SSM - Health Systems 5 (2025) 100134

Contents lists available at ScienceDirect

SSM - Health Systems

journal homepage: www.sciencedirect.com/journal/ssm-health-systems

Performance and challenges of Accredited Social Health Activists (ASHAs) in delivering key Maternal and Newborn Health (MNH) services in India: A systematic review and meta-analyses

Sukriti Chawla [a,*], Chandan Kumar [a,b], Montu Bose [c], Shikha M. Shrivastav [d]

[a] Department of Policy and Management Studies, TERI School of Advanced Studies (TERI SAS), New Delhi 110070, India
[b] Emerson Centre of Excellence for Sustainability Studies, TERI SAS, New Delhi 110070, India
[c] Centre for Health and Social Sciences, School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai 400088, India
[d] School of Management, Bennett University, Greater Noida 201310, India

ARTICLE INFO

Keywords:
Accredited social health activist
Community health worker
Maternal and newborn health
MNH
Antenatal care
ANC
Institutional delivery
Postnatal care
PNC
And India

ABSTRACT

Background: Accredited Social Health Activists (ASHAs), a cadre of community health workers in India, have played a significant role in improving key maternal and newborn health (MNH) services since their inception in 2005 under the National Rural Health Mission (NRHM). However, persistent inequalities in the coverage of these health services and the expanding engagement of ASHAs within the health system necessitate a revisit to their performance and the challenges they face. This study synthesizes existing evidence on ASHAs' performance in MNH services.

Methods: A comprehensive search of bibliographic databases, including PubMed, Scopus, Embase, and Web of Science, yielded a total of 9140 studies. Of these, 38 studies were included in the systematic review, and 31 in the meta-analyses. Random-effects models were used to estimate the pooled effect size (Relative Risk) of ASHAs in delivering three key MNH services: antenatal care visits, institutional deliveries, and postnatal care.

Findings: The meta-analyses suggest that ASHAs have a positive, albeit marginal, impact on improving key MNH services. Qualitative studies revealed both enablers and barriers to ASHA's performance, which were classified into individual, cultural, and health system-related factors.

Interpretation: The study highlights that fostering a supportive environment is crucial for enhancing ASHAs' impact on MNH service coverage. Given significant interstate disparities, regionally adaptive strategies are required. Additionally, the scope of ASHAs' responsibilities should be periodically reviewed to ensure the provision of holistic and culturally sensitive maternal care.

1. Introduction

MNH services, particularly Antenatal Care (ANC), Institutional Delivery (ID), and Postnatal Care (PNC), are crucial for improving the health of mothers and their newborns (World Health Organization, 2022). These services are delivered across key stages of pregnancy and during the initial few months post-delivery, a critical period for health interventions targeting pregnant or nursing mothers and their newborns (World Health Organization, 2013). The importance of such care is underscored by the fact that nearly half of maternal deaths and approximately 40 % of neonatal deaths occur during labour or within the first 24 h after birth (WHO, 2024). Worldwide, and specifically in India, improvements in these services have been associated with significant reductions in mortality rates (Chou et al., 2019). For instance, India's maternal mortality ratio (MMR) fell by 28 % between 2016 and 2021 (from 130 to 93 per 100,000 livebirths), and neonatal mortality dropped by 25 % during the same period (from 130 to 93 per 1000 livebirths) (Registrar General of India, 2025). Nevertheless, India continues to contribute a substantial share to global maternal and newborn deaths, with ongoing gaps in the provision of quality and equitable MNH services (Mishra et al., 2024). Addressing these gaps requires strong community-level engagement.

Community Health Workers (CHWs) have played a key role in improving access to healthcare worldwide for several decades. In

* Corresponding author.
E-mail addresses: chawlasukriti@gmail.com (S. Chawla), c.kumar803@gmail.com (C. Kumar), monbose@gmail.com (M. Bose), shikha.shrivastav@bennett.edu.in (S.M. Shrivastav).

https://doi.org/10.1016/j.ssmhs.2025.100134
Received 31 December 2024; Received in revised form 13 June 2025; Accepted 3 September 2025
Available online 4 September 2025

response to acute shortages and urban–rural disparities in healthcare personnel, many countries began deploying lay health workers, especially to serve rural communities since the mid-20th century (Haines and Kuruvilla, 2007). China's famous "barefoot doctors" initiative in the 1940s, which trained rural residents to provide basic healthcare, is recognized as the first large-scale CHW program (Li et al., 2017). Building on this model, Bangladesh's BRAC (Bangladesh Rural Advancement Committee) organization launched a community health volunteer program in the 1970s, which helped shape the modern CHW approach (Javadi et al., 2006). These early successes demonstrated that trained community volunteers could effectively deliver essential health services in underserved regions, which led to their integration into global health strategies.

The 1978 Alma-Ata Declaration formally recognized CHWs as integral to primary health care, urging countries to engage CHWs in the "Health for All" agenda. Since then, CHW programs have become a fundamental element of reproductive, maternal, newborn, and child health (RMNCH+) initiatives globally (World Health Organization, 1978). Efforts to reduce maternal and child mortality — from the Safe Motherhood Initiative to the Millennium Development Goals — have increasingly relied on CHWs to promote antenatal care, safe deliveries, newborn care, immunization, and family planning at the community level (Gilmore and McAuliffe, 2013). This historical and global context set the stage for India's adoption of the CHW model to strengthen MNH services.

In India, the CHW concept was first adopted through the Swasthya Raksha (Health Protection) Scheme in 1977, which engaged village health volunteers in basic health promotion. However, the national CHW program faced challenges and was eventually phased out by the late 1980s (Strodel and Perry, 2019). The gap was later addressed with the launch of the Accredited Social Health Activist (ASHA) program under the National Rural Health Mission (NRHM) in 2005. The ASHA initiative introduced a cadre of women village-based health volunteers, with one ASHA assigned per 1000 rural inhabitants (Agarwal et al., 2019). ASHAs were tasked with promoting MNH services — including ANC, ID, and PNC — and other public health activities. Their deep understanding of and trust within rural communities has proven critical in increasing the uptake of MNH services (Kumar et al., 2024).

ASHA workers are recognized for their multiple roles: as service providers, as link workers connecting communities to formal health systems, and as grassroots activists. As service providers, ASHAs are trained to deliver basic preventive care, distribute medicines, and assist with antenatal and postnatal care at the household level (Sundararaman et al., 2012). In their capacity as link workers, they need to ensure that pregnant women receive recommended health check-ups, facilitate access to health facilities for institutional deliveries, and oversee the timely immunization and health check-ups of both mothers and newborns post-delivery. As activists, ASHAs help raise awareness about health determinants and advocate for community rights within the healthcare system (Scott et al., 2019). These multifaceted roles position ASHAs as essential contributors to improving MNH outcomes, particularly in rural India.

Over the past 15 years, the ASHA program has expanded in both size and scope alongside India's health system (Blanchard et al., 2021). Today, approximately 1 million ASHAs serve across 35 states and union territories, making it the largest community health volunteer network in the world (Ved et al., 2019).

Data from National surveys have reflected substantial improvements in MNH service coverage since the inception of the ASHA program (Padda et al., 2013). For instance, ID increased from 48.8 % in 2005–06 to 88 % in 2019–2021, while PNC coverage grew from 37.3 % to 81.7 % over the same period in India (International Institute for Population Sciences, 2020). While these improvements are likely due to a combination of factors, including financial incentives (Lim et al., 2010), facility expansion (National Health Systems Resource Centre (NHSRC), 2023), and broader systemic reforms (Kruk et al., 2018), the role of ASHAs as local facilitators is widely recognized in program evaluations and community-level studies (Scott et al., 2019). In contrast, ANC coverage saw only a modest increase from 52 % to 54 % over the same period (International Institute for Population Sciences, 2020), indicating a potential area of challenge or persistent barriers to access. This marginal progress is particularly concerning given ANC's role in identifying high-risk pregnancies, managing maternal health conditions, and providing education and counselling on immunization, nutrition, breastfeeding, birth spacing, and more (Say et al., 2014; Kuhnt and Vollmer, 2017).

Recent research also point to persistent disparities in MNH service coverage across Indian states and districts, even among areas with similar socio-economic conditions (Wahid et al., 2019; Blanchard et al., 2021; George et al., 2022). These subnational disparities suggest potential differences in the effectiveness of the ASHA program, underscoring the importance of understanding how ASHAs operate in diverse contexts. This systematic review and meta-analyses aim to assess the performance and implementation challenges of ASHAs in delivering three key MNH service coverage indicators: ANC, ID, and PNC. This synthesis will guide resource allocation, policy adaptations, and training improvements to strengthen the CHW program and enhance service coverage, relevant to both India and other low- and middle-income countries (LMIC).

2. Methods

2.1. Search strategy

This study follows a systematic review and meta-analysis protocol to assess the performance and challenges ASHAs face in improving the coverage of three critical MNH services: ANC, ID, and PNC, within the complex healthcare landscape of rural India. A comprehensive literature search was conducted across four major bibliographic databases: PubMed, Scopus, Embase, and Web of Science. The search covered publications from January 2005, corresponding with the launch of the NRHM, through August 2024. The search strategy incorporated a combination of keywords and Boolean operators, including terms such as "Accredited Social Health Activist," "ASHA," "frontline health workers," "Community Health Worker," "Maternal Health," "Antenatal care," "ANC," "Institutional delivery," "Postnatal care," "PNC," and "India". The complete details of the search syntax are provided in Table S1 of the Supplementary Material. While some studies included broader CHW categories, only those explicitly analyzing ASHAs were retained. In cases where CHWs were grouped, studies were included only if data could be disaggregated for ASHAs (Table S1 in Supplementary File).

2.2. Inclusion and exclusion criteria

This review included peer-reviewed primary studies employing either quantitative or qualitative methodologies. Eligible studies focused on rural populations of reproductive-aged women (15–49 years) who were pregnant or recently delivered, and assessed the impact of ASHAs on coverage of ANC, ID, or PNC services. Studies were excluded if they were systematic reviews, meta-analyses, conference abstracts, or did not disaggregate ASHAs from other CHW cadres. Furthermore, studies based exclusively in urban contexts or those not reporting outcomes related to the three focal services were also excluded. This approach ensured consistency in assessing ASHAs' role in delivering key MNH services under the NRHM framework in rural India. While selecting studies for meta-analyses, it was ensured that they follow an experimental study design, mainly randomized controlled trials.

2.3. Key outcome indicators

To maintain conceptual clarity, standardized definitions were applied to the three MNH service coverage outcomes. ANC was defined

as care received from a skilled health professional, such as a doctor, nurse, or Auxiliary Nurse Midwife (ANM), and typically measured as having at least one check-up (ANC1 +) or a minimum of four check-ups (ANC4 +) during pregnancy. These services are most commonly accessed at government health facilities or during outreach clinics, with ASHAs responsible for identification, counseling, and referral rather than direct clinical provision (World Health Organization, 2016).

ID referred to births occurring in a government-recognized health facility — including primary health centers, community health centers, or hospitals — under the supervision of a skilled birth attendant. ASHAs support institutional delivery by helping families prepare for childbirth, arranging transportation, and accompanying women to facilities (World Health Organization, 2015).

PNC was defined as receiving a postnatal check-up from a qualified provider, such as an ANM, nurse, or physician, within 48 h to 7 days postpartum. PNC services could be provided either before discharge at a health facility or via home visits arranged by ASHAs in coordination with facility-based personnel (World Health Organization, 2013).

2.4. Screening and data extraction

The review was conducted in adherence with the PRISMA guidelines (Table S2 in Supplementary File). To ensure the accuracy and completeness of the screening process, the first and second authors independently screened all titles and abstracts against predefined inclusion criteria. Discrepancies were resolved through discussion and re-examination of the studies in question. Full texts were similarly reviewed by both authors to determine final eligibility. Screening and data management were performed using Microsoft Excel, allowing for systematic coding.

For each study meeting the eligibility criteria, data were extracted regarding authorship, year of publication, geographic location, study design, sample size, reported outcomes, and ASHA-related intervention components. A summary of these data is presented in Table 2.

2.5. Meta- analyses

Meta-analyses were performed using Review Manager (RevMan). The Mantel-Haenszel random-effects model was used to compute pooled Relative Risks (RR) and 95 % confidence intervals (CI) for each outcome. The decision to use the Mantel-Haenszel (M-H) random-effects model was based on its suitability for handling sparse data and low event rates, compared to alternatives like Inverse Variance (IV) and Peto methods (Borenstein et al., 2009). Unlike the IV approach, which assigns greater weights to larger studies, the M-H model weights studies proportional to the number of participants and events, providing more reliable estimates, especially in cases with limited or small sample sizes (Deeks et al., 2022).

The meta-analyses focused on assessing the impact of ASHAs on coverage of essential MNH services. Forest plots synthesized results from studies comparing outcomes in groups with ASHA contact against controls without such contact. Each study was represented with its event counts and total sample, along with its contribution to the pooled estimate. The RR and their 95 % CI are displayed, with squares representing individual studies (size proportional to study weight) and a diamond representing the pooled effect.

2.6. Qualitative Data Analysis

Thematic analysis was conducted to synthesize findings for the included qualitative studies. Coding identified recurring themes related to barriers encountered by ASHAs and enablers that support MNH service delivery. These codes were grouped into overarching themes reflecting individual, community, and health system factors influencing ASHA performance. Illustrative evidence was extracted from the studies and organized thematically in Table 2 to provide additional context and depth to the quantitative findings.

2.7. Quality appraisal

Quality assessment was performed using two validated tools: Quality Assessment Tool (QAT) for overall study quality and the Cochrane Risk of Bias (RoB) tool for methodological scrutiny. The QAT evaluated nine parameters: clarity of title and abstract, methodological rigor, sampling strategy, ethical considerations, result presentation, and potential research implications. Studies were graded on a numerical scale from 9 to 36 points and categorized into three quality grades: A (high-quality, 30–36 points), B (medium-quality, 24–29 points), and C (low-quality, 9–23 points) (Table S3 and S4 in Supplementary File).

The Cochrane RoB tool examined six domains: randomization process, deviation from intended interventions, completeness of outcome data, outcome measurement, selective reporting, and overall risk of bias (Figures S1 and S2 in Supplementary File). Each domain was assessed using signaling questions, with judgments classified as low, high, or raising some concerns. This comprehensive approach ensured a thorough and transparent assessment of the methodological integrity of included studies, thereby enhancing the reliability and credibility of the review's findings. Additionally, a funnel plot and Egger's test were used to assess publication bias.

3. Results

From the searches conducted across various bibliographic databases, 9140 studies were initially identified, of which 926 duplicate records were removed. This resulted in 8214 unique records available for screening. Of these, 7783 records were deemed ineligible during title and abstract screening for reasons including irrelevance to the current topic, a focus on predictors other than the effectiveness of ASHAs in delivering MNH services, or coverage of unrelated topic areas. Consequently, 431 records were deemed eligible for full-text review.

From the remaining 431 studies, 120 were excluded as their outcomes did not align with study's objectives. An additional 100 studies were excluded due to an inappropriate study population — either women not of reproductive-age or the focus was not specific to ASHA — while 90 studies were excluded due to lack of ASHA-specific analysis. Four studies could not be retrieved. A further 20 studies were excluded for being based in urban settings, and 28 were excluded due to insufficient or incomplete data, or poor methodological quality. Ultimately, 69 studies met the inclusion criteria, with 31 quantitative studies included in the meta-analyses, and 38 qualitative studies synthesized thematically. The PRISMA flow diagram detailing the study selection process is presented in Fig. 1.

3.1. Study characteristics

Table 1 provides an overview of the quantitative studies included in the meta-analyses. Of the 31 studies analysed, 15 (48.3 %) were conducted in Empowered Action Group (EAG) states — Uttar Pradesh, Bihar, Uttarakhand, Odisha, Chhattisgarh, Jharkhand, Madhya Pradesh, and Rajasthan — and 16 studies (51.6 %) in non-EAG states.

Studies primarily focused on ANC, comprised 14 studies (45.2 %). ID was the focus of 4 studies (12.9 %), while PNC was covered by seven studies (22.6 %). Some studies addressed multiple aspects of MNH, with three studies (9.7 %) covered all three services, two (6.4 %) addressed both ANC and PNC, and one (3.2 %) focused on ID and PNC.

Regarding types of interventions, behaviour change interventions and technological interventions were each featured in 10 studies (32.3 %). Microteaching was examined in 3 studies (9.7 %), while state-based schemes or health programs were evaluated in 8 studies (25.8 %).

The duration of the interventions varied, with the majority (54.8 %) lasted less than 6 months. A significant portion, 29.0 %, had intervention durations between 6 and 12 months. Only 1 study (3.2 %) had an

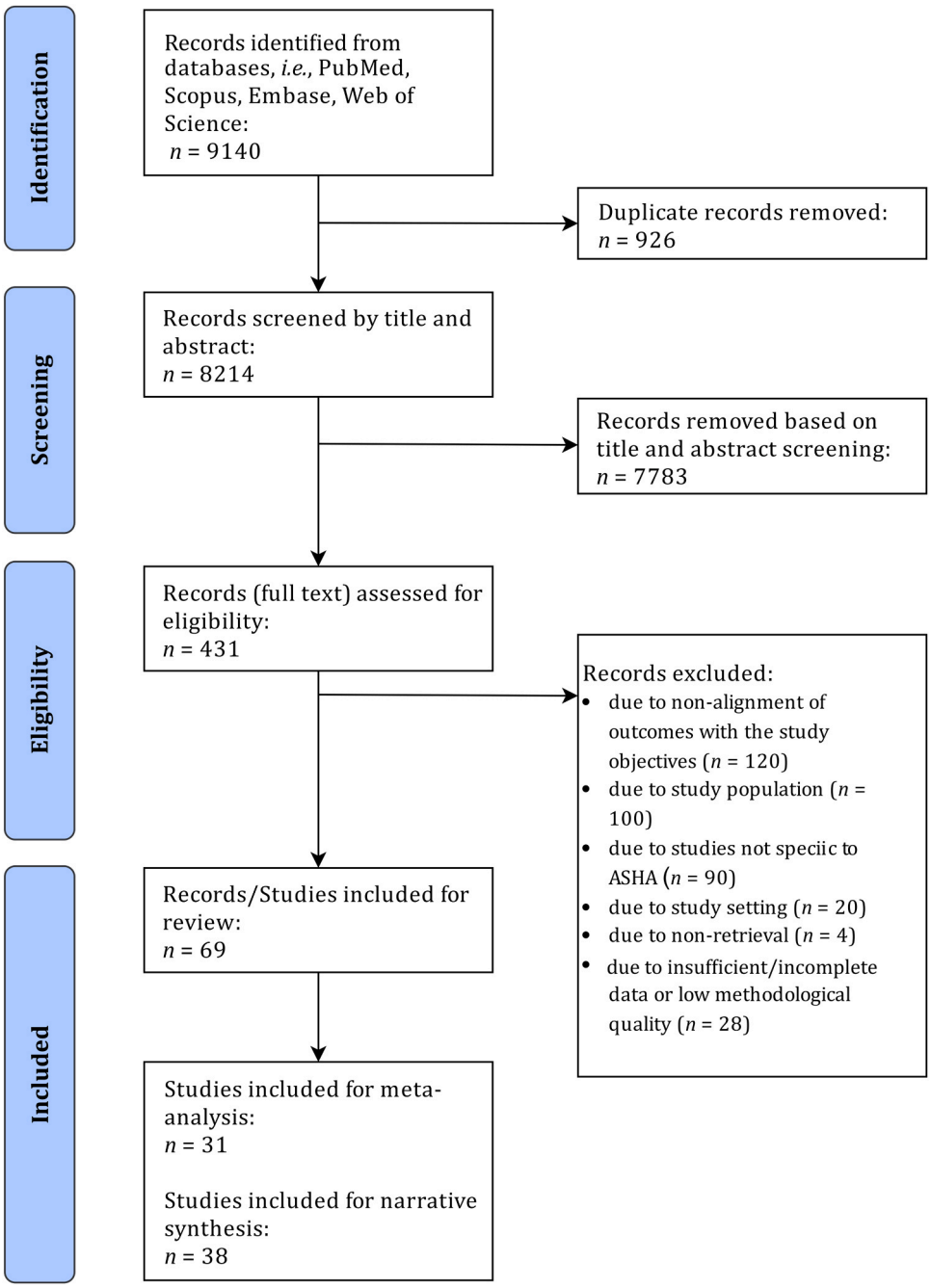


Fig. 1. PRISMA Flow diagram for systematic review and meta-analyses.

intervention lasting between 13 and 18 months, while three studies (9.7 %) were conducted over a 19–24-month period, and a single study (3.2 %) lasted over 24 months.

Regionally, most studies were conducted in the East (13 studies, 41.9 %) and North (11 studies, 35.5 %) India. Notably, there were no studies from the Northeast; two studies (6.5 %) were from the South region, and five studies (16.1 %) from the West region.

Table 2 outlines the characteristics and principle findings of 38 qualitative studies examining the performance and challenges of ASHAs included in the systematic review.

3.2. ASHAs' impact on ANC coverage

Across the included studies, contact with ASHAs was consistently associated with improved ANC coverage. The meta-analysis yielded a pooled RR of 1.26 (95 % CI: 1.15–1.39), indicating a positive impact. This evidence resolve the earlier inconsistencies and underscores ASHAs' key role in facilitating early and repeated antenatal care, particularly in supportive programmatic environments (Chauhan and Bhalani, 2020). Consistent with the pooled effect, behavior-change and digital support interventions, such as Trials of Improved Practices (TIPs), and Clinical Decision Support System (CDSS) tools, have demonstrated improvements across multiple studies (Choudhury et al., 2021; Mehta et al., 2020; Nagraj et al., 2023; Shivalli et al., 2015; Walia et al., 2020).

As illustrated in Fig. 2, the forest plot demonstrates the positive association between ASHA contact and ANC coverage, corroborated by data presented in Table S5 in Supplementary File. The funnel plot (Figure S3 in Supplementary File) exhibits some asymmetry, with a concentration of smaller studies (with higher standard errors) to the

Table 1
Characteristics of quantitative studies focused on ASHAs included in meta-analyses.

Study Characteristics	Studies	%
Study setting		
EAG States	15	48.3
Non-EAG States	16	51.6
Study Focus		
ANC	14	45.2
ID	4	12.9
PNC	7	22.6
All three	3	9.7
ANC and PNC	2	6.4
ID and PNC	1	3.2
Study Intervention		
Behavioural Change Communication	10	32.3
Technological Intervention	10	32.3
Microteaching	3	9.7
State-based scheme/programme	8	25.8
Intervention Duration		
Less than 6 months	17	54.8
6–12 months	9	29.0
13–18 months	1	3.2
19–24 months	3	9.7
24 + months	1	3.2
Region		
Central	1	2.6
East	13	41.9
North	11	35.5
Northeast	0	0
South	2	6.5
West	5	16.1

EAG: Empowered Action Group; ANC: Antenatal Care; ID: Institutional Delivery; PNC: Postnatal Care

right, indicating potential publication bias. Nonetheless, most data points remain within the 95 % CI, with no clear outliers. Egger's test revealed a positive slope coefficient of 0.081 ($p = 0.186$) and a bias coefficient of 2.045 (95 % CI: −0.486–4.577), which was not statistically significant ($p = 0.107$). This implies that there is weak evidence supporting the presence of publication bias.

3.3. ASHAs' impact on ID coverage

ASHAs' impact on ID was also consistently positive across studies. The meta-analysis produced a pooled RR of 1.12 (95 % CI: 1.05–1.19), confirming that ASHA contact is associated with a significant increase in facility-based deliveries. These findings underscore ASHAs' effectiveness in providing birth preparedness counseling (Boone et al., 2017; Patel et al., 2017), coordinating logistics (Bhandari et al., 2014; Tripathy et al., 2010), and facilitating government incentive schemes such as Janani Suraksha Yojana (JSY) (Ward, 2021; Weng et al., 2020). Participatory women's groups and community-level promotion trials in India have increased institutional births and improved perinatal outcomes, complementing ASHAs' birth-preparedness counseling and logistical support provided by ASHAs (Boone et al., 2017; Tripathy et al., 2010).

The forest plot in Fig. 3 indicates that ASHA interventions are associated with improved ID coverage, as also supported by data presented in Table S6 in Supplementary File. The funnel plot (Figure S4 in Supplementary File) shows the asymmetric distribution of studies, with a rightward cluster suggesting potential publication bias. Egger's test produced a statistically non-significant negative slope coefficient of −0.014 ($p = 0.300$); while the coefficient of bias was estimated as 2.473 (95 % CI: 1.117–3.829), which was statistically significant ($p = 0.004$). These findings suggest that while the slope indicates no significant relationship, there is substantial evidence of publication bias in this meta-analysis, as smaller studies are more likely to report more favorable outcomes.

3.4. ASHAs' impact on PNC coverage

PNC coverage also improved in the presence of ASHA interventions. The meta-analysis showed a pooled RR of 1.13 (95 % CI: 1.05–1.21), with the most marked improvements where ASHAs received specific training or support for conducting early postnatal home visits. Evidences show that structured postnatal support through Kangaroo Mother Care (KMC) and Home Based Newborn Care (HBNC), often facilitated by ASHAs, improves survival, early development, and caregiving practices (Chaudhary et al., 2023; Mazumder et al., 2019; Mehta et al., 2020; Muthukumaran and Sharma, 2023; Newton-Lewis and Bahety, 2021; Taneja et al., 2020; Weng et al., 2020).

As depicted in Fig. 4, ASHA interventions were consistently associated with improved PNC coverage; also supported by Table S7 in Supplementary File. The funnel plot (Figure S5 in Supplementary File) indicates asymmetry, with a cluster of points on the right side indicating potential publication bias. While Egger's test revealed statistically significant bias ($p = 0.044$), the direction and magnitude of pooled results across study types remain consistent with the hypothesis that ASHAs contribute positively to PNC uptake, especially in early postpartum stages.

3.5. ASHAs and MNH service coverage: barriers and enablers

An analysis of thirty-eight qualitative studies examining various dimensions of ASHA's roles —including strengths, performance, and challenges — identified ten barriers and seven enabling factors across twelve Indian states (Bihar, Uttar Pradesh, Karnataka, Punjab, Rajasthan, Maharashtra, Haryana, Odisha, Jharkhand, West Bengal, Gujrat, and Madhya Pradesh), as detailed in Table 2.

The seven enabling factors that positively influence the performance of ASHAs included ASHA's knowledge, supervision and training, monetary incentives, technological intervention, family support, and community acceptance. On the other hand, key barriers negatively linked with ASHAs' performance included patriarchal belief systems, the quality of health facility services, administrative delays, inadequate resources, technological challenges, excessive workload, caste and religious discrimination, seasonal migration and language barriers. These barriers and enablers were classified and organized into a 3 × 3 matrix. The columns represent three key MNH services, while the rows represent three major factors: Individual, Cultural, and Health System-related factors.

Individual factors that may influence ASHAs' performance include, but are not limited to, their knowledge, family support, and workload. Cultural factors affecting ASHAs' performance encompass the patriarchal belief system, caste discrimination, language barriers, and religious discrimination. Health System-related factors included issues related to transportation, inadequate resources, and technological interventions. Fig. 5 illustrates the arrangement of these factors, reflecting empirical evidence.

Within the category of individual factors, knowledge was the most frequently cited enabling factor, with most studies demonstrating a positive relationship between ASHAs' knowledge and their activities. However, a few studies from Uttar Pradesh (Bhattacharyya et al., 2015), Bihar (Karvande et al., 2016), Rajasthan (Scott et al., 2020), Maharashtra (Shrivastava and Shrivastava, 2012) observed gaps in ASHAs' knowledge. For instance, Shrivastava and Shrivastava (2012) revealed that 67 % of ASHAs were unaware of preventive measures for anemia in pregnant women, and 50.4 % were unaware of referral protocols for babies' immunization issues. While ASHAs are generally well-trained in basic MNH interventions, there is a need for more advanced, region-specific training that covers emerging health issues and local health contexts.

The next most commonly mentioned factor was incentives. Studies indicate that there is generally a positive relationship between ASHAs' performance and monetary incentives, except for a few studies from

Table 2
Characteristics and findings of qualitative studies focused on ASHAs included in the systematic review.

Sl. No.	Study	Study area	Focus	Study Sample (n)	Data collection	Positive assessment of ASHA	Challenges faced by ASHA
[1]	Acharya and Kalyanwala, (2012)	Bihar (Nawada); Maharashtra (Wardha)	ANC; PNC	ANM (20); ASHA (56)	In-depth interviews	ASHAs were able to manage due to support from their mother-in-law and husband in managing household chores, and also due to their knowledge of pain management and possible complications	The provider's knowledge of gestation and other important doses was far from universal. 74.7 % of ASHAs had poor knowledge of the criticality of the abortion symptoms. Although they counselled women, the discussions were limited to pain management and possible complications. Even in many cases, the ASHAs were reluctant to assist other caste women.
[2]	Aruldas et al., (2017)	Uttar Pradesh (Amethi and Rae Bareli)	ANC; PNC	ASHA (49)	In-depth interview		The causes of illness are perceived by older women in the family as supernatural. Strong belief in traditional healing; Mother-in-laws never allowed to check mother or newborn, even if the condition was life-threatening. Community perception of ASHA is very negative. ASHAs have to arrange transportation for the patients.
[3]	Bhattacharyya et al., (2015)	Uttar Pradesh (Rampur)	ANC; ID	ASHA (16); PW (43)	In-depth interviews		Male child preference, limited knowledge on key aspects, poor training, technology, and limited infrastructure. Transportation conditions are very bad. ASHA complains that women come unprepared and with aged women at odd hours or during heavy workload, which makes it challenging to handle complications.
[4]	Carmichael et al., (2019)	Bihar (Begusarai)	ANC; ID	ASHA (153); ANM (45)	FGDs of ANMs and ASHAs	Social responsibility, incentives, and happiness in helping others boosted ASHA, along with the knowledge of handling complications, which also increased their community acceptance in the village.	ASHAs reported that additional responsibilities were assigned at the panchayat/AWW/education department by officials who pressured them to complete. Unhealthy colleague relationships involve discriminating and blaming—no arrangement to stay at night. ASHA cannot leave for lunch. Family & community don't accept
[5]	Dandona et al., (2023)	Bihar (Banka)	ANC	ASHA (40)	In-depth interview		Trust issues, loss of follow-up due to distance or migration, and absence of refresher training and supervision by the supervisors make it difficult for ASHA to serve the community effectively. Unhealthy colleague relationships
[6]	Devi et al., (2023)	Uttrakhand (Dehradun)	PNC	ASHA (120)	Semi-structure interview		Less than 50 % of ASHAs were aware of mandatory vaccines and infection, and also lacked knowledge regarding preventive measures.
[7]	Goel et al., (2019)	Haryana (Ballabgarh)	ANC; ID; PNC	ASHA (136)	In-depth interview	ASHA was aware of newborn illness symptoms because of the refresher training they received. They were generally motivated by good incentives, both monetary and non-monetary, and community acceptance.	ASHA observed vaccine hesitancy in cases of nuclear families, female girl children were neglected in care and nutrition, and because of this, even mothers of female children were neglected as well. Mothers-in-law forced ASHAs not to provide care to

(*continued on next page*)

Table 2 (*continued*)

Sl. No.	Study	Study area	Focus	Study Sample (n)	Data collection	Positive assessment of ASHA	Challenges faced by ASHA
							the girlchild. The Socioeconomic status differential between the community and ASHA also impacts their performance. Higher birth order, unawareness of ASHA, and lack of trust. Knowledge on vaccinations was lacking in ASHA
[8]	Gupta et al., (2017)	Chandigarh (Sector 45)	PNC	ASHA (12)	In-depth interviews	ASHAs had knowledge of diarrhoea, anaemia	Maternal examination skills, such as fever, discharge per vaginum, breast milk, and abdominal examination, did not show any significant improvement.
[9]	John et al., (2020)	Bihar (Arwal)	ANC; ID; PNC	AWW (110) ASHA (10)	In-depth interview	Incentives along with family support and community acceptance were a key motivator for taking up the role.	20 % had low birth weight because of poor training, caste dynamics, socioeconomic status, incomplete vaccination, and migration. Incentives do not match the workload imposed on ASHA. Lack of transportation in critical times also hinders the accessibility of care.
[10]	Karol and Bhalani, (2014)	Rajasthan (Banswara)	ANC	ASHA (79)	In-depth interview	ASHAs feel confident and empowered due to their ability to solve critical issues of pregnant women and newborn child	Socioeconomic factors, only 43 % received cash incentives, 67 % received POSHAN counselling, no milk consumption. Their knowledge is low in essential MNH services.
[11]	Karvande et al., (2016)	Bihar (Siwan & Saran); Jharkhand (Chatra & Koderma)	ID	ASHA (50); HH (50)	In-depth interviews		Illiterate women sometimes were not paid because they needed to fill in the forms correctly due to language issues and technological challenges. Some ASHAs unable to attend deliveries at night were not paid even if they called an ambulance to transport a pregnant woman for delivery. ASHAs prioritised those services that were incentivized.
[12]	Kavi et al., (2022)	Karnataka (Belgavi)	ID	ASHA (20)	In-depth interviews	By adjusting to local beliefs and language, the ASHA were able to make their space in the community.	Mothers-in-law doubt the intentions of ASHAs and usually resist their suggestions.
[13]	Khandre et al., (2023)	Bihar (Bhagalpur)	ANC	ANM (30) ASHA (30)	Semi-structure interview		Inadequate supplies force the family to purchase, or the provider reuses supplies without sterilization. Limited providers with role uncertainty. Cultural norms like male-child preference deteriorate the condition. Traditional belief delays immediate neonatal care.
[14]	Kochukuttan et al., (2015)	Karnataka (Belgavi)	ID	ASHA (225)	Semi-structure interview		Tensions in the family due to poor incentives and heavy workload with no payment for ambulance, travel, or mobile expenses. Unhealthy colleague relations, inadequate resources, and no facility to stay overnight with the patient, knowledge regarding danger signs were poor, and the traditional belief of the community
[15]	Kumar and Roy, (2021)	Uttar Pradesh (Amethi)	ANC	ASHA (45)	In-depth interviews	Above 80 % of ASHAs had proper knowledge of	

(*continued on next page*)

Table 2 (*continued*)

Sl. No.	Study	Study area	Focus	Study Sample (n)	Data collection	Positive assessment of ASHA	Challenges faced by ASHA
						community mobilization and complication readiness.	
[16]	Manivannan et al., (2023)	Karnataka (Raichur & Bangalore)	ID; PNC	CHW (27) ASHA (10); PW (20)	Telephonic interview	ASHAs were accepted by lower strata families with whom they built strong relationships over time due to their knowledge and training in community mobilization and counselling to access public health services.	ASHAs were affected by the geographical clustering of some lower socio-economic groups in disparate hamlets, the remoteness of some villages, environmental barriers, and limited infrastructure to link them. People's trust in ASHAs. Financial constraints and gender disparities make it difficult for pregnant women to access nutritious food.
[17]	Nair et al., (2021)	Jharkhand (West Singhbum & Khunti)	ID	ASHA (617)	In-depth interview	94 % of ASHAs had proper knowledge about Exclusive breastfeeding. ASHAs were aware of ORS packets and their uses, with 99 % able to explain the steps of ORS solution preparation correctly. Monetary incentives also played a major role in improving the coverage of 4 + ANC visits	A study in Rajasthan revealed that only 23.4 % of ASHAs had proper knowledge of the duration of EBF. A majority (74.7 %) of ASHAs had poor knowledge regarding the schedule of immunization
[18]	Nallala et al., (2023)	Odisha (Rayagada)	ANC	ASHA (14); PW (56)	In-depth interview and FGD	The ASHA were motivated because of the support and supervision they received from their supervisors and fellow ASHA.	Families preferred household-level care as the first step of care for newborn illnesses. The road condition is terrible, and carrying an ill person is difficult. I have to walk long distances in weak conditions. Caste dynamics and language barriers further complicate the access to care.
[19]	Nguyen et al., (2021)	Uttar Pradesh (Dehat & Unnao)	ANC; PNC	PW (496); ASHA (55)	In-depth interviews		Inadequate supplies force the family to purchase. Cultural norms and traditional beliefs delay immediate care. Community forced ASHAs not to supply medicines.
[20]	Patel et al., (2018)	Bihar (Bhagalpur)	ANC	ASHA (67)	In-depth interviews	Almost all the ASHAs were happy and satisfied with their activities due to the continuous handholding by the supervisors.	Relatively poor literacy among tribal ASHAs, as against rural ASHAs, affected documentation and record-keeping. Being married, many ASHAs struggled to balance daily household chores and their responsibilities. The seasonal work hampers the regular work of ASHA. Families do not allow ASHA from different communities to enter their houses or touch their daughter-in-law. Insufficient pregnancy kits with the ASHA also hamper their effectiveness
[21]	Prabhughate et al., (2018)	Uttar Pradesh (Gonda & Bulandshahr)	PNC	Sakhi (35) ASHA (8)	FGD	ASHAs received training on diarrhoea handling, vaccination, and post-vaccination referrals.	Community and family against work. The community does not trust the process of care and doubts why the ASHAs are taking so much information; they usually avoid contact with the ASHAs. An ASHA from a different caste is not allowed to even cross the road of an upper caste community member. Family is also not accommodating and ASHAs have to fend for everything by themselves

(*continued on next page*)

Table 2 (*continued*)

Sl. No.	Study	Study area	Focus	Study Sample (n)	Data collection	Positive assessment of ASHA	Challenges faced by ASHA
[22]	Rizwan et al., (2014)	Uttar Pradesh (Auraiya)	PNC	ASHA (63)	In-depth interviews	The literate, non-tribal ASHA is able to smoothly handle the mobile given by the government to maintain records and check for the next doses of medicines for pregnant women. They say we were taught all this during our training sessions. Even the male members of the house who are aware of smartphones help the ASHA adjust to the technology.	ASHA cannot fill basic registers due to language issues. ASHA is afraid of their husband and does not work. ASHA, who are not from the same village or appointed through politicians, does not take an interest. Health department people do not allow ASHA due to limited training on child immunization. Less incentives and uncertain promotions lead to demotivation. Lack of vaccines for children
[23]	Silan et al., (2014)	Uttar Pradesh (Auraiya)	PNC	ASHA (63)	In-depth interviews		ASHA cannot fill basic registers. ASHA is afraid of their husband and hence doesn't work. ASHA, who are not from the same village or appointed through politicians, does not take an interest. Health department people do not allow ASHA to work for AWWs. Limited training on child immunization and lack of transportation. Less incentives and uncertain promotions lead to demotivation. Lack of vaccines for children
[24]	Saggurti et al., (2019)	Bihar (Banka)	ANC; ID	CHW (112) ASHA (56)	In-depth interviews	ASHAs had proper knowledge about Expected Date of Delivery (EDD), referral. The mother-in-law helps in household chores when ASHA are not around.	The families were reluctant to follow the ASHAs' approach due to their strong belief in traditional healing
[25]	Saha and Quazi, (2022)	Gujrat (Dwarka)	PNC	PW (215); ASHA (40)	Semi-structure interview	Child health indicators improved by maintaining records, which saved a lot of time. Improved data quality	Reduced breastfeeding without hygienic substitutes provided by ASHAs. Malnutrition and poor immunization due to illiterate mothers and ASHAs
[26]	Sarin and Lunsford, (2017)	Punjab	ANC	ASHA (49); PW (49)	In-depth interview	ASHA said that money, and awareness of technology acted as a motivator as now they feel confident and independent	ASHA cannot fill basic registers. ASHA is afraid of their husband and hence doesn't work. Religious and language barriers inhibit ASHA from providing care to the community. The decision to conceal pregnancy also delays care. The hospital's cleanliness is also bad, making it difficult for the ASHAs to assist the patients at night.
[27]	Sarin et al., (2016)	Punjab (Gurdaspur); Haryana (Mewat)	ANC	ASHA (50); HH (50)	In-depth interviews	ASHAs feel confident and empowered, as they can contribute to the house's expenses and buy something for their children and family.	Illiterate women were sometimes unpaid because they could not correctly fill out the required forms. Some ASHAs were unable to receive payment for night deliveries, even when they successfully arranged ambulance transportation for pregnant women. Consequently, ASHAs tended to prioritize only those services that offered financial incentives
[28]	Scott et al., (2020)	Rajasthan (Jaipur)	ANC	ASHA (30)	In-depth interviews	70 % of ASHAs understood the importance of 4 + ANC	Physical violence, decision-making, socioeconomic factors. Varying levels of confidence in their capacity to make accurate estimates. Technological challenges like breach of data privacy due to

(*continued on next page*)

Table 2 (*continued*)

Sl. No.	Study	Study area	Focus	Study Sample (n)	Data collection	Positive assessment of ASHA	Challenges faced by ASHA
							unawareness of the online register create problems for the ASHA
[29]	Shah et al., (2019)	Gujrat (Jhagadia)	PNC	ASHA (45)	In-depth interviews	Sufficient competency was observed when ASHAs operated mobile technology, which also improved service coverage and outcomes.	
[30]	Sharma et al., (2016)	Bihar (West Champaran)	ID	ASHA (88)	Semi-structure interview	ASHA felt motivated by receiving a bonus, and cycle and institutional deliveries increased by 20 %	Delay in recognition of symptoms or poor recognition of critical symptoms; delay in decision to seek care due to spiritual or cultural reasons, absence of primary decision maker, poor availability of drugs, distrust in the government healthcare system
[31]	Sharma et al., (2014)	Rajasthan (Udaipur)	ANC; ID; PNC	ASHA (63)	In-depth interview	Family support and incentives significantly motivated the ASHA to improve their performance and coverage of MNH service.	Half of the neonates were not taken to any health facility; 24.2 % of infants and 19.4 % of children were not taken to a health facility before death. The consistent challenges were arranging transport to take children outside their homes, even under pressure from other duties. Delay was due to waiting for the home remedies. Poor incentives impede care
[32]	Shrivastava et al., (2023)	Madhya Pradesh (Sehore)	ANC	ASHA (30)	In-depth interviews	Community acceptance and non-monetary incentives, such as giving cycles or a pencil box for their school-going children, encourage ASHA.	ASHA feels disrespected, demotivated, and insulted when dealing with fellow CHWs. The community's acceptance of ASHA is very low, which makes it difficult to maintain amicable relationships with them. Access to resources is also very poor. In addition to routine duties, additional unpaid work is also assigned, which deviates their attention from main tasks. It also creates conflicts within ASHAs' families. There is no proper training.
[33]	Shrivastava and Shrivastava, (2012)	Maharashtra (Palghar)	ANC; PNC	ASHA (150)	In-depth interviews		Knowledge on certain aspects was not up to date, for instance, about 54 % of ASHA became aware of preventing pre-lacteal feeding in newborns. Inadequate supply of ORS, zinc for the babies suffering from diarrhoea
[34]	Singh et al., (2019)	Uttar Pradesh (Sultanpur)	ANC	PW (479); ASHA (34)	In-depth interviews	85 % of ASHAs were aware of referral, and tetanus doses to be given to pregnant mothers	Only 66 % of women or their families had saved or made arrangements for money to meet expenses during delivery or in case of any emergency. Identification of institutions in case of any complication was reported by only 4 % of the women. Due to religious differences, the community avoids ASHA.
[35]	Vidler et al., (2016)	Karnataka (Belgaum & Bagalkot)	ANC	ASHA (53); PW (41)	In-depth interviews and FGD	Proactively providing services even with resistance from the woman or her family. Balancing compliance with traditional practices and promoting HBNC with the help of online data keeping.	Faced challenges from their own family. Even the community resisted their visits by threatening them. Doctors also did not trust them, and sometimes, assistance in the form of an

(*continued on next page*)

Table 2 (*continued*)

Sl. No.	Study	Study area	Focus	Study Sample (n)	Data collection	Positive assessment of ASHA	Challenges faced by ASHA
							ambulance is also not provided to ASHAs.
[36]	Wagner et al., (2018)	West Bengal (West Midnapore)	ANC; ID	ASHA (30)	Semi-structured interviews	Strong 'financial' motive to support their families and technological intervention improved their efficacy.	It is hard for ASHA to bring PW for group counselling without distributing money. The unavailability of transportation and water facilities affected AWWs' workload and hindered the quality of preschool services. The majority of AWWs interviewed felt overburdened. Caste dynamics between the AWW and the community create discrimination. Corruption in selection
[37]	Wendt et al., (2018)	Bihar (Samastipur)	ANC	ASHA (59)	In-depth interview		Despite being entitled to IFA by policy mandate, Lactating women were not included. If the ASHA delays the supply of IFA to women, their salaries are deducted. The supplies given by the authorities are often nearing expiry.
[38]	Williams et al., (2020)	Uttar Pradesh (Barabanki); Karnataka (Mandaya)	ANC; ID	Children (14); PW (65) ASHA (14)	In-depth interview and FGD		Engaging ASHAs for training and monitoring was challenging due to the limited training capacity. They felt overburdened as they maintained a manual register due to the fear of losing data, issues of internet connectivity/and software leading to offline operations. Adapting New technology for elderly ANMs is an issue. Caste and poor decision-making ability of pregnant women also impede decision-making. Transportation is another challenge

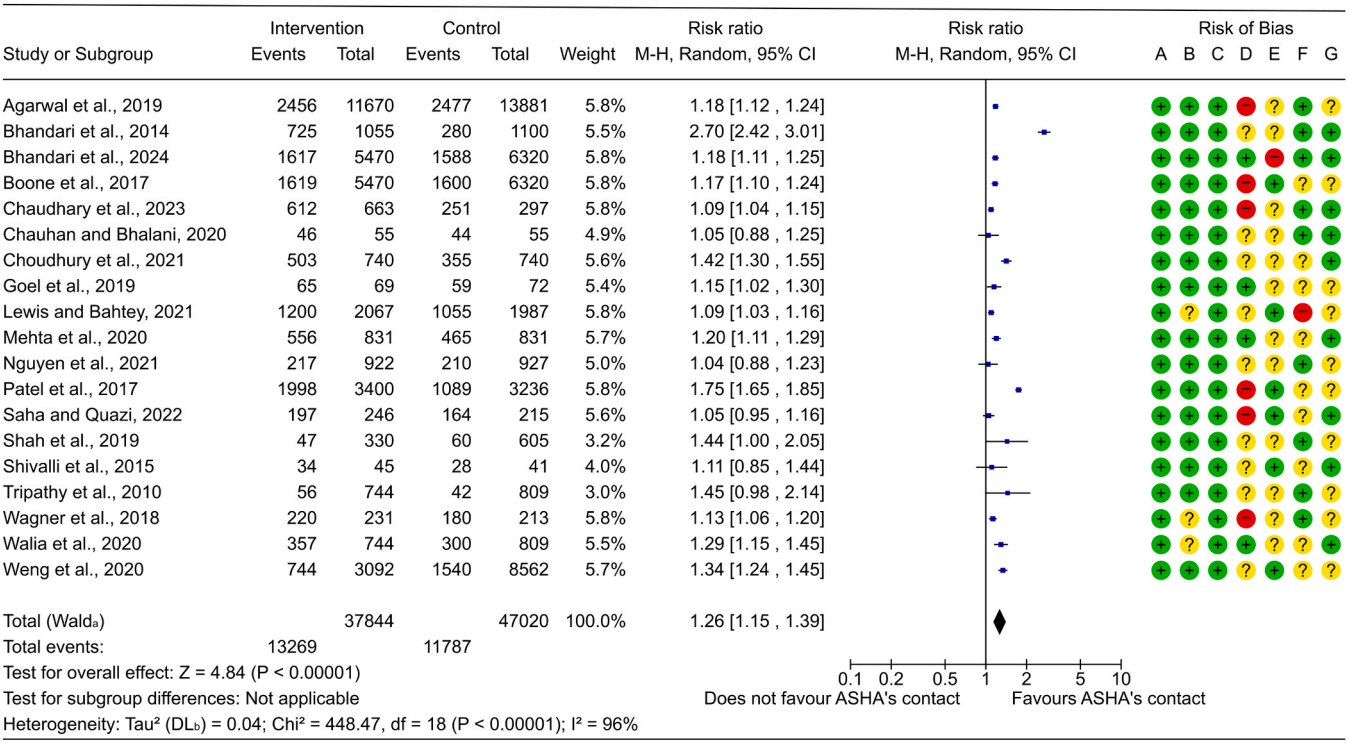
ANC: Antenatal Care; ID: Institutional Delivery; PNC: Postnatal Care; PW: Pregnant Women; HH: Household; ANM: Auxiliary Nurse Midwife; AWW: Anganwadi Worker, FGD: Focus Group Discussion

Punjab (Sarin et al., 2016), Bihar (John et al., 2020), and Rajasthan (Sharma et al., 2014). In these studies, ASHAs expressed dissatisfaction with the amount of money they received, feeling it was insufficient compared to their workload. They also faced challenges related to completing forms for service documentation, which acted as invoices. This documentation process was time-consuming and particularly difficult for illiterate ASHAs, further delaying their payments and resulting in decreased motivation and performance. Limited literacy, especially among tribal ASHAs, impacts their record-keeping abilities (Sharma et al., 2014).

Supervision and training are the next most frequently mentioned individual factors. Generally, the influence of this factor is positive; however, in Bihar (Dandona et al., 2023; John et al., 2020), and Madhya Pradesh (Shrivastava et al., 2023), it was noted that the training of ASHAs lacked rigor, especially in community mobilization, interpersonal skills, and child immunization.

In four studies, family support was identified as a key factor in ASHAs' performance. While the overall linkages of family support are positive, a study in Maharashtra (Prabhughate et al., 2018) reported that many married ASHAs struggle to balance household responsibilities with workload, most of which were unpaid (Sarin et al., 2016). Some fear their husbands, making them hesitant to work, while others may be unable to attend night deliveries. Moreover, the heavy workload placed on ASHAs reduces the time and resources available for maternal health (Prabhughate et al., 2018).

Cultural challenges substantially impede ASHAs' service delivery, with patriarchal belief systems often restricting women's healthcare decision-making. ASHAs frequently face situations where women conceal pregnancies due to family pressure, and mothers-in-law resist facility-based care. Many families doubt ASHAs' intentions (Patel et al., 2018). Cultural norms, such as a preference for male children, can delay immediate neonatal care, adding to the resistance they encounter. In some instances, ASHAs have faced threats during home visits, creating a hostile working environment (Prabhughate et al., 2018). Language barriers and religious discrimination further complicate healthcare engagement, with notable instances reported in states like Bihar, Odisha, and Punjab (Nallala et al., 2023). In other studies, ASHAs gain community acceptance through ongoing engagement, especially in lower socio-economic groups, by consistently providing support (John et al., 2020). ASHAs effectively combine traditional practices with modern healthcare recommendations, allowing them to navigate cultural sensitivities (Kavi et al., 2022; Goel et al., 2019; Shrivastava et al., 2023). Seasonal migration among low-income and marginalized communities also disrupts continuity of care, as entire families temporarily relocate, making it difficult for ASHAs to maintain follow-up, deliver services, or ensure adherence to ANC and PNC visits (John et al., 2020). Several studies indicated that when ASHAs themselves belong to the communities they serve, the uptake of services improves (Singh, 2021)

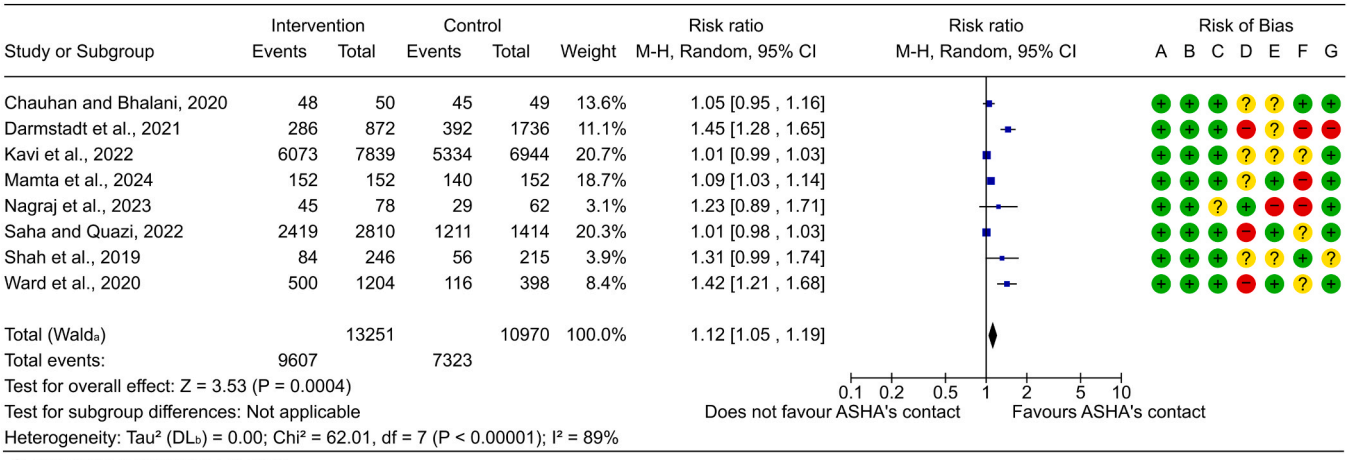


aCI calculated by Wald-type method.

bTau² calculated by DerSimonian and Laird method.

Risk of bias element: (A) Random sequence generation (selection bias); (B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias); (D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias); (F) Selective reporting (reporting bias); (G) Other bias

Fig. 2. Effectiveness of ASHAs in the coverage of Antenatal Care (ANC) Visits.



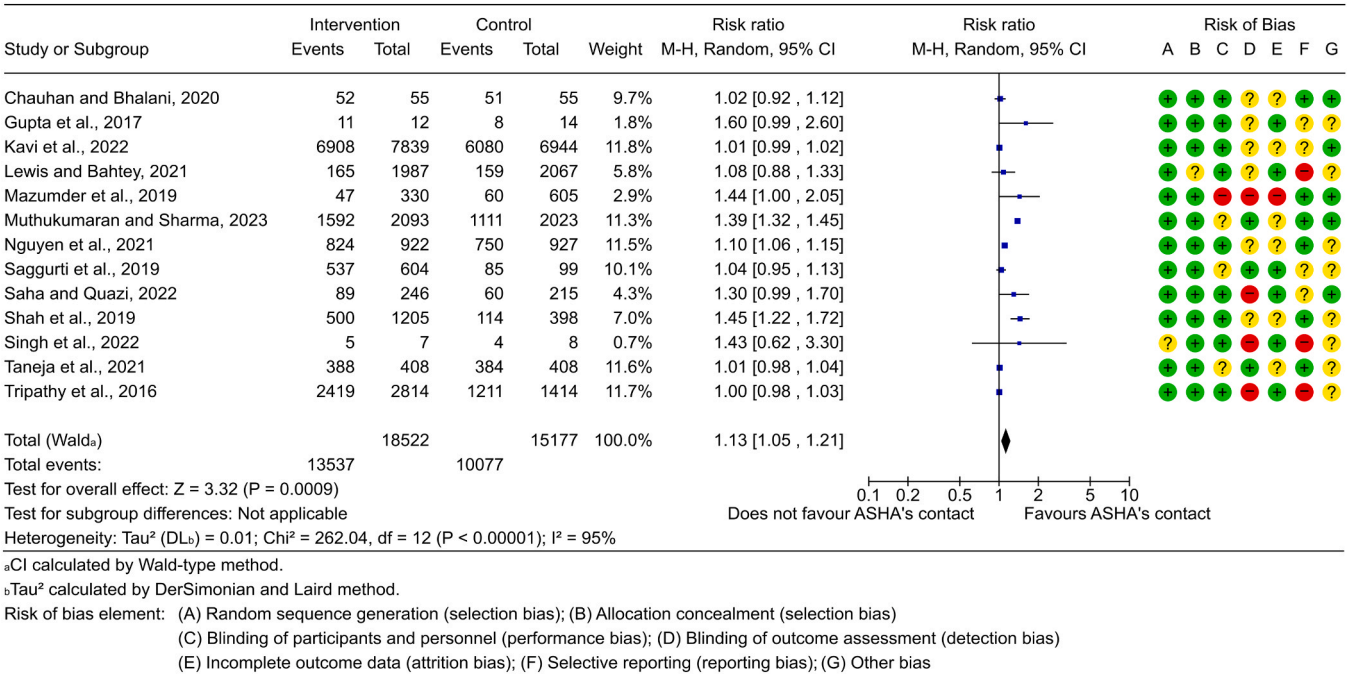
aCI calculated by Wald-type method.

bTau² calculated by DerSimonian and Laird method.

Risk of bias element: (A) Random sequence generation (selection bias); (B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias); (D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias); (F) Selective reporting (reporting bias); (G) Other bias

Fig. 3. Effectiveness of ASHAs in the coverage of Institutional Deliveries (ID).

Doctors and health officials frequently do not fully trust ASHAs (Rizwan et al., 2014). ASHAs also report experiencing humiliation from health professionals, receiving insufficient medical kits, and facing severe transportation issues. In some areas, they must travel up to 10 kilometers to reach medical facilities and often incur personal expenses for patient transportation (Dandona et al., 2023). Our review noted that in studies where ASHAs received little supervision or feedback from ANMs and other health staff, their home visits or community mobilization performance was suboptimal. Contrarily, there are studies where the health system offers supportive mechanisms for ASHAs to encourage them to serve delivery in certain areas. For instance, health departments have developed monitoring strategies that involve ANMs in training and supervision (Nallala et al., 2023). The introduction of technological tools shows promise for improving data management and service



[a]CI calculated by Wald-type method.

[b]Tau² calculated by DerSimonian and Laird method.

Risk of bias element: (A) Random sequence generation (selection bias); (B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias); (D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias); (F) Selective reporting (reporting bias); (G) Other bias

Fig. 4. Effectiveness of ASHAs in the coverage of Postnatal Care (PNC).

delivery (Modi et al., 2019). However, limited digital infrastructure, lack of training on digital tools and inconsistent access to mobile devices continue to pose technological challenges for ASHAs' in many regions (Karvande et al., 2016; Scott et al., 2020). In addition, administrative delays such as delayed drug procurement hinder timely supply of essential items like IFA tablets, forcing ASHAs' to operate without critical resources (Wendt et al., 2018). Therefore, while supporting mechanisms exist, their availability and effectiveness vary across regions, emphasizing the need for a comprehensive approach to ensure ASHAs are both motivated and equipped to overcome barriers in delivering MNH services (Dev et al., 2022).

These barriers help explain the variability in ASHA effectiveness observed in different studies and regions (Scott et al., 2019). Where the barriers were greatest, ASHAs' impact on service coverage tended to be muted.

4. Discussion

4.1. Main findings

The results of a systematic review and meta-analyses confirm that ASHAs have contributed to improved coverage of key MNH services (Agarwal et al., 2019). A notable insight from our review is the differential impact of ASHA across key MNH services and regions. This is consistent with findings from other studies, which report higher uptake of ID following ASHA interventions but limited improvement in ANC attendance (Agarwal et al., 2019). This nuance suggests that broader health system factors, such as supply-side readiness and women's baseline care-seeking behaviors, and supportive interventions, including additional training and mHealth tools (Modi et al., 2019), also influence the service coverage; ASHAs alone cannot overcome all barriers (Bhandari et al., 2024; Bhatia et al., 2021; Darmstadt et al., 2020; Mamta et al., 2024).

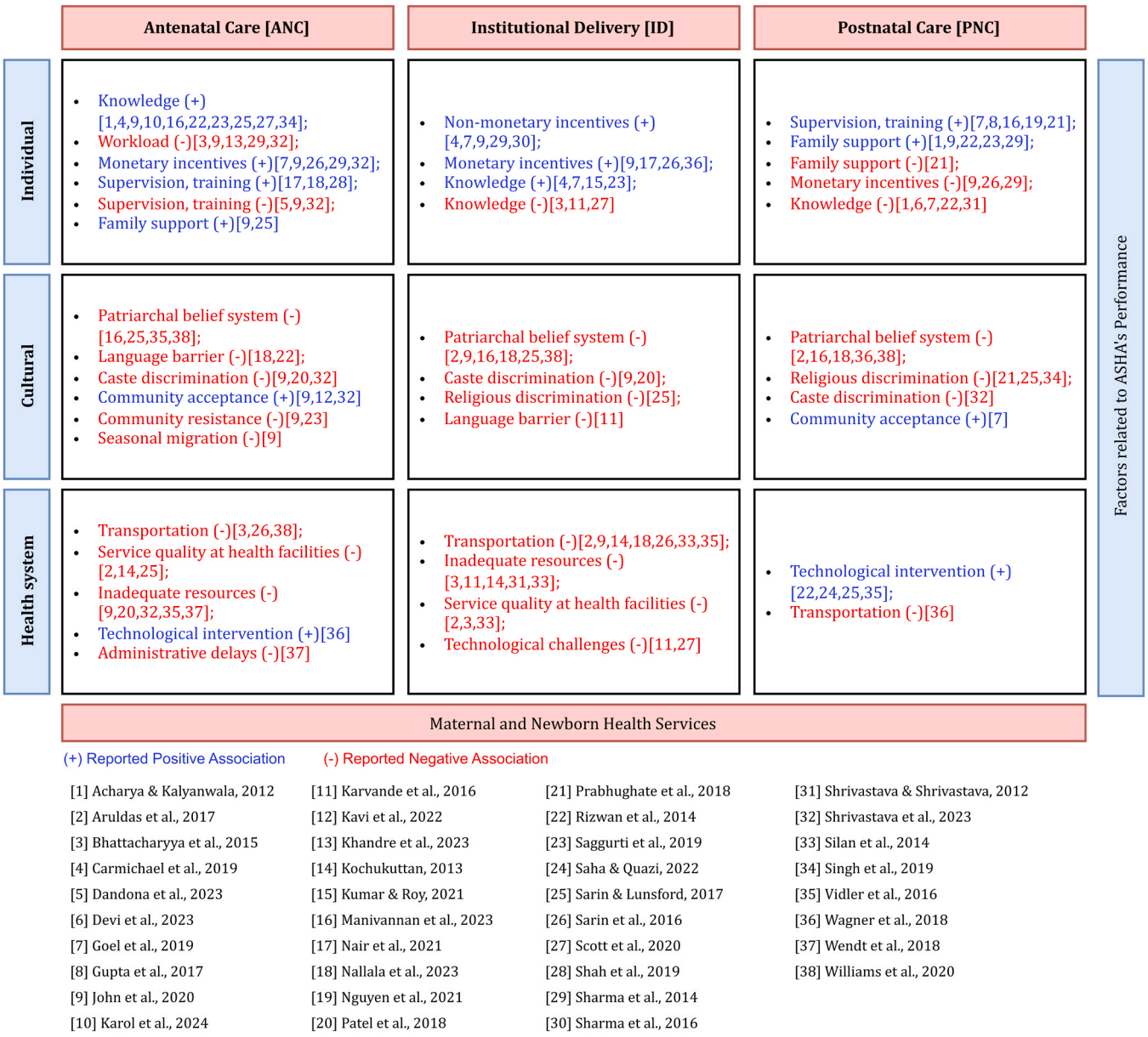
Global evidence similarly indicates that CHWs can improve the uptake of key MNH interventions, such as facility births, childhood immunizations, and breastfeeding practices (Lewin et al., 2005). These findings align with existing literature from other LMICs, where CHW interventions have demonstrated strong effects on maternal and neonatal survival. In countries like Bangladesh and Nepal, CHWs have played a crucial role in reducing neonatal mortality and increasing institutional birth rates (Baqui et al., 2008; Manandhar et al., 2004). Within this international context, the Indian ASHA program stands out due to its scale and formal integration into the national public health system. However, unlike in some LMICs where CHW roles tend to be more clinically focused or narrowly defined, ASHAs in India are tasked with a wide range of responsibilities. This breadth of roles may dilute their effectiveness if not adequately supported (Scott et al., 2019).

The main takeaway from our findings is that, with appropriate support, ASHAs make a positive contribution to improving coverage of key MNH services. Nonetheless, the extent of their impact varies according to contextual factors and enabling environments.

4.2. Interstate variability in ASHA performance

A key theme emerging from this review is the considerable variation in ASHA performance across Indian states. Although the ASHA program is centrally funded and governed, its implementation is decentralized, resulting in marked interstate differences in training quality, supervision, incentive disbursement, and overall program effectiveness (Scott et al., 2019). For instance, while states like Karnataka and Tamil Nadu have historically demonstrated strong public health infrastructure and higher ASHA performance metrics—though fewer studies from these regions were captured in our review—states in the EAG category, such as Uttar Pradesh and Bihar, exhibit more variable outcomes, often due to systemic constraints and sociocultural barriers (Scott et al., 2019).

This heterogeneity is not unique to India. Similar challenges have been documented in decentralized CHW programs in countries such as Nigeria and Indonesia, where local political will, infrastructure capacity, and community norms significantly influence CHW effectiveness (Babalola and Fatusi, 2009; Heywood and Harahap, 2009). In India, the diversity of sociolinguistic contexts, caste dynamics, and geographical accessibility further complicate program implementation. For example, tribal areas in Jharkhand and Odisha face logistical challenges, language barriers, and limited community trust in ASHAs, while urbanizing districts may experience role dilution due to overlapping responsibilities with other health cadres (Soman et al., 2023).



[1] Acharya & Kalyanwala, 2012
[2] Aruldas et al., 2017
[3] Bhattacharyya et al., 2015
[4] Carmichael et al., 2019
[5] Dandona et al., 2023
[6] Devi et al., 2023
[7] Goel et al., 2019
[8] Gupta et al., 2017
[9] John et al., 2020
[10] Karol et al., 2024
[11] Karvande et al., 2016
[12] Kavi et al., 2022
[13] Khandre et al., 2023
[14] Kochukuttan, 2013
[15] Kumar & Roy, 2021
[16] Manivannan et al., 2023
[17] Nair et al., 2021
[18] Nallala et al., 2023
[19] Nguyen et al., 2021
[20] Patel et al., 2018
[21] Prabhughate et al., 2018
[22] Rizwan et al., 2014
[23] Saggurti et al., 2019
[24] Saha & Quazi, 2022
[25] Sarin & Lunsford, 2017
[26] Sarin et al., 2016
[27] Scott et al., 2020
[28] Shah et al., 2019
[29] Sharma et al., 2014
[30] Sharma et al., 2016
[31] Shrivastava & Shrivastava, 2012
[32] Shrivastava et al., 2023
[33] Silan et al., 2014
[34] Singh et al., 2019
[35] Vidler et al., 2016
[36] Wagner et al., 2018
[37] Wendt et al., 2018
[38] Williams et al., 2020

Fig. 5. Factors impacting the effectiveness of ASHAs in delivering key MNH services.

These interstate disparities suggest that generalizing ASHA performance without accounting for sub-national variation risks oversimplifying the program's impact. A one-size-fits-all approach is unlikely to yield optimal outcomes. Instead, adaptive strategies that allow for regional tailoring, such as linguistically appropriate training modules or flexible incentive schemes, may enhance ASHA engagement and effectiveness in diverse contexts.

4.3. Implications for program design and policy

The findings emphasize the importance of designing context-sensitive performance monitoring systems, which should include regionally tailored training, performance-linked incentives, strengthened linkages between ASHAs and ANMs, trust-building, cultural alignment, community embeddedness, relational dynamics, and overall health system strengthening. While quantitative metrics (such as the number of ANC visits or institutional deliveries) are useful for broad assessments, they fail to capture the nuances of ASHA performance shaped by sociocultural and systemic factors (Kok et al., 2015).

Given evidence from India and other LMICs, future iterations of the ASHA program must move beyond simply counting service contacts. Investments should prioritize improving the quality of interactions, deepening community engagement, and building supportive ecosystems that incorporate regular mentoring, digital tools for reporting, and effective grievance redressal mechanisms. Moreover, inter-state comparative studies using mixed methods can offer actionable insights into which combinations of structural support, community characteristics, and incentive models yield the best outcomes.

Finally, policymakers must ensure that ASHAs are not merely delivery agents, but empowered facilitators of comprehensive and culturally sensitive maternal healthcare. Their roles should be continually redefined in response to changing health priorities, demographic trends, and technological advancements.

4.4. Limitations and future directions

While our review provides evidence of ASHAs' role in improving key MNH service coverage, it is important to acknowledge its limitations and

highlight areas for future research.

First, the scope of this review was deliberately narrow with regard to indicators. We focused exclusively on three MNH service coverage indicators: ANC, ID, and PNC. These indicators were selected as critical measures of service coverage; however, they do not encompass the full spectrum of MNH outcomes. Other important aspects, such as neonatal and maternal mortality, morbidity, and essential newborn care practices, were kept beyond the scope of this review. This represents a clear limitation, as improvements in service coverage do not necessarilly translate into better health outcomes. For instance, an increase in ANC visits or ID may not reduce mortality without concurrent improvements in the quality of care. Future studies and reviews should examine a broader range of outcomes to more fully assess ASHAs' performance.

Second, geographic and demographic limitations affect the generalizability of our findings. The studies included in our meta-analysis were not evenly distributed across all regions of India, with many concentrated in specific states or districts. For example, high-focus states in northern and parts of central India were well-represented in the evidence base, while there was relatively limited representation from southern states. Urban areas were also under-represented, as the ASHA program initially focused on rural populations. Therefore, our results may not be fully generalizable to urban community health worker programs or to states with different socio-demographic and health contexts. Even within rural India, there is considerable diversity: some included studies were conducted in tribal-dominated districts, while others took place in more densely populated settings, each with distinct health service infrastructures and cultural practices. Evidence suggests substantial variation in ASHA effectiveness between states (Agarwal et al., 2019). In our analysis, this heterogeneity contributed to the broad CIs observed in between-study variation. Thus, caution should be exercised when extrapolating the average effect sizes to all contexts. Future research could use more interstate comparative studies to better understand the contextual drivers of ASHA effectiveness.

5. Conclusions

This systematic review and meta-analysis underscore the vital, yet complex and multifaceted, role of ASHAs in improving key MNH service coverage across India. Although this study did not encompass all MNH outcomes, the selected three indicators remain central to India's MNH policy framework as essential components.

Despite facing significant operational and contextual barriers, ASHAs have demonstrated the ability to mobilize women, facilitate access to health services, and promote early care-seeking. However, our findings suggest that the overall effectiveness of ASHA interventions may be influenced by publication bias, variability in program implementation, and region-specific constraints.

These findings reaffirm the importance of continued investment in the ASHA workforce to enhance the quality, frequency, and content of care within India's national health programs. Addressing persistent challenges—such as irregular incentives, inadequate training on complex MNH conditions, and uneven integration into health systems—is crucial for strengthening the impact of ASHAs.

Moreover, this review offers relevant insights for policymakers in other LMICs aiming to implement or refine community-based maternal health strategies. The findings suggest that, with adequate support, training, and supervision, ASHAs can improve service uptake in underserved populations, particularly when their roles are clearly defined and embedded within functional health systems. While this review did not involve direct stakeholder consultation, engaging with relevant stakeholders in future systematic reviews could yield more actionable and programmatically relevant evidence to inform policy and practice.

Funding

This research did not receive any specific grant from funding agencies in public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Sukriti Chawla: Conceptualization, Formal analysis, Data curation, Investigation, Visualization, Writing – original draft. **Chandan Kumar:** Conceptualization, Methodology, Formal analysis, Validation, Visualization, Resources, Writing – review & editing, Project administration, Supervision. **Montu Bose:** Methodology, Writing – review & editing, Supervision. **Shika M. Shrivastav:** Writing – review & editing, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors would like to express their sincere gratitude to the anonymous reviewers for their valuable comments and suggestions, which greatly improved the quality of an earlier version of this manuscript. The content of this manuscript was presented at the 6th Asian Population Association (APA) Conference held during 27–30 November 2024 in Kathmandu City, Nepal. The authors are thankful to the Session Chair, Prof. Bernard Baffour, The Australian National University (ANU), Canberra, Australia, for his critical review and insightful suggestions during the conference. The first author also acknowledges the Indian Council of Social Science Research (ICSSR) for providing fellowship support to pursue a PhD programme at TERI School of Advanced Studies, New Delhi.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ssmhs.2025.100134.

References

Acharya, R., Kalyanwala, S., 2012. Knowledge, attitudes, and practices of certified providers of medical abortion: evidence from bihar and maharashtra, India. Int. J. Gynecol. Obstet. 118 (S1), S74. https://doi.org/10.1016/j.ijgo.2012.05.009.

Agarwal, S., Curtis, S.L., Angeles, G., Speizer, I.S., Singh, K., Thomas, J.C., 2019. The impact of India's accredited social health activist (ASHA) programme on the utilization of maternity services: a nationally representative longitudinal modelling study. Article 1. Hum. Resour. Health 17 (1). https://doi.org/10.1186/s12960-019-0402-4.

Aruldas, K., Kant, A., Mohanan, P.S., 2017. Care-seeking behaviors for maternal and newborn illnesses among self-help group households in uttar pradesh, India. J. Health Popul. Nutr. 36 (S1), 49. https://doi.org/10.1186/s41043-017-0121-1.

Babalola, S., Fatusi, A., 2009. Determinants of use of maternal health services in Nigeria – looking beyond individual and household factors. BMC Pregnancy Childbirth 9 (1), 43. https://doi.org/10.1186/1471-2393-9-43.

Baqui, A.H., El-Arifeen, S., Darmstadt, G.L., Ahmed, S., Williams, E.K., Seraji, H.R., Mannan, I., Rahman, S.M., Shah, R., Saha, S.K., Syed, U., Winch, P.J., Santosham, M., Black, R.E., 2008. Effect of community-based newborn-care intervention package implemented through two service-delivery strategies in sylhet district, Bangladesh: a cluster-randomised controlled trial. Lancet 371 (9628), 1936–1944. https://doi.org/10.1016/S0140-6736(08)60835-1.

Bhandari, A., Prasad, S., Kaur, S., 2024. A study to determine various factors associated with high-risk pregnancies. Int. J. Reprod. Contracept. Obstet. Gynecol. 13 (3), 841–844. https://doi.org/10.18203/2320-1770.ijrcog20240612.

Bhandari, N., Mazumder, S., Taneja, S., George, J., Bilal, N., Mohan, S.B., 2014. A cluster randomized implementation trial to measure the effectiveness of an intervention package aiming to increase the utilization of skilled birth attendants by women for childbirth: study protocol. BMC Pregnancy Childbirth 14, 109. https://doi.org/10.1186/1471-2393-14-109.

Bhatia, M., Awasthi, S., Soni, P., 2021. Role of community health workers in maternal health services: a qualitative study from India. Reprod. Health 18 (1), 1–9. https://doi.org/10.1186/s12978-021-01163-0.

Bhattacharyya, S., Issac, A., Rajbangshi, P., Srivastava, A., Avan, B.I., 2015. Neither we are satisfied nor they"—users and provider's perspective: a qualitative study of

maternity care in secondary level public health facilities, uttar pradesh, India. BMC Health Serv. Res. 15 (1), 421. https://doi.org/10.1186/s12913-015-1077-8.
Blanchard, A.K., Colbourn, T., Prost, A., Ramesh, B.M., Isac, S., Anthony, J., Dehury, B., Houweling, T.A.J., 2021. Associations between community health workers' home visits and education-based inequalities in institutional delivery and perinatal mortality in rural uttar pradesh, India: a cross-sectional study. BMJ Open 11 (7), 1–12. https://doi.org/10.1136/bmjopen-2020-044835.
Boone, P., Eble, A., Elbourne, D., Frost, C., Jayanty, C., Lakshminarayana, R., Roy, S.S., 2017. Community health promotion and medical provision for neonatal health—CHAMPION cluster randomised trial in nagarkurnool district, telangana (formerly Andhra Pradesh), India. PLOS Med. 14 (1), e1002324. https://doi.org/10.1371/journal.pmed.1002324.
Borenstein, M., Hedges, L.V., Higgins, J.P.T., Rothstein, H.R., 2009. Introduction to meta-analysis. John Wiley & Sons. https://doi.org/10.1002/9780470743386.
Carmichael, S.L., Mehta, K., Raheel, H., Srikantiah, S., Chaudhuri, I., Trehan, S., Mohanty, S., Borkum, E., Mahapatra, T., Weng, Y., Kaimal, R., Sivasankaran, A., Sridharan, S., Rotz, D., Tarigopula, U.K., Bhattacharya, D., Atmavilas, Y., Munar, W., Rangarajan, A., Darmstadt, G.L., 2019. Effects of team-based goals and non-monetary incentives on front-line health worker performance and maternal health behaviours: a cluster randomised controlled trial in bihar, India. BMJ Glob. Health 4 (4). https://doi.org/10.1136/bmjgh-2018-001146.
Chaudhary, K., Nepal, J., Shrestha, K., Karmacharya, M., Khadka, D., Shrestha, A., Shakya, P.R., Rawal, S., Shrestha, A., 2023. Effect of a social media-based health education programme on postnatal care (PNC) knowledge among pregnant women using smartphones in dhulikhel hospital: a randomized controlled trial (Article). PLOS ONE 18 (1), e0280622. https://doi.org/10.1371/journal.pone.0280622.
Chauhan, P.A., Bhalani, K.D., 2020. Evaluation of maternal health services being provided to the high-risk mothers of bhavnagar district, gujarat. Indian J. Community Med. 45 (1), 18–22. https://doi.org/10.4103/ijcm.IJCM_38_19.
Chou, V.B., Walker, N., Kanyangarara, M., 2019. Estimating the global impact of poor quality of care on maternal and neonatal outcomes in 81 low- and middle-income countries. PLOS Med. 16 (12), e1002990. https://doi.org/10.1371/journal.pmed.1002990.
Choudhury, N., Hathi, P., Saggurti, N., Spears, D., 2021. Association between coordinated counseling from both ASHA and anganwadi workers and improved maternal health outcomes in India: a cross-sectional study. PLOS Glob. Public Health 1 (10), e00003639. https://doi.org/10.1371/journal.pgph.0003639.
Dandona, R., Kumar, G.A., Majumder, M., Akbar, M., Prasad Dora, S.S., Dandona, L., 2023. Poor coverage of quality-adjusted antenatal care services: a population-level assessment by visit and source of antenatal care services in bihar state of India. Lancet Reg. Health Southeast Asia, 100332. https://doi.org/10.1016/j.lansea.2023.100332.
Darmstadt, G.L., Pepper, K.T., Ward, V.C., Srikantiah, S., Mahapatra, T., Tarigopula, U. K., Bhattacharya, D., Irani, L., Schooley, J., Chaudhuri, I., Dutt, P., Sastry, P., Mitra, R., Chamberlain, S., Monaghan, S., Nanda, P., Atmavilas, Y., Saggurti, N., Borkum, E., Shah, H., 2020. Improving primary health care delivery in bihar, India: learning from piloting and statewide scale-up of ananya. J. Glob. Health 10 (2), 021001. https://doi.org/10.7189/jogh.10.021001.
Deeks, J.J., Higgins, J.P.T., & Altman, D.G. (2022). Analysing data and undertaking meta-analyses. In {C}J.P.T. Higgins et al.{C} (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions* (Version 6.3, Chapter 10). Cochrane. ⟨https://training.cochrane.org/handbook⟩.
Dev, S., Lincoln, A.K., Shidhaye, R., 2022. Evidence to practice for mental health task-sharing: understanding readiness for change among accredited social health activists in sehore district, madhya pradesh, India. Adm. Policy Ment. Health Ment. Health Serv. Res. 49 (3), 463–475. https://doi.org/10.1007/s10488-021-01176-w.
Devi, R.S., Pugazhendi, S., Juyal, R., Gaur, A., Singh, S.B., 2023. Evaluation of existing Home-Based newborn care (HBNC) services and training for improving performance of accredited social health activists (ASHA) in rural India: a multiple observation study. Midwifery 116, 103514. https://doi.org/10.1016/j.midw.2022.103514.
George, G., Chaturvedi, S., Corbishley, C., Atun, R., 2022. Relational co-ordination and stigma at work: how frontline employees compensate for failures in public health systems. J. Manag. Stud. 20 (2), 54–65. https://doi.org/10.1111/joms.12813.
Gilmore, B., McAuliffe, E., 2013. Effectiveness of community health workers delivering preventive interventions for maternal and child health in low- and middle-income countries: a systematic review. BMC Public Health 13, 847. https://doi.org/10.1186/1471-2458-13-847.
Goel, A.D., Gosain, M., Amarchand, R., Sharma, H., Rai, S., Kapoor, S.K., Krishnan, A., 2019. Effectiveness of a quality improvement programme using difference-in-difference analysis for home-based newborn care – results of a community intervention trial. Indian J. Pediatr. 86 (11), 1028–1035. https://doi.org/10.1007/s12098-019-03012-4.
Gupta, M., Tripathy, J.P., Jamir, L., Sarwa, A., Sinha, S., Bhag, C., 2017. Improving quality of home-based postnatal care by microteaching of multipurpose workers in rural and urban slum areas of chandigarh, India: a pilot study. Adv. Med. Educ. Pract. 8, 1–8. https://doi.org/10.2147/AMEP.S111697.
Haines, A., Kuruvilla, S., 2007. Achieving child survival goals: potential contribution of community health workers. Lancet 364 (9442), 1643–1649. https://doi.org/10.1016/S0140-6736(07)60325-0.
Heywood, P., Harahap, N.P., 2009. Human resources for health at the district level in Indonesia: the smoke and mirrors of decentralization. Hum. Resour. Health 7 (1). https://doi.org/10.1186/1478-4491-7-6.
International Institute for Population Sciences. (2020). *National Family Health Survey (NFHS-5), 2019-21 India: Volume II*. Ministry of Health and Family Welfare. ⟨https://main.mohfw.gov.in/sites/default/files/NFHS-5_Phase-II_0.pdf⟩.
Javadi, D., Gergen, J., Perry, H., 2006. The BRAC shasthya shebika community health worker in Bangladesh. In Case studies of large-scale community health worker programs. Management Sciences for Health, pp. 9–12. Retrieved from. ⟨https://www.mcsprogram.org/wp-content/uploads/2017/01/CHW-CaseStudies-Globes.pdf⟩.
John, A., Nisbett, N., Barnett, I., Avula, R., Menon, P., 2020. Factors influencing the performance of community health workers: a qualitative study of anganwadi workers from bihar, India. PLOS ONE 15 (11), e0242460. https://doi.org/10.1371/journal.pone.0242460.
Karol, P., Bhalani, B.K. (2014). Community health workers and reproductive and child health care: An evaluative study on knowledge and motivation of ASHA workers in Rajasthan, India. Retrieved from ⟨https://www.academia.edu/19551193⟩.
Karvande, S., Sonawane, D., Chavan, S., Mistry, N., 2016. What does quality of care mean for maternal health providers from two vulnerable states of India? Case study of bihar and jharkhand. J. Health Popul. Nutr. 35 (1), 6. https://doi.org/10.1186/s41043-016-0043-3.
Kavi, A., Kinshella, M.-L.W., Ramadurg, U.Y., Charantimath, U., Katageri, G.M., Karadiguddi, C.C., Honnungar, N.V., Bannale, S.G., Mungarwadi, G.I., Bone, J.N., Vidler, M., Magee, L., Mallapur, A., Goudar, S.S., Bellad, M., Derman, R., von Dadelszen, P., Working Group, T.C.I., 2022. Community engagement for birth preparedness and complication readiness in the community level interventions for Pre-eclampsia (CLIP) trial in India: a mixed-method evaluation. BMJ Open 12 (12), e060593. https://doi.org/10.1136/bmjopen-2021-060593.
Khandre, R.R., Jakasania, A., Raut, A., 2023. "We are working for seven days a week": time motion study of accredited social health activists from central India. Med. J. Armed Forces India 79, S142–S149. https://doi.org/10.1016/j.mjafi.2022.03.008.
Kochukuttan, S., Ravindran, T.K.S., Krishnan, S., 2015. Evaluating birth preparedness and pregnancy complications readiness knowledge and skills of accredited social health activists in India. Int. J. MCH AIDS (IJMA) 2 (1). https://doi.org/10.21106/ijma.17.
Kok, M.C., Broerse, J.E.W., Theobald, S., Ormel, H., Dieleman, M., Taegtmeyer, M., 2015. How does context influence performance of community health workers? Evidence from the literature. Health Res. Policy Syst. 13 (1), 13. https://doi.org/10.1186/s12961-015-0001-3.
Kruk, M.E., Gage, A.D., Joseph, N.T., Danaei, G., García-Saisó, S., Salomon, J.A., 2018. Mortality due to low-quality health systems in the universal health coverage era: a systematic analysis of amenable deaths in 137 countries. Lancet 392 (10160), 2203–2212. https://doi.org/10.1016/S0140-6736(18)31668-4.
Kuhnt, J., Vollmer, S., 2017. Antenatal care services and its implications for vital and health outcomes of children: evidence from 193 surveys in 69 low-income and middle-income countries. BMJ Open 7 (11). https://doi.org/10.1136/bmjopen-2017-017122.
Kumar, R., Roy, S.T., 2021. Assessment of knowledge, behavior, and practices of maternal and child health of rural pregnant women. Matern. Child Health Dev. Ctries. 489–501. https://doi.org/10.1007/978-981-16-0041-8_41.
Kumar, S., Agarwal, M., Kumar, H.D., 2024. Assessment of services provided by urban ASHAs to mothers of urban slums in lucknow district – a cross-sectional study. J. Fam. Med. Prim. Care 13 (12), 5667–5673. https://doi.org/10.4103/jfmpc.jfmpc_687_24.
Lewin, S.A., Dick, J., Pond, P., Zwarenstein, M., Aja, G., van Wyk, B.E., Bosch-Capblanch, X., Patrick, M., 2005. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. Cochrane Database Syst. Rev. 2005 (1), CD004015. https://doi.org/10.1002/14651858.CD004015.pub2.
Li, X., Lu, J., Hu, S., Cheng, K.K., De Maeseneer, J., Meng, Q., Mossialos, E., Xu, D.R., Yip, W., Zhang, H., Krumholz, H.M., Jiang, L., Hu, S., 2017. The primary health-care system in China. Lancet 390 (10112), 2584–2594. https://doi.org/10.1016/S0140-6736(17)33109-4.
Lim, S.S., Dandona, L., Hoisington, J.A., James, S.L., Hogan, M.C., Gakidou, E., 2010. India's janani suraksha yojana, a conditional cash transfer programme to increase births in health facilities: an impact evaluation. Lancet 375 (9730), 2009–2023. https://doi.org/10.1016/S0140-6736(10)60744-1.
Mamta, T., Tara, G., Singh, G., 2024. Effectiveness of awareness training on birth preparedness and complication readiness among community health workers of New Delhi, India. Indian J. Community Med. 49 (5), 713–718. https://doi.org/10.4103/ijcm.ijcm_97_23.
Manandhar, D.S., Osrin, D., Shrestha, B.P., Mesko, N., Morrison, J., Tumbahangphe, K. M., Tamang, S., Thapa, S., Shrestha, D., Thapa, B., Shrestha, J.R., Wade, A., Borghi, J., Standing, H., Manandhar, M., Costello, A.M., 2004. Effect of a participatory intervention with women's groups on birth outcomes in Nepal: Cluster-randomised controlled trial. Lancet 364 (9438), 970–979. https://doi.org/10.1016/S0140-6736(04)17021-9.
Manivannan, M.M., Vaz, M., Swaminathan, S., 2023. Perceptions of healthcare providers and mothers on management and care of severely wasted children: a qualitative study in karnataka, India. BMJ Open 13 (5), e067592. https://doi.org/10.1136/bmjopen-2022-067592.
Mazumder, S., Taneja, S., Dube, B., Bhatia, K., Ghosh, R., Shekhar, M., Sinha, B., Bahl, R., Martines, J., Bhan, M.K., Sommerfelt, H., Bhandari, N., 2019. Effect of community-initiated kangaroo mother care on survival of infants with low birthweight: a randomised controlled trial. Lancet 394 (10210), 1724–1736. https://doi.org/10.1016/S0140-6736(19)32223-8.
Mehta, K.M., Irani, L., Chaudhuri, I., Mahapatra, T., Schooley, J., Srikantiah, S., Abdalla, S., Ward, V., Carmichael, S.L., Bentley, J., Creanga, A., Wilhelm, J., Tarigopula, U.K., Bhattacharya, D., Atmavilas, Y., Nanda, P., Weng, Y., Pepper, K.T., Darmstadt, G.L., Ananya Study Group, 2020. Health layering of self-help groups:

impacts on reproductive, maternal, newborn and child health and nutrition in bihar, India. J. Glob. Health 10 (2), 021007. https://doi.org/10.7189/jogh.10.021007.
Mishra, A., Gadwal, S.V., Baru, R., 2024. Trends and determinants of maternal health services utilization in India: national coverage and equity (Article). Sci. Rep. 15, 87975. https://doi.org/10.1038/s41598-024-87975-0.
Modi, D., Dholakia, N., Gopalan, R., Venkatraman, S., Dave, K., et al., 2019. Mhealth intervention "ImTeCHO" to improve delivery of maternal, neonatal, and child care services—A cluster-randomized trial in tribal areas of gujarat, India. PLOS Med. 16 (10), e1002939. https://doi.org/10.1371/journal.pmed.1002939.
Muthukumaran, A., Sharma, R., 2023. A study to assess the knowledge regarding kangaroo mother care among primigravida postnatal mothers at era hospital, lucknow. IP J. Nutr. Metab. Health Sci. 6 (2), 88–95. https://doi.org/10.18231/j.ijnmhs.2023.015.
Nagraj, S., Kennedy, S., Jha, V., Norton, R., Hinton, L., Billot, L., Rajan, E., Mohammed Abdul, A., Phalswal, A., Arora, V., Praveen, D., Hirst, J., 2023. A mobile clinical decision support system for high-risk pregnant women in rural India (SMARThealth Pregnancy): pilot cluster randomized controlled trial. JMIR Form. Res. 7, e44362. https://doi.org/10.2196/44362.
Nair, N., Tripathy, P.K., Gope, R., Rath, S., Pradhan, H., Rath, S., Kumar, A., Nath, V., Basu, P., Ojha, A., Copas, A., Houweling, T.A.J., Haghparast-Bidgoli, H., Minz, A., Baskey, P., Ahmed, M., Chakravarthy, V., Mahanta, R., Prost, A., 2021. Effectiveness of participatory women's groups scaled up by the public health system to improve birth outcomes in jharkhand, eastern India: a pragmatic cluster non-randomised controlled trial. BMJ Glob. Health 6 (11). https://doi.org/10.1136/bmjgh-2021-005066.
Nallala, S., Ghosh, U., Desaraju, S.S., Kadam, S., Kadarpeta, R.R., Van Belle, S., 2023. Why are they "unreached"? macro and meso determinants of health care access in hard to reach areas of odisha, India. Int. J. Equity Health 22 (1), 2. https://doi.org/10.1186/s12939-022-01817-y.
National Health Systems Resource Centre (NHSRC), International Institute for Population Sciences (IIPS), India Health Action Trust (IHAT), University of Manitoba, & Countdown to 2030. (2023). *Exemplars in Maternal and Newborn Health Study: National Report*. Ministry of Health and Family Welfare, Government of India. ⟨https://nhsrcindia.org/sites/default/files/202308/Exemplars%20National%20Report_Web.pdf⟩.
Newton-Lewis, T.A., Bahety, G., 2021. Evaluating the effectiveness of community health worker home visits on infant health: a quasi-experimental evaluation of home based newborn care plus in India. J. Glob. Health 11, 04060. https://doi.org/10.7189/jogh.11.04060.
Nguyen, P.H., Kachwaha, S., Tran, L.M., Avula, R., Young, M.F., Ghosh, S., Sharma, P.K., Escobar-Alegria, J., Forissier, T., Patil, S., Frongillo, E.A., Menon, P., 2021. Strengthening nutrition interventions in antenatal care services affects dietary intake, micronutrient intake, gestational weight gain, and breastfeeding in uttar pradesh, India: results of a cluster-randomized programme evaluation. J. Nutr. 151 (8), 2282–2295. https://doi.org/10.1093/jn/nxab131.
Padda, P., Devgun, S., Gupta, V., Chaudhari, S., Singh, G., 2013. Role of ASHA in improvement of maternal health status in Northern India: an urban-rural comparison. Indian J. Community Health 25 (4), 465–471. Retrieved from. https://www.researchgate.net/publication/297992373.
Patel, A.B., Prakash, A.A., Raynes-Greenow, C., Pusdekar, Y.V., Hibberd, P.L., 2017. Description of inter-institutional referrals after admission for labor and delivery: a prospective population-based cohort study in rural maharashtra, India. BMC Health Serv. Res. 17 (1), 360. https://doi.org/10.1186/s12913-017-2302-4.
Patel, P., Das, M., Das, U., 2018. The perceptions, health-seeking behaviours and access of scheduled caste women to maternal health services in bihar, India. Reprod. Health Matters 26 (54), 114–125. https://doi.org/10.1080/09688080.2018.1533361.
Prabhughate, A.S., Tiwari, P., Sohoni, S., Morgaonkar, V.A., Phatak, A.G., Nimbalkar, S. M., Mahajani, A.A., 2018. Surmounting difficulties to provide home based neonatal care – reflections of community health workers. BMC Women'S. Health 18 (1), 17. https://doi.org/10.1186/s12905-018-0511-6.
Registrar General of India. (2025). *Special bulletin on maternal mortality in India 2019–2021*. Office of the Registrar General & Census Commissioner, India. Retrieved from ⟨https://censusindia.gov.in⟩.
Rizwan, S., Silan, V., Kant, S., Archana, S., Misra, P., 2014. Determinants of underutilisation of free delivery services in an area with high institutional delivery rate: a qualitative study. North Am. J. Med. Sci. 6 (7), 315. https://doi.org/10.4103/1947-2714.136906.
Saggurti, N., Porwal, A., Atmavilas, Y., Walia, M., Das, R., Irani, L., 2019. Effect of behavioral change intervention around new-born care practices among most marginalized women in self-help groups in rural India: analyses of three cross-sectional surveys between 2013 and 2016. J. Perinatol. 39 (7), 990–999. https://doi.org/10.1038/s41372-019-0358-1.
Saha, S., Quazi, Z.S., 2022. Does digitally enabling frontline health workers improve coverage and quality of maternal and child health services? Findings from a mixed methods evaluation of TECHO+ in gujarat. Front. Public Health 10. https://doi.org/10.3389/fpubh.2022.856561.
Sarin, E., Lunsford, S.S., 2017. How female community health workers navigate work challenges and why there are still gaps in their performance: a look at female community health workers in maternal and child health in two Indian districts through a reciprocal determinism framework. Hum. Resour. Health 15 (1), 44. https://doi.org/10.1186/s12960-017-0222-3.
Sarin, E., Lunsford, S.S., Sooden, A., Rai, S., Livesley, N., 2016. The mixed nature of incentives for community health workers: lessons from a qualitative study in two districts in India. Front. Public Health 4. https://doi.org/10.3389/fpubh.2016.00038.
Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A.-B., Daniels, J., 2014. Global causes of maternal death: a WHO systematic analysis. Lancet Glob. Health 2 (6), e323–e333. https://doi.org/10.1016/S2214-109X(14)70227-X.
Scott, K., George, A., Ved, R., 2019. Taking stock of 10 years of published research on the ASHA programme: examining India's national community health worker programme from a health systems perspective. Health Res. Policy Syst. 17 (1), 29. https://doi.org/10.1186/s12961-019-0427-0.
Scott, K., Gupta, S., Williams, E., Arthur, M., Somayajulu, U.V., Noguchi, L., 2020. I can guess the month … but beyond that, I can't tell" an exploratory qualitative study of health care provider perspectives on gestational age estimation in rajasthan, India. BMC Pregnancy Childbirth 20 (1), 529. https://doi.org/10.1186/s12884-020-03201-6.
Shah, P., Madhiwala, N., Shah, S., Desai, G., Dave, K., Dholakia, N., Patel, S., Desai, S., Modi, D., 2019. High uptake of an innovative mobile phone application among community health workers in rural India: an implementation study. Natl. Med. J. India 32 (5), 262. https://doi.org/10.4103/0970-258X.295956.
Sharma, J., Negandhi, P., Chauhan, M., Sethy, G., Reddy, S., Neogi, S., 2016. An assessment of bicycle intervention to improve service delivery by accredited social health activists in selected blocks of west champaran district of bihar. Indian J. Public Health 60 (4), 261–267. https://doi.org/10.4103/0019-557X.197786.
Sharma, R., Webster, P., Bhattacharyya, S., 2014. Factors affecting the performance of community health workers in India: a multi-stakeholder perspective. Glob. Health Action 7 (1). https://doi.org/10.3402/gha.v7.25352.
Shivalli, S., Srivastava, R.K., Singh, G.P., 2015. Trials of improved practices (TIPs) to enhance the dietary and iron-folate intake during pregnancy: a quasi-experimental study among rural pregnant women of varanasi, India. PLOS ONE 10 (9), e0137735. https://doi.org/10.1371/journal.pone.0137735.
Shrivastava, R., Sharma, L., Jolly, M., Ahuja, R., Sharma, R., Naslund, J., Agarwal, J., Mehrotra, S., Hollon, S.D., Patel, V., Tugnawat, D., Kumar, A., Bhan, A., Bondre, A., 2023. "We are everyone's ASHAs but who's there for us?" a qualitative exploration of perceptions of work stress and coping among rural frontline workers in madhya pradesh, India. Soc. Sci. Med., 116234 https://doi.org/10.1016/j.socscimed.2023.116234.
Shrivastava, S.R., Shrivastava, P.S., 2012. Evaluation of trained accredited social health activist (ASHA) workers regarding their knowledge, attitude and practices about child health. Rural Remote Health 12 (4), 2099. https://doi.org/10.22605/RRH2099.
Silan, S., Kant, S., Archana, S., Misra, P., 2014. Determinants of underutilisation of free delivery services in an area with high institutional delivery rate: a qualitative study. North Am. J. Med. Sci. 6 (7), 315. https://doi.org/10.4103/1947-2714.136906.
Singh, R., Neogi, S.B., Hazra, A., Irani, L., Ruducha, J., Ahmad, D., Kumar, S., Mann, N., Mavalankar, D., 2019. Utilization of maternal health services and its determinants: a cross-sectional study among women in rural uttar pradesh, India. J. Health Popul. Nutr. 38 (1), 13. https://doi.org/10.1186/s41043-019-0173-5.
Singh, S., 2021. The ASHA programme in times of universal health coverage: old tensions in a new context. Conversat. Health Policy RTHResources. Retrieved from ⟨https://rthresources.in/conversations-on-health-policy/the-asha-program-in-times-of-universal-health-coverage-old-tensions-in-a-new-context/⟩.
Soman, B., Lathika, A.R., Unnikrishnan, B., Shetty, R.S., 2023. Tracing the disparity between healthcare policy–based infrastructure and health belief–led practices: a narrative review on indigenous populations of India. J. Racial Ethn. Health Disparities. https://doi.org/10.1007/s40615-023-01810-3.
Strodel, R.J., Perry, H.B., 2019. The National village health guide scheme in India: lessons four decades later for community health worker programs today and tomorrow. Hum. Resour. Health 17 (1), 76. https://doi.org/10.1186/s12960-019-0413-1.
Sundararaman, T., Ved, R., Gupta, G., Samatha, M., 2012. Determinants of functionality and effectiveness of community health workers: results from evaluation of ASHA program in eight Indian states. BMC Proc. 6 (5), O30. https://doi.org/10.1186/1753-6561-6-S5-O30.
Taneja, S., Sinha, B., Upadhyay, R.P., Mazumder, S., Sommerfelt, H., Martines, J., Dalpath, S.K., Gupta, R., Kariger, P., Bahl, R., Bhandari, N., Dua, T., 2020. Community-initiated kangaroo mother care and early child development in low birth weight infants in India: a randomized controlled trial (Article). BMC Pediatr. 20, 150. https://doi.org/10.1186/s12887-020-02046-4.
Tripathy, P., Nair, N., Barnett, S., Mahapatra, R., Borghi, J., Rath, S., Rath, S., Gope, R., Mahto, D., Sinha, R., Lakshminarayana, R., Patel, V., Pagel, C., Prost, A., Costello, A., 2010. Effect of a participatory intervention with women's groups on birth outcomes and maternal depression in jharkhand and orissa, India: a cluster-randomised controlled trial. Lancet 375 (9721), 1182–1192. https://doi.org/10.1016/S0140-6736(09)62042-0.
Ved, R., Scott, K., Gupta, G., Ummer, O., Singh, S., Srivastava, A.S., 2019. How are gender inequalities facing India's one million ASHAs being addressed? Hum. Resour. Health 17, 1–8. https://doi.org/10.1186/s12960-018-0338-0.
Vidler, M., Ramadurg, U., Charantimath, U., Katageri, G., Karadiguddi, C., Sawchuck, D., Qureshi, R., Dharamsi, S., Joshi, A., von Dadelszen, P., Derman, R., Bellad, M., Goudar, S., Mallapur, A., 2016. Utilization of maternal health care services and their determinants in karnataka state, India. Reprod. Health 13 (S1), 37. https://doi.org/10.1186/s12978-016-0138-8.
Wagner, A.L., Xia, L., Ghosh, A., Datta, S., Pandey, P., Santra, S., Chattopadhyay, S., Nandi, U., Mazumder, T., Joshi, S., Pal, J., Mukherjee, B., 2018. Using community health workers to refer pregnant women and young children to health care facilities in rural west bengal, India: a prospective cohort study. PLOS ONE 13 (6). https://doi.org/10.1371/journal.pone.0199607.
Wahid, S., Munar, W., Das, S., Gupta, M., Darmstadt, G.L., 2019. 'Our village is dependent on us. That's Why we can't leave our work': characterizing mechanisms

of motivation to perform among accredited social health activists (ASHA) in bihar. J. Health Policy Plan. 35 (1), 58–66. https://doi.org/10.1093/heapol/czz131.
Walia, M., Irani, L., Chaudhuri, I., Atmavilas, Y., Saggurti, N., 2020. Effect of sharing health messages on antenatal care behavior among women involved in microfinance-based self-help groups in bihar, India. Article 3 Glob. Health Res. Policy 5. https://doi.org/10.1186/s41256-020-0132-0.
Ward, P.R., et al., 2021. Institutional deliveries in India: a study of associates and inequality. Int. J. Soc. Econ. 48 (11), 1597–1614. https://doi.org/10.1108/IJSE-08-2021-0444.
Wendt, A., Stephenson, R., Young, M.F., Webb-Girard, A., Hogue, C., Ramakrishnan, U., Martorell, R., 2018. Identifying bottlenecks in the iron and folic acid supply chain in bihar, India: a mixed-methods study. BMC Health Serv. Res. 18 (1), 281. https://doi.org/10.1186/s12913-018-3017-x.
Weng, Y., Abdalla, S., Mehta, K.M., Mahapatra, T., Srikantiah, S., Shah, H., Ward, V.C., Pepper, K.T., Bentley, J., Carmichael, S.L., Creanga, A., Wilhelm, J., Tarigopula, U. K., Nanda, P., Bhattacharya, D., Atmavilas, Y., Darmstadt, G.L., 2020. Trends in reproductive, maternal, newborn, and child health and nutrition indicators during five years of piloting and scaling-up of ananya interventions in bihar, India. J. Glob. Health 10 (2), 021003. https://doi.org/10.7189/jogh.10.021003.
WHO. (2024, April). *Maternal mortality [Fact sheet]*. World Health Organization. Retrieved June 8, 2025, from ⟨https://www.who.int/news-room/fact-sheets/detail/maternal-mortality⟩.
Williams, P.A., Poehlman, J., Moran, K., Siddiqui, M., Kataria, I., Rego, A.M., Mehrotra, P., Saldanha, N., 2020. Strategies to address anaemia among pregnant and lactating women in India: a formative research study. Public Health Nutr. 23 (5), 795–805. https://doi.org/10.1017/S1368980019003938.
World Health Organization. (1978). *Declaration of Alma-Ata: International Conference on Primary Health Care, Alma-Ata, USSR, 6–12 September 1978*. World Health Organization. ⟨https://iris.who.int/bitstream/handle/10665/39228/9241800011.pdf⟩.
World Health Organization. (2013). *Postnatal care for mothers and newborns: Highlights from the World Health Organization 2013 guidelines*. Geneva: World Health Organization. Retrieved from ⟨https://www.who.int/maternal_child_adolescent/publications/WHO-MCA-PNC-2014-Briefer/en/⟩.
World Health Organization. (2015). Strategies toward ending preventable maternal mortality (EPMM). Geneva: WHO. Retrieved from ⟨https://www.who.int/publications/i/item/strategies-toward-ending-preventable-maternal-mortality⟩.
World Health Organization. (2016). *Community health workers: A strategy to ensure access to primary health care services*. ⟨https://iris.who.int/handle/10665/249563⟩.
World Health Organization. (2022). *WHO recommendations on maternal and newborn care for a positive postnatal experience*. ⟨https://iris.who.int/bitstream/handle/10665/352658/9789240045989-eng.pdf?sequence=1⟩.