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 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 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 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 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 • 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 • 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 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 • 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 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) 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 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 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 • 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; 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 Interviews with 20 CHWs, 26 service users and 11 health workers Four FGDs with 18 CHWs 	 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 • Cross-sectional survey with CHWs and primary caregivers of children under five years	 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 = 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.

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 • Cross-sectional survey with 613 mothers of reproductive age (15-49), having at least one under-five child	 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 • Fourteen FGDs and 44 interviews in 2013 with CHWs, traditional birth attendants, health professionals and community members	 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 • Cross-sectional survey with 725 women with under-five children	 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 Program evaluation using a propensity score matching method and village, facility and household surveys 	 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 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.

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 Secondary data analysis of National Morbidity and Mortality Survey – 1985 on 974 women of reproductive age 	 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 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 	 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 Cross-sectional household survey of 253 households with at least one child 5 years or younger and covered by the PSF 	 Most caretakers of young children were satisfied. However, less than half of the caretakers perceived the PSF unit 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 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 SAVADOR ³⁶	To evaluate the health service impact of the Rural Health Aide Program in El Salvador	 Quantitative 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: -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	 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 Survey of 415 CHWs currently employed and 134 CHWs who had left the service 	 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)

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

worker programs

Seri al 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	Principle observed: - Community Participation as the program aims to increase community involvement in health related activities in order to empower them	 Principles observed: 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 	 Principles observed: 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 ³⁵	 Principle observed: UHC As the program aimed to increase immunisation coverage in Iranian children to 90% by their first birthday 	 Principles observed: UHC Community Participation* 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 	 Principle observed: UHC Appropriateness 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

Seri al 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}	Principle observed: - 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 – comprehensivenes s & equity	 Principles observed: 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 	 Principles observed: 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}	 Principles observed: 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 	 Principles observed: 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

Seri al 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	Principles observed: - UHC via low cost health service provision in remote areas - Community Participation via increase in local women's participation in health promotion	Principles observed: - 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	 Principles observed: 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

Seri al No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
		 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 	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	 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
9.	RWANDA / RapidSMS program / 2013 ²⁰	 Principles observed: 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, 	 <u>Principles observed</u>: 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> Appropriateness (use of technology, acceptability) RapidSMS was well accepted by most CHWs and community members – acceptability aspect of appropriateness principle 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

Seri al 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	Principle observed: - UHC – as the program aimed to extend the coverage of PHC services throughout rural Niger	Principle observed: - 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	Principle observed: - UHC – via improving health outcomes by providing home and community- based health services	 Principle observed: 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 	 Principle observed: 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	Principle observed: - UHC – as the organizational principles include universality and equity	 Principle observed: 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	Principle observed: - UHC – via provision of PHC and family planning services	 Principle observed: UHC Community Participation* Health education by CHWs for rural families Provision of family planning supplies to women 	 Principle observed: UHC Appropriately trained PHC workers promote contact between rural populations and the health care system

Seri al No.	Country / CHW Program / year commenced	CHW Program Objective	Implementation of the CHW Program	Stated Outcome/ achievement of the CHW Program
			 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 	• 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	Principle observed: - 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* 	 Principle observed: 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