longitudinal approach <ul style="list-style-type: none"> Secondary data analysis from 1991 and 2000 national census and data from Brazilian MoH of 721 municipalities 	A statistically significant negative association between CHW program coverage and infant mortality rate was found after controlling for potential confounders.

Author and year of publication / Country	Key objective of the study	Methods	Main findings
Rubin 1983 / EL SALVADOR ³⁶	To evaluate the health service impact of the Rural Health Aide Program in El Salvador	Quantitative <ul style="list-style-type: none"> Survey of 363 respondents in cantons served by CHWs for one year and 169 in cantons served by CHWs for two years 	Compared to villagers of cantons served by CHWs for one year, those in cantons served by CHWs for 2 years were: <ul style="list-style-type: none"> -more likely to be visited by their CHW & to visit their CHW -more likely to visit their health centres after referral by their CHW -more likely to have their children vaccinated
Ennever 1990 / JAMAICA ²⁶	<ul style="list-style-type: none"> To describe the activities of CHWs currently employed, and their perceptions about supervision and management To describe the current employment status of CHWs who had left the service between 1982 and 1986, and use of the skills they had learned as CHWs. 	Quantitative <ul style="list-style-type: none"> Survey of 415 CHWs currently employed and 134 CHWs who had left the service 	<ul style="list-style-type: none"> Currently employed CHWs continued to perform duties in the community & in health centres with emphasis on the MCH services and the management of diabetics and hypertensives. Previously employed CHWs unemployed though many continued to use their skills on a voluntary basis.

CHW = Community Health Worker, FGD = Focus Group Discussion, HEP = Health Extension Program (Ethiopia) LHWP = Lady Health Worker Program (Pakistan), MCH = Maternal and Child Health, PSF = Programa de Saude da Familia (Family Health Program, Brazil)

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Supplementary Table 2: Evidence for the application of primary health care principles as reflected in the national community health worker programs

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
1.	IRAN / Women Health Volunteers Program / 1992 ¹⁷	<u>Principle observed:</u> - Community Participation as the program aims to increase community involvement in health related activities in order to empower them	<u>Principles observed:</u> - UHC - Community Participation* <ul style="list-style-type: none"> • The CHWs encouraged and actively followed up on individuals to visit health centres at their required time especially those who needed special care --- thus contributing to increased service utilisation • CHWs delivering health messages to families and distributing educational materials reflect one aspect of comprehensiveness as part of universal health coverage • CHWs are selected from the local community - Community Participation and appropriateness 	<u>Principles observed:</u> - UHC - Community Participation* - Intersectoral coordination <ul style="list-style-type: none"> - The active follow up by WHV increased utilization of health services – contributing to universal health coverage • The experts and stakeholders believed that CHW program increased people’s participation and created self-esteem and self-reliance in people – However, the evidence on how it achieved this is not available in this study • The WHV network connects MoH, medical universities and health centers to the people – Intersectoral coordination
2.	IRAN / Primary Health Care Network – EPI / 1983 ³⁵	<u>Principle observed:</u> - UHC <ul style="list-style-type: none"> • As the program aimed to increase immunisation coverage in Iranian children to 90% by their first birthday 	<u>Principles observed:</u> - UHC - Community Participation* <ul style="list-style-type: none"> • CHWS were involved in provision of general preventive services for all the individuals in their coverage area – Comprehensiveness, Universal health coverage • CHWs were also expected to provide basic therapeutic measures for minor illnesses and refer other cases to their immediate Rural Health Centre – universal health coverage • CHWs were selected from the same area in which they work – community participation 	<u>Principle observed:</u> - UHC - Appropriateness <ul style="list-style-type: none"> • Immunisation coverage of children improved significantly in 1987 as compared to 1984 especially for BCG (56.3%) - universal health coverage • Mothers in rural areas with PHC services receive much better MCH care, advice and attention in comparison to mothers in other rural and most urban areas – appropriateness

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
3.	PAKISTAN / National Program for Family Planning & Primary Health Care / 1994 ^{27 33}	<u>Principle observed:</u> - UHC as the program aimed to increase utilisation of promotive, preventive and curative services at the community level particularly for women and children in poor and underserved areas – comprehensiveness & equity	<u>Principles observed:</u> - UHC - Community Participation* • CHWs were involved in health education and community mobilization along with provision of immunization, family planning services, basic curative care to the community at the doorstep and referral of patients to the appropriate health facility - reflecting universal health coverage	<u>Principles observed:</u> - UHC - Community Participation* • Increased utilisation of antenatal care and family planning - universal health coverage • Improved infant mortality rate, maternal mortality ratio and contraceptive prevalence rate in CHW covered areas as compared to national average - universal health coverage • Cultural acceptability of CHWs, unlimited access to households and free interaction with local women – community participation and appropriateness
4.	INDIA / Accredited Social Health Activist (ASHA) Program / 2005 ^{31 37 38}	<u>Principles observed:</u> - UHC through accessible care to rural population especially vulnerable groups - Appropriateness via provision of affordable and quality health care	<u>Principles observed:</u> - UHC via CHWs as 'service extension and link workers' - Community Participation as CHWs are selected from the local communities	<u>Principles observed:</u> - UHC as CHWs were motivating women for antenatal care and hospital delivery through home visits • Women empowerment – as CHWs have reported an increased sense of empowerment and personal growth, in part through their belief in the social value of their work. • Additionally, becoming a CHW enabled rural women to gain knowledge, status as a role model, and exposure beyond the village, as well as to access a limited amount of remuneration
5.	BANGLADESH / National MCH and Family Planning Program / 1976 ²⁹	Not reported	<u>Principles observed:</u> - UHC - Community Participation* • CHWs were utilised for health education and extending immunisation and family planning services at the household level. They also provided referral for antenatal, perinatal, and	Not reported

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
			postnatal care. – comprehensiveness as part of universal health coverage	
6.	NEPAL / Female Community Health Volunteer Program / 1988 ¹⁸	<u>Principles observed:</u> - UHC via low cost health service provision in remote areas - Community Participation via increase in local women's participation in health promotion	<u>Principles observed:</u> - Community Participation* - UHC via provision of MCH care by CHWs in rural communities	Not reported
7.	CAMBODIA / Village Malaria Worker Project as part of National Malaria Control Program / 2001 ²⁸	Not reported	<u>Principles observed:</u> - UHC - Community Participation* • Malaria prevention, diagnosis and treatment services to remote villages by CHWs – universal health coverage - Management of minor childhood illness, prescribing and providing basic medications, referral and health promotion – comprehensiveness as part of universal health coverage	<u>Principle observed:</u> - UHC • 15,898 children received child health services from village Malaria Workers in 2011
8.	ETHIOPIA / Health Extension Program / 2003 ¹⁹ ³⁰	<u>Principles observed:</u> - UHC - Community Participation • To improve access and utilization of health care particularly for	<u>Principles observed:</u> - UHC - Community Participation • CHWs providing antenatal and postnatal care, family planning and immunization services and conducting clean and safe deliveries - Universal Health Coverage	<u>Principles observed:</u> - UHC - Community Participation • Increased use of health post for antenatal care, family planning, delivery and other illnesses such as diarrhoea – reflecting universal health coverage

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		<p>children and mothers in rural communities – Universal Health Coverage</p> <ul style="list-style-type: none"> To improve the health status of families with their full participation, using local technologies & the community's skill & knowledge - Community Participation 	<ul style="list-style-type: none"> Quarterly evaluation of health centers performance by the community during facility or public forums. Monitoring of CHWs by the <i>kebele</i> (lowest administrative unit) administration at the health post level. Need based adjustment of maternal health education – Community Participation 	<ul style="list-style-type: none"> Statistically significant increase in the proportion of children fully and individually vaccinated against tuberculosis, polio, diphtheria-tetanus-tetanus, and measles in the program villages. Mothers reported that CHWs were available at health posts during their last visit for MCH services Mothers also indicated that they had gotten a complete explanation of their own/child's health condition from the CHWs Moreover, CHWs were understanding, friendly and helpful thus assured a "natural link" between them and the community - appropriateness Community members reported that HEWs being female was important to them, as they prefer to discuss maternal health issues amongst women - appropriateness
9.	RWANDA / RapidSMS program / 2013 ²⁰	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - UHC - Appropriateness To improve access to antenatal, PNC, institutional delivery and emergency obstetric care To facilitate communication between CHWs and the broader health system, including the ambulance system, 	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - UHC - Community Participation* - Appropriateness – use of technology The RapidSMS system sent automatic reminders to CHWs for clinical appointments, delivery, and post-natal care visits, with the intent of increasing timely access and utilization Provision of a quick link to emergency obstetric care through so-called Red Alerts and creation of a database of clinical records on maternal care delivery – use of technology for increasing access to health care 	<p><u>Principles observed:</u></p> <ul style="list-style-type: none"> - Appropriateness (use of technology, acceptability) <p>RapidSMS was well accepted by most CHWs and community members – acceptability aspect of appropriateness principle</p> <ul style="list-style-type: none"> mHealth appeared to have helped improve communication and potentially service use Claims that mHealth has contributed to maternal mortality reduction are not substantiated considering the difficulties that were highlighted by the respondents

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		health facilities, and MoH officials		
10.	NIGER / Rural Health Improvement Program / 1970s ³²	<u>Principle observed:</u> - UHC – as the program aimed to extend the coverage of PHC services throughout rural Niger	<u>Principle observed:</u> - UHC – By upgrading existing health dispensaries and deploying trained village health teams to unserved villages to deliver PHC services	Not reported
11.	SOUTH AFRICA / ward-based outreach teams (WBOT) - national CHW program / 2011 ³⁹	<u>Principle observed:</u> - UHC – via improving health outcomes by providing home and community-based health services	<u>Principle observed:</u> - UHC - Community Participation* • Universal health coverage via CHWs providing treatment support and home-based care in underserved rural areas. Core MCH activities include visiting all mothers during pregnancy, antenatal education and support. Moreover, CHWs are linked in with local PHC clinics	<u>Principle observed:</u> - Appropriateness as CHWs were trusted, accessible and able to understand the mother's situation
12.	BRAZIL / Family Health Program (Programa de Saude da Familia, PSF) / 1994 ³⁴	<u>Principle observed:</u> - UHC – as the organizational principles include universality and equity	<u>Principle observed:</u> - UHC - Community Participation* - Universal health coverage via provision of promotive, preventive and basic curative services by CHWs to mothers and children	<u>Principle observed:</u> - UHC – as the growth of the CHW program was associated with a decrease in infant and child mortality rates • Caretakers who reported that their agent made at least one home visit per month were significantly more likely to have received care for child diarrhoea from an agent
13.	EL SAVADOR / Rural Health Aide Program / 1976 ³⁶	<u>Principle observed:</u> - UHC – via provision of PHC and family planning services	<u>Principle observed:</u> - UHC - Community Participation* • Health education by CHWs for rural families • Provision of family planning supplies to women	<u>Principle observed:</u> - UHC • Appropriately trained PHC workers promote contact between rural populations and the health care system

Serial No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
			<ul style="list-style-type: none"> • Provision of systematic treatment of minor illnesses; administration of prescribed intramuscular injections; dispensing of antiparasitic medication; and performance of simple first-aid measures • Promotion of registration of births and deaths 	<ul style="list-style-type: none"> • To the extent that this improves the health status of the population, particularly in the area of MCH, we might expect to see better health indices in rural populations served by these workers than in populations without them
14.	JAMAICA / Community Health Aide program / 1978 ²⁶	<u>Principle observed:</u> - UHC as the program aimed to train local women to provide basic health care and health education to families.	<u>Principles observed:</u> - UHC – CHWs encouraging for immunization and family planning, weighing babies and testing urine - Community Participation*	<u>Principle observed:</u> - UHC • CHWs have been functioning in both health centre and community, encouraging people to utilize the services and assisting in some of the less technical duties such as weighing babies and testing urine

UHC = Universal Health Coverage

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	
Limitations	20	Discuss the limitations of the scoping review process.	
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: 10.7326/M18-0850.



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