

Effect of community mentoring on measles-containing vaccine (MCV) coverage among children aged 9 to 23 months of adolescent mothers in the Binza Météo health zone: A systematic review

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Page | 1

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Abstract

Background: Measles-containing vaccine (MCV) coverage in the Democratic Republic of the Congo (DRC) remains below the 95% elimination threshold, and adolescent childbearing is common. Children of adolescent mothers may be at increased risk of under-vaccination, yet evidence on community mentoring for this group in Kinshasa is scarce.

Objective: To synthesize evidence on the potential contribution of community mentoring to MCV coverage among children of adolescent mothers, in order to inform a field study in the Binza Météo Health Zone.

Methods: Following PRISMA 2020, PubMed/MEDLINE, the Cochrane Library, Google Scholar, African Journals Online, three trial registries and institutional websites were searched for studies published between 2010 and 2025. Two reviewers independently screened records, extracted data and assessed risk of bias using Joanna Briggs Institute checklists and AMSTAR-2. Findings were synthesized narratively across five themes, and certainty of evidence was rated with GRADE.

Results: Nineteen studies were included. None simultaneously addressed community mentoring, MCV coverage and adolescent mothers. Indirect evidence showed that a mentor mother programme improved retention of mother–infant pairs in care (71.2% vs 20.6% at 18 months), and that community health worker interventions increased complete childhood vaccination by 10.1 percentage points in Kenya and by 20.4 percentage points in Pakistan (adjusted RR 1.39). Young maternal age was associated with incomplete vaccination in Ethiopia (AOR 4.23) and Kinshasa, but not in all settings. Certainty of evidence was low to very low.

Conclusion: Community mentoring could plausibly improve MCV coverage among children of adolescent mothers, but direct evidence is lacking.

Need for future research: A context-specific cluster-randomized or quasi-experimental study in the Binza Météo Health Zone is needed to test this hypothesis and to measure the effect of community mentoring on card-verified MCV1 and MCV2 coverage.

Keywords: Community mentoring, vaccination, measles, adolescent mothers, Democratic Republic of the Congo.

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1. Introduction

Measles continues to cause a substantial share of preventable illness and death among young children in sub-Saharan Africa. The Democratic Republic of the Congo (DRC) experienced a prolonged nationwide epidemic between 2018 and 2020, during which 458,156 suspected cases and 8,127 deaths were notified (Sodjinou et al., 2022), making it one of the largest measles outbreaks reported worldwide in recent years. This situation reflects persistently insufficient coverage with measles-containing vaccine (MCV), which has remained far below the 95% level needed to interrupt transmission: WHO and UNICEF estimated first-dose (MCV1) coverage in the DRC at only 52–56% in 2021–2022 (WHO & UNICEF, 2023).

Early childbearing is also frequent in the country. In the second Demographic and Health Survey, approximately one in four girls aged 15–19 years (about 24%) had already started childbearing, one of the highest proportions in the region (National Institute of Statistics & ICF International, 2014). Adolescent mothers frequently experience school interruption, economic hardship, social isolation and limited knowledge of the immunisation calendar, conditions that can compromise the timely vaccination of their children. Multilevel analyses of Demographic and Health Survey data from sub-Saharan Africa have linked younger maternal age with incomplete or delayed measles vaccination (Chilot et al., 2022; Kebede et al., 2025), although this association is not observed in every setting (Tadesse et al., 2022).

Evidence from other regions points in the same direction. Using three rounds of India's National Family Health Survey (1990–2006), Kumar et al. (2016) showed that full immunisation among children of adolescent mothers remained strongly patterned by socioeconomic position, with a persistent gap between the most and the least advantaged groups. In central Uganda, Atuyambe et al. (2008) found that children of first-time adolescent mothers were less likely than those of adult mothers to receive the second and third doses of polio vaccine (OR = 0.73 and 0.70) and of DTP (OR = 0.71 and 0.68). Neither study addressed measles vaccination or mentoring, but both indicate that young motherhood is a distinct risk factor for incomplete childhood immunisation schedules.

More broadly, under-vaccination in sub-Saharan Africa is shaped by proximal determinants linked to the use of maternal health services. In a pooled analysis of 29 Demographic and Health Surveys (n = 60,964 children), Budu et al. (2021) reported that children whose mothers attended fewer than four antenatal visits, delivered without a skilled birth attendant or received no postnatal care were less likely to be fully vaccinated. In Bassona Worena woreda, Ethiopia, measles vaccination coverage reached only 71.3%, mainly because of poor knowledge of vaccine benefits, distrust of health services and long distances to

health facilities (Abebe et al., 2019). In Kinshasa, a doctoral study conducted in the N'djili health zone also examined the factors underlying incomplete vaccination schedules among mothers of children aged 0–15 months (Dipela, 2023). Although these barriers are not specific to adolescents, they are informational and social in nature and are likely to be amplified among young mothers, which supports community-based approaches that combine information with social support.

Community mentoring, in which mothers are accompanied along the maternal and child health continuum by trained peers who have lived similar experiences, has emerged as a promising strategy in African public health. The mentor mother model, initially designed for the prevention of mother-to-child transmission (PMTCT) of HIV, has improved the retention of mother–infant pairs in care and adherence to treatment (Carlucci et al., 2022; Igumbor et al., 2019; Shroufi et al., 2013). In the DRC, the Mashako Plan, the national strategy to revitalise routine immunisation, relied heavily on community engagement through community health volunteers (*relais communautaires*, RECOs), who sensitised households and traced children who had missed doses (Gavi, the Vaccine Alliance, 2021; Lame et al., 2023).

Taken together, the measles burden, the vulnerability of children born to adolescent mothers and the documented benefits of mentoring in related fields converge on a clear research question. Yet, to our knowledge, no published study has evaluated the effect of a community mentoring programme on measles vaccination coverage among children of adolescent mothers, either in Kinshasa or elsewhere in the DRC. In the Binza Météo Health Zone, the only local study identified explored pregnant women's perceptions of COVID-19 vaccination (Landu Makesi et al., 2024); childhood immunisation among adolescent mothers has not been investigated.

Routine data illustrate the programmatic stakes. In 2025, the Binza Météo Health Zone had 803,061 inhabitants distributed across 11 health areas, of whom 28,021 children (3.49%) were targeted for MCV1 and MCV2. Administrative coverage reached 74.0% for MCV1 but only 42.6% for MCV2, indicating a substantial drop-out between doses. For 2026, the population was projected at 829,562, and first-semester coverage was 84% for MCV1 and 70% for MCV2 (Kinshasa Provincial Health Division, DHIS2 routine data, personal communication, 2026). Despite this recent progress, MCV2 coverage remains insufficient in a large and young population, which justifies a field evaluation of community mentoring in this health zone.

This systematic review therefore aimed to build, from the available indirect evidence, a conceptual framework and a scientific rationale for such a study. It addressed the following PICO question: among children aged 9–23 months born to adolescent mothers (P), does community

mentoring (I), compared with standard health-service follow-up (C), improve MCV coverage (O)? Specifically, we sought to (i) synthesise evidence on the effects of peer mentoring and community engagement on related maternal and child health outcomes; (ii) examine maternal age as a determinant of measles under-vaccination; and (iii) delineate the novelty of this research question relative to the existing literature.

2. Methodology

2.1 Protocol and registration

This systematic review was conducted and reported in accordance with the PRISMA 2020 statement (Page et al.,

2021). Because the included studies differed widely in concepts, populations and outcomes, a structured thematic narrative synthesis was preferred to a single quantitative meta-analysis, following the Synthesis Without Meta-analysis (SWiM) reporting guideline (Campbell et al., 2020). The protocol was registered on PROSPERO under number CRD420261476855.

2.2 Eligibility criteria

Eligibility criteria were defined using the PICOS framework and are presented in Table 1. Studies providing no useful quantitative data were excluded, as were journalistic news items lacking underlying research.

Table 1

Eligibility criteria (PICOS framework)

Population	Children of adolescent mothers (< 20 years) eligible for the measles vaccine, in the DRC and in comparable settings in sub-Saharan Africa and South Asia; children aged 9 to 23 months (age of eligibility for MCV1 and then MCV2)
Intervention	Community mentoring (support for adolescent mothers provided by peers or community health workers)
Comparator	Lack of community mentoring / standard follow-up by health services
Outcome measures	Vaccination coverage with MCV (MCV1/MCV2); comparable maternal and child health outcomes (retention in care, overall vaccination completeness, timeliness, drop-out) in the absence of direct data on MCV
Study types	Randomised and quasi-experimental trials, cohort studies, cross-sectional studies, qualitative and mixed-methods studies; systematic reviews and meta-analyses
Timeframe	Publications between 2010 and 2025
Language	French, English

Note. DRC = Democratic Republic of the Congo; MCV1/MCV2 = first/second dose of measles-containing vaccine; PICOS = Population, Intervention, Comparator, Outcome, Study design.

2.3 Information sources

Four bibliographic databases were searched: PubMed/MEDLINE (last searched on 31 December 2025), the Cochrane Library, including CENTRAL and the Cochrane Database of Systematic Reviews (last searched on 31 December 2025), Google Scholar (last searched on 31 December 2025) and African Journals Online (AJOL; last searched on 31 December 2025). Three trial registries were consulted: ClinicalTrials.gov, the WHO International Clinical Trials Registry Platform (ICTRP) and the Pan African Clinical Trials Registry (PACTR), all last consulted on 31 December 2025. Institutional grey literature was sought on the websites of the WHO and its Regional Office for Africa, UNICEF, Gavi, the Vaccine Alliance, and the Expanded Programme on Immunisation (EPI) of the DRC

(last consulted on 31 December 2025). Routine immunisation data for the Binza Météo Health Zone were obtained from the Kinshasa Provincial Health Division (DHIS2). Finally, the reference lists of all included studies and of relevant reviews were hand-searched (backward citation searching).

2.4 Search strategy

The search combined free-text terms and controlled vocabulary (MeSH) for four concepts: (1) community mentoring and community engagement (community mentoring, mentor mother, peer mentoring, peer support, community health worker, community engagement, community mobilisation); (2) measles and childhood vaccination (measles, measles-containing vaccine, MCV1, MCV2, immunisation, vaccination); (3) adolescent or young mothers and maternal age; and (4) the setting (Democratic Republic of the Congo, DRC, Kinshasa, Binza Météo, sub-Saharan Africa, low-and middle-income countries). Equivalent French terms (mentorat communautaire, mère

mentor, rougeole, vaccination, mères adolescentes, RDC) were used wherever the source allowed. The limits applied were publication date (1 January 2010 to 31 December

2025), language (English or French) and human studies. The full search strategy used for each database, register and website, including filters and limits, is presented in Table 2.

Table 2

Full search strategies for each database, register and website

Page | 4

Source	Search string / approach	Filters and limits	Date last searched
PubMed/MEDLINE	(mentor*[tiab] OR mentor mother*[tiab] OR peer mentor*[tiab] OR peer support*[tiab] OR "Community Health Workers [MeSH] OR "community health worker* [tiab] OR community engagement*[tiab] OR "community mobili*"[tiab]) AND ("Measles Vaccine [MeSH] OR measles[tiab] OR MCV1[tiab] OR MCV2[tiab] OR "Vaccination Coverage"[MeSH] OR immuni*[tiab] OR vaccin*[tiab]) AND (Maternal Age[MeSH] OR "adolescent mother*[tiab] OR teenage mother*[tiab] OR young mother*[tiab] OR Pregnancy in Adolescence"[MeSH] OR mother*[tiab]) AND (Africa South of the Sahara [MeSH] OR "Democratic Republic of the Congo"[MeSH] OR Congo[tiab] OR DRC[tiab] OR Kinshasa[tiab] OR Developing Countries[MeSH] OR low-income [tiab] OR middle-income[tiab])	2010/01/01–2025/12/31; English, French; Humans	30 juin 2026
Cochrane Library (CENTRAL, CDSR)	#1 (mentor* OR "peer support" OR "community health worker*" OR "community engagement" OR "community mobili*");ti,ab,kw; #2 (measles OR immuni* OR vaccin*);ti,ab,kw; #3 ("adolescent mother*" OR "teenage mother*" OR "young mother*" OR "maternal age" OR mother*);ti,ab,kw; #4 #1 AND #2 AND #3	Publication year 2010–2025; trials and reviews	30 juin 2026
Google Scholar	(1) "community mentoring" OR "mentor mothers" OR "peer mentoring" measles vaccination "adolescent mothers" Africa; (2) "community health workers" immunization coverage "sub-Saharan Africa"; (3) "maternal age" measles vaccination Africa; (4) "mentorat communautaire" OR "mère mentor" rougeole vaccination "mères adolescentes" RDC Kinshasa	Custom range 2010–2025; first 200 results per query screened (sorted by relevance)	30 juin 2026
African Journals Online (AJOL)	(mentor* OR "community health worker*" OR "community engagement") AND (measles OR vaccin* OR immuni*); (rougeole OR vaccination) AND (Congo OR Kinshasa)	2010–2025; English, French	30 juin 2026
ClinicalTrials.gov, WHO ICTRP, PACTR	Condition: measles OR immunization OR vaccination; Intervention: mentor OR peer OR "community health worker" OR "community engagement"	Registration 2010–2025; all recruitment statuses	30 juin 2026
Websites: WHO, WHO-AFRO, UNICEF, Gavi, EPI-DRC	Manual browsing of publication and news pages and site search using: measles, rougeole, Mashako, routine immunisation, adolescent mothers, Kinshasa	2010–2025; reports and programme documents	30 juin 2026
Citation searching	Backward screening of the reference lists of the 19 included studies and of relevant systematic reviews	None	30 juin 2026

Note. [tiab] = title/abstract; [MeSH] = Medical Subject Headings; ti, ab, kw = title, abstract, keywords; CENTRAL = Cochrane Central Register of Controlled Trials; CDSR = Cochrane Database of Systematic Reviews; ICTRP = International Clinical Trials Registry Platform; PACTR = Pan African Clinical Trials Registry; EPI-DRC = Expanded Programme on Immunisation of the DRC. Asterisks denote truncation.

2.5 Selection process

Records retrieved from all sources were combined and duplicates were removed manually. The selection was then carried out in two phases. Two reviewers (A-S.L.M. and E.K.L.) independently screened every title and abstract against the eligibility criteria, and then independently assessed the full text of each potentially eligible report. Disagreements were resolved by discussion and, when consensus could not be reached, by a third reviewer (J-P.K.T.N.N.). No automation tool was used. Reasons for excluding full-text reports were recorded and are reported in Figure 1.

2.6 Data collection process

Data were extracted using a standardised form developed in Microsoft Excel and piloted on three included studies. Two reviewers (A-S.L.M. and E.K.L.) independently extracted the data from each report and then compared their entries; discrepancies were resolved by discussion or, when necessary, by the third reviewer. Study investigators were not contacted to obtain or confirm data; information not reported in the publications was recorded as 'not specified' (N.P.). When a study was described in several reports, the data were collated under a single study entry.

2.7 Data items

The primary outcome was MCV coverage, defined as the proportion of children aged 9–23 months who had received the first (MCV1) and/or the second (MCV2) dose of measles-containing vaccine, as documented on the vaccination card or, when unavailable, by maternal recall. Secondary outcomes were: (a) complete childhood vaccination, defined as receipt of all basic antigens recommended in the national schedule (BCG, three doses of DTP/pentavalent and polio vaccines, and MCV1) by 12–23 months of age; (b) timeliness of vaccination, defined as receipt of a dose within the recommended age window; (c) vaccination drop-out, defined as the proportion of children who received a first dose but not the subsequent dose (e.g., Penta1–Penta3 or MCV1–MCV2); (d) retention of mother–infant pairs in care, defined as the proportion still attending scheduled follow-up at a given time point; and (e) the association between maternal age (< 20 years or the youngest category reported) and any of these vaccination outcomes. For each outcome domain, all compatible results reported in each study were sought, including all measures, time points and analyses. When several results were available for the same outcome, adjusted estimates were preferred to crude estimates, the longest follow-up was retained, and card-verified data were preferred to maternal recall. The other variables extracted were: first author, year of publication, country and setting, study design, sample

size, characteristics of the target population, nature of the intervention and comparator, and source of funding.

2.8 Study risk of bias assessment

The risk of bias of each included study was assessed with the Joanna Briggs Institute (JBI) critical appraisal checklist appropriate to its design (Aromataris & Munn, 2020), namely the checklists for randomised controlled trials, quasi-experimental studies, analytical cross-sectional and cohort studies, and qualitative research. Programme descriptions and evaluations without a comparison group were appraised with an adapted JBI analytical checklist. The four systematic reviews and meta-analyses were assessed with AMSTAR-2 (Shea et al., 2017). Two reviewers (A-S.L.M. and E.K.L.) independently rated each item as 'yes', 'no', 'unclear' or 'not applicable'; disagreements were resolved by discussion or, in the absence of consensus, by a third reviewer (J-P.K.T.N.N.). The overall quality of each study was classified as high ($\geq 80\%$ of applicable items met; low risk of bias), moderate (50–79%) or low (< 50%; high risk of bias).

2.9 Effect measures

For dichotomous outcomes (MCV coverage, complete vaccination, drop-out and retention in care), effects were expressed as the absolute difference in percentage points between intervention and comparison groups (or between post- and pre-intervention periods for before–after designs), together with risk ratios (RR) or odds ratios (OR), adjusted when available (aOR), and their 95% confidence intervals (CI), as reported by the authors. Associations between maternal age and vaccination outcomes were expressed as aORs with 95% CIs. For systematic reviews and meta-analyses, the pooled estimate reported by the authors was used. Qualitative findings were summarised as themes.

2.10 Synthesis methods

Studies were grouped into five thematic areas defined a priori from the PICO question: peer mentoring and maternal and child health; community engagement and vaccination coverage; maternal age and measles under-vaccination; community mobilisation in the DRC; and the Kinshasa/Binza Météo context. Because populations, interventions, comparators and outcomes were too heterogeneous for statistical pooling, no meta-analysis was performed, and the results were synthesised narratively following the SWiM guideline (Campbell et al., 2020), with attention to the direction, magnitude and consistency of effects. To prepare the data for presentation, percentage-point differences were calculated from the proportions reported in each study when they were not given directly; no other data conversion was needed, and missing summary statistics were not imputed. Study characteristics and risk-of-bias judgements were tabulated (Tables 3–5), and the

effects reported by the three studies with comparable binary outcomes were displayed in a bar chart (Figure 2). A sensitivity analysis restricted the synthesis to studies of high methodological quality in order to assess whether the direction of the conclusions changed.

2.11 Reporting bias assessment

Because no meta-analysis was performed and fewer than ten studies contributed to each outcome, funnel plots and statistical tests for small-study effects were not applicable. The risk of bias due to missing results was therefore assessed qualitatively by (i) searching trial registries and grey literature to identify completed but unpublished studies, (ii) comparing the outcomes reported in each study with those described in its methods section or registered protocol, when available, and (iii) considering the funding and institutional origin of programme evaluations. These judgements were incorporated into the publication bias domain of the certainty assessment.

2.12 Certainty assessment

The certainty of the body of evidence for each outcome was assessed with the GRADE approach (Guyatt et al., 2008), adapted to narrative syntheses without a single pooled estimate (Murad et al., 2017). Evidence from randomised trials started at high certainty and evidence from observational studies at low certainty; it was then

downgraded for risk of bias, inconsistency, indirectness, imprecision and publication bias, or upgraded for a large magnitude of effect. Certainty was rated as high, moderate, low or very low. Confidence in qualitative findings was assessed with GRADE-CERQual (Lewin et al., 2018). Two reviewers performed these assessments independently and resolved disagreements by consensus.

3. Results

3.1 Study selection

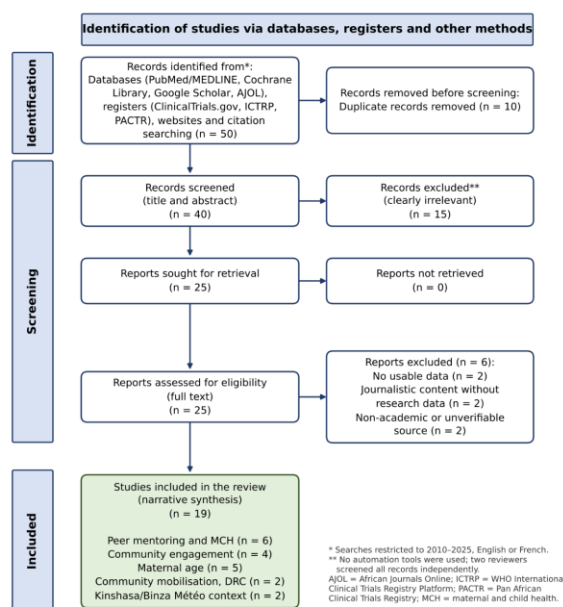
The searches identified 50 records from databases, registers, websites and citation searching. After removal of 10 duplicates, 40 records were screened on title and abstract, and 15 of them were excluded because they were clearly irrelevant. All 25 reports sought for retrieval were obtained and assessed in full text.

Six of these were excluded: two lacked usable quantitative data, two others were journalistic pieces without research data, and two came from non-academic or unverifiable sources.

Finally, 19 studies were selected for a narrative synthesis (Figure 1), categorised into five thematic areas: peer mentoring and maternal and child health (n = 6), community engagement and vaccination coverage (n = 4), maternal age and under-vaccination against measles (n = 5), community mobilisation in the Democratic Republic of the Congo (n = 2), and the context of Kinshasa/Binza Météo (n = 2).

Figure 1

PRISMA 2020 flow diagram of the study selection process



Note. Adapted from the PRISMA 2020 flow diagram template (Page et al., 2021).

3.2 Study characteristics

Tables 3 and 4 summarise the design, setting, sample size, population or intervention and thematic focus of the 19 included studies, published between 2011 and 2025. Table 3 presents the ten studies on peer mentoring and community engagement, and Table 4 the nine studies on maternal age, community mobilisation in the DRC and the Kinshasa

context. The 19 studies comprised four systematic reviews or meta-analyses, one randomised controlled trial, three quasi-experimental or interrupted time-series studies, five cross-sectional or multilevel survey analyses, one cohort study, three qualitative studies and two programme descriptions or evaluations. Four studies were conducted in the DRC, including two in Kinshasa.

Table 3

Characteristics of the included studies on peer mentoring and community engagement (studies 1–10)

No.	Study	Context	Study design	N	Population / Intervention	Thematic focus
1	Jain et al. (2022)	19 countries (review)	Systematic review + meta-analysis	61 impact evaluations	Community engagement and childhood vaccination	Community engagement
2	Xie et al. (2024)	Multi-country (review)	Systematic review + meta-analysis	N.P.	Community engagement strategies	Community engagement
3	Nzioki et al. (2017)	Mwingi, Kenya	Quasi-experimental (pre-post)	422 households	Community health workers	Community engagement
4	Owais et al. (2011)	Karachi, Pakistan	Community-based randomized trial	366 pairs	Trained community health workers, illustrated messages	Community engagement
5	Igumbor et al. (2019)	Uganda	Quasi-experimental	1161 / 1143	Peer mentoring (HIV/PMTCT)	Community mentoring
6	Carlucci et al. (2022)	Zambézia, Mozambique	Interrupted time series	85 health facilities	Peer mentoring (PMTCT)	Community mentoring
7	Carbone et al. (2019)	Malawi	Qualitative study	16 focus groups	Mentoring tailored to adolescent mothers	Community mentoring
8	Peer mentors, South Africa (2021)	South Africa	Programme description	106 mentors	Mentoring, HIV-positive teenage mothers	Community mentoring
9	Shroufi et al. (2013)	Bulawayo, Zimbabwe	Qualitative study	79 interviews	Peer mentoring (PMTCT)	Community mentoring
10	Prost et al. (2013)	Multi-country	Meta-analysis of 7 cluster-randomised trials	7 trials	Participatory community women's groups	Community mentoring

Note. HIV = human immunodeficiency virus; N.P. = not specified; PMTCT = prevention of mother-to-child transmission of HIV.

Table 4

Characteristics of the included studies on maternal age, community mobilisation in the DRC and the Kinshasa context (studies 11–19)

No.	Study	Context	Study design	N	Population / Intervention	Thematic focus
11	Chilot et al. (2022)	Sub-Saharan Africa	Multilevel analysis (DHS)	DHS data	Determinants of the second MCV dose	Maternal age/determinants
12	Kebede et al. (2025)	Ethiopia	Multilevel analysis (DHS)	DHS data	Maternal age and incomplete vaccination	Maternal age/determinants
13	Hu et al. (2018)	Zhejiang, China	Cross-sectional	Children aged 24–35 months	Maternal age and MCV vaccination delay	Maternal age/determinants
14	Bangura et al. (2020)	Sub-Saharan Africa	Systematic review	Multiple	Maternal knowledge, barriers	Maternal age/determinants
15	Tadesse et al. (2022)	Ethiopia (North Shoa)	Cross-sectional	410 children	Young maternal age and MCV2 coverage	Maternal age/determinants
16	Lame et al. (2023)	DRC (national)	Programme evaluation	9 provinces	Community mobilisation, RECO	Mobilisation in the DRC
17	Bokoko Bikoko et al. (2025)	Mbandaka, DRC (Équateur)	Cross-sectional	Children aged 6–59 months	Determinants of vaccination dropout	Mobilisation in the DRC
18	Landu Makesi et al. (2024)	Kinshasa (Binza Météo)	Qualitative phenomenological	Interviews + focus groups	Perceptions of vaccination among pregnant women (COVID-19)	Binza Météo context
19	Boisson-Walsh et al. (2023)	Kinshasa, DRC	Cohort (105 maternity units)	2,398 mother-infant pairs	Maternal age and BCG-Pental vaccination	Kinshasa context

Note. BCG = bacille Calmette–Guérin; DHS = Demographic and Health Survey; DRC = Democratic Republic of the Congo; MCV/MCV2 = measles-containing vaccine/second dose; Pental = first dose of pentavalent vaccine; RECO = relais communautaire (community health volunteer).

3.3 Risk of bias in studies

The risk-of-bias assessment of each included study is presented in Table 5. Overall, 8 studies were judged to be of high quality, 10 of moderate quality and 1 of low quality; the low rating concerned a programme description without a comparison group (study No. 8). The most frequent limitations were the absence of a concurrent control group in quasi-experimental studies and programme evaluations,

the cross-sectional design of most determinant studies, which precludes causal inference, possible recall bias in maternal reports of vaccination status, and the limited transferability of studies conducted outside sub-Saharan Africa. Because of these limitations, the indirect evidence summarised below must be interpreted with caution and does not allow direct causal conclusions to be drawn for the Binza Météo context.

Table 5

Risk of bias of the 19 included studies (JBI / AMSTAR-2 checklists)

No .	Study	Tool used	Quality rating	Main limitations / risks of bias
1	Jain et al. (2022)	AMSTAR-2	High	Heterogeneity of the interventions included in the meta-analysis
2	Xie et al. (2024)	AMSTAR-2	Moderate	Protocol not registered, primary sources lacking detail
3	Nzioki et al. (2017)	JBI quasi-experimental	Moderate	No concurrent control group, pre-post design
4	Owais et al. (2011)	JBI randomised controlled trials	High	Community-based randomisation, loss-to-follow-up not detailed
5	Igumbor et al. (2019)	JBI quasi-experimental	Moderate	Non-randomised groups, possible confounding factors
6	Carlucci et al. (2022)	JBI quasi-experimental	Moderate	Data aggregated by facility, no individual-level data
7	Carbone et al. (2019)	JBI qualitative research	High	Limited generalisability due to a targeted sample (Malawi)
8	Peer mentors, South Africa (2021)	JBI analytical studies (adapted)	Low	Programme description, lack of comparator
9	Shroufi et al. (2013)	JBI qualitative research	Moderate	Limited methodological details on sampling
10	Prost et al. (2013)	AMSTAR-2	High	Clinical heterogeneity amongst the 7 pooled trials
11	Chilot et al. (2022)	JBI cross-sectional studies	High	Cross-sectional design, causality cannot be established
12	Kebede et al. (2025)	JBI cross-sectional studies	High	Cross-sectional study, possible maternal recall bias
13	Hu et al. (2018)	JBI cross-sectional studies	Moderate	Chinese urban context not readily transferable to Kinshasa
14	Bangura et al. (2020)	AMSTAR-2	Moderate	Restriction to the English language, heterogeneity of primary studies
15	Tadesse et al. (2022)	JBI cross-sectional studies	Moderate	Single-centre study (one urban area), causality cannot be established
16	Lame et al. (2023)	JBI analytical studies (adapted)	Moderate	No control group, aggregated administrative data
17	Bokoko Bikoko et al. (2025)	JBI cross-sectional studies	Moderate	Congolese journal not indexed in major international databases
18	Landu Makesi et al. (2024)	JBI qualitative research	High	Single-centre study; focuses on COVID-19, not on MCV
19	Boisson-Walsh et al. (2023)	JBI cohort studies	High	Population living with HIV; generalizability should be considered with caution

Note. JBI = Joanna Briggs Institute; AMSTAR-2 = A Measurement Tool to Assess Systematic Reviews (version 2). High = low risk of bias ($\geq 80\%$ of items met); Moderate = 50–79%; Low = high risk of bias ($< 50\%$). Assessments were performed independently by two reviewers.

3.4 Results of syntheses

3.4.1 Lack of direct studies according to the PICO framework

The most striking finding of this review is that none of the 19 selected studies, nor any other identified source, examines the impact of community-based mentoring on MCV coverage among children of adolescent mothers, whether in Binza Météo or in other regions of the DRC. The only study found in the Binza Météo health zone (Landu Makesi et al., 2024) focuses on the perceptions of pregnant women regarding the COVID-19 vaccine, without addressing childhood vaccination or mentoring.

This observation is in itself a significant finding, establishing that this research occupies a unique intersection between two previously separate fields: peer mentoring in maternal and child health, primarily focused on preventing mother-to-child transmission of HIV, and the exploration of factors influencing measles vaccination coverage among children of adolescent mothers.

3.4.2 Impact of peer mentoring on retention and adherence among adolescent mothers

Although no research directly focuses on MCV, several studies indicate a significant effect of peer mentoring on analogous maternal and child health outcomes. In Uganda, mother-and-child pairs participating in a 'mentor mothers' programme showed a significantly higher rate of retention in care than the comparison group: 96.7 percent versus 65.8 percent six weeks after childbirth ($p < 0.001$), and 71.2 percent versus 20.6 percent at eighteen months ($p < 0.001$); women who received mentoring had a significantly reduced risk of dropping out of follow-up (adjusted odds ratio = 0.05; 95% CI: 0.02–0.15) (Igumbor et al., 2019). In Zambézia Province, Mozambique, an interrupted time-series analysis of data from 85 health facilities found that the introduction of mentor mothers was associated with improvements in PMTCT outcomes (Carlucci et al., 2022).

In Kenya, the intervention by community health workers led to a 10.1 percentage point increase in childhood vaccination coverage in the intervention area (from 88.7 per cent to 98.8 percent, $Z = 6.02$, $p < 0.0001$) (Nzioki et al., 2017). In Pakistan, a community-based randomised trial conducted by trained health workers revealed a 39% improvement in the rate of complete vaccination (72.1% versus 51.7% in the control group, i.e., an absolute difference of 20.4 percentage points; adjusted RR = 1.39; 95% CI: 1.06–1.81) (Owais et al., 2011). A meta-analysis of seven cluster-randomised trials further showed that participatory women's groups reduced neonatal mortality in low-resource settings (Prost et al., 2013).

Qualitative research carried out in Malawi among adolescent mothers living with HIV highlighted an explicit need for support from younger peers who are able to

understand their specific experiences (Carbone et al., 2019). Similarly, in Zimbabwe, 79 in-depth interviews with mentor mothers, beneficiaries, family members and health staff showed that peer support was valued for the emotional support and practical guidance it provided along the PMTCT pathway (Shroufi et al., 2013), and a peer mentoring programme for HIV-positive adolescent mothers in South Africa (2021) described the deployment of 106 trained mentors. This finding is directly relevant to the present study, which argues that adolescent mothers constitute a subgroup requiring a different type of support from that offered to adult mothers.

3.4.3 Impact of community engagement on vaccination coverage in resource-constrained settings

The systematic review and meta-analysis conducted by Jain et al. (2022) on 61 impact evaluations across 19 low- and middle-income countries concluded that there is a positive, albeit modest, effect of community engagement interventions on various indicators of vaccination coverage and adherence to schedules, with a median cost (excluding the vaccine) of USD 3.68 per dose administered for each additional percentage point of coverage achieved. This effect remains significant even after excluding studies presenting a high risk of methodological bias.

A more recent meta-analysis (Xie et al., 2024) confirms this trend, demonstrating that the magnitude of the impact on vaccination rates increases with the level of community engagement, with the most intensive interventions yielding the most significant results. Among the strategies studied, direct support for health services generates the greatest impact, followed by health education, community discussions, follow-up reminders, as well as social marketing and community mobilization campaigns.

3.4.4 Maternal age as a determinant of under-vaccination against measles

Numerous multilevel analyses based on demographic and health surveys highlight young maternal age as a key determinant of incomplete or delayed measles vaccination. In sub-Saharan Africa, a comprehensive analysis reveals that young maternal age, lack of education, difficulties in accessing healthcare and the absence of antenatal care are all linked to insufficient uptake of the second dose of the measles vaccine (MCV2) (Chilot et al., 2022). In Ethiopia, mothers aged 15 to 24 are more than four times as likely to have an incomplete vaccination schedule than mothers aged 35 years or older (adjusted odds ratio = 4.23; 95% CI: 2.17–8.26) (Kebede et al., 2025). In Zhejiang Province, China, children of younger mothers were more likely to receive MCV2 late (Hu et al., 2018), and a systematic review of barriers to childhood immunisation in sub-Saharan Africa

identified insufficient maternal knowledge among the main obstacles to vaccination (Bangura et al., 2020).

However, this relationship is not consistent. A cross-sectional study in the urban area of North Shoa, Ethiopia, focusing on the second dose of MCV, shows, on the contrary, that a younger maternal age (≤ 25 years) is associated with a significantly higher probability of complete vaccination (adjusted odds ratio = 9.12; 95% CI: 1.97–42.19). This suggests that the link between maternal age and vaccination coverage varies according to the local context, which calls for an empirical assessment specific to Kinshasa, rather than a simple extrapolation of data from other regions (Tadesse et al., 2022).

In Kinshasa, a cohort study carried out in 105 maternity wards among mothers and their children living with HIV revealed that older maternal age and a higher level of education are associated with earlier and more complete vaccination (82.6 percent of children had received the BCG vaccine and 68.4 percent had received the first dose of the pentavalent vaccine) (Boisson-Walsh et al., 2023). These findings support the hypothesis that children of younger mothers are more vulnerable in the context of Kinshasa.

3.4.5 Community mobilisation and vaccination coverage in the DRC

With regard to community mobilization and vaccination coverage in the Democratic Republic of the Congo, the Mashako plan, which constitutes the national strategy to revive routine vaccination implemented between 2018 and 2020, relied heavily on community engagement. Community health volunteers (RECOs) were responsible

for raising awareness, identifying children to be vaccinated and ensuring that children who had not received their doses were caught up. Thanks to this approach, full vaccination coverage rose from around 30–35 percent to 50–56 per cent in the nine target provinces, with a 50 per cent increase in the number of vaccination sessions organised (Gavi, the Vaccine Alliance, 2021; Lame et al., 2023).

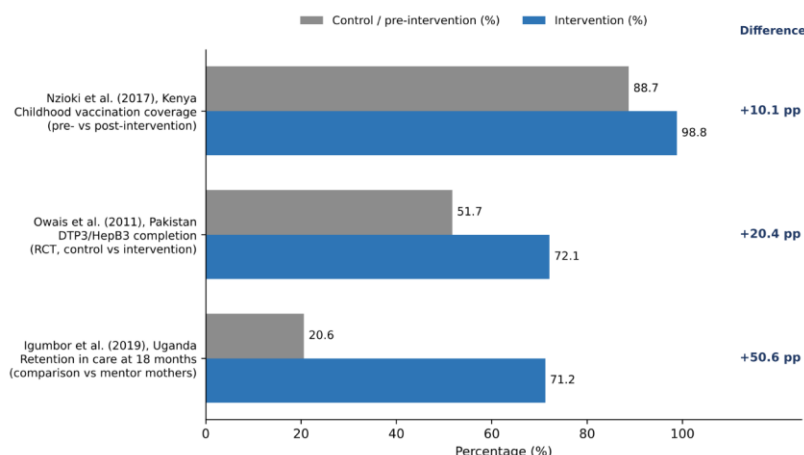
At local level, a cross-sectional study in the Mbandaka urban-rural health zone (Equateur Province, DRC) identified several factors contributing to vaccination drop-out, such as the remoteness of health facilities and a lack of awareness within the community (Bokoko Bikoko et al., 2025). This research, in conjunction with the Mashako plan, shows that community mobilisation is a recognised lever within the Congolese health system, although no study has specifically examined an individualised mentoring programme focused on adolescent mothers.

3.4.6 Comparison of reported effects

Finally, Figure 2 presents a comparative summary of the measured effects reported by the selected studies on mentoring and community engagement, expressed as the percentages of vaccination coverage or retention in care observed in the intervention group and the control group (or before the intervention). Although these three comparisons relate to different outcomes, all demonstrate a positive and practically relevant impact of community support or peer mentoring, with differences ranging from 10.1 percentage points (Kenya; Nzioki et al., 2017) to over 50 percentage points (retention at 18 months, Uganda; Igumbor et al., 2019).

Figure 2

Comparison of the effects reported for mentoring and community engagement interventions



Note. pp = percentage points. Comparators differ across studies: pre-intervention coverage (Nzioki et al., 2017), randomised control group (Owais et al., 2011) and non-mentored comparison group (Igumbor et al., 2019)

3.5 Sensitivity analysis

When the synthesis was restricted to the eight studies of high methodological quality, the direction of the conclusions was unchanged. The randomised trial from Pakistan (Owais et al., 2011) and the meta-analyses by Jain et al. (2022) and Prost et al. (2013) still supported a positive effect of community-based interventions; the qualitative evidence from Malawi (Carbone et al., 2019) still indicated a demand for age-appropriate peer support among adolescent mothers; and the multilevel and cohort analyses (Boisson-Walsh et al., 2023; Chilot et al., 2022; Kebede et al., 2025) still associated younger maternal age with under-vaccination. No direct evidence on the primary outcome was available in any scenario.

3.6 Reporting biases

N completed but unpublished study meeting the eligibility criteria was identified in ClinicalTrials.gov, the WHO ICTRP or the PACTR. Nevertheless, the risk of bias due to missing results was judged to be present (suspected) for the intervention outcomes (retention in care and childhood vaccination coverage): all the mentoring and community engagement studies reported favourable effects, several were programme evaluations conducted or supported by

implementing organisations (Igumbor et al., 2019; Lame et al., 2023), and the restriction to English and French may have excluded studies from Lusophone settings. For the maternal-age outcome, the risk was judged low (undetected), because most estimates came from nationally representative surveys with pre-specified variables, and both positive and inverse associations were published (Tadesse et al., 2022). These judgements were taken into account in the GRADE assessment.

3.7 Certainty of evidence

The certainty of evidence for each outcome is summarised in Table 6. No study provided evidence for the primary outcome, namely the effect of community mentoring on MCV coverage among children of adolescent mothers. Certainty was low for the effect of community engagement and community health worker interventions on complete childhood vaccination, and very low for the effect of mentor mother programmes on retention in care, for the association between young maternal age and under-vaccination, and for the effect of community mobilisation in the DRC. Confidence in the qualitative finding that adolescent mothers want age-appropriate peer support was moderate.

Table 6

Certainty of evidence for each outcome (GRADE and GRADE-CERQual)

Outcome	Studies (design)	Summary of findings	Certainty	Reasons for rating
MCV1/MCV2 coverage among children of adolescent mothers receiving community mentoring (primary outcome)	None	No study identified	Not assessable (no evidence)	—
Retention of mother–infant pairs in care (mentor mother programmes)	2 (1 quasi-experimental; 1 interrupted time series)	Retention 71.2% vs 20.6% at 18 months; aOR for drop-out 0.05 (95% CI 0.02–0.15); improved PMTCT outcomes	Very low	Started low; downgraded for risk of bias and indirectness (HIV population); upgraded for large effect; suspected publication bias
Complete childhood vaccination (community engagement and community health worker interventions)	4 (1 RCT; 1 pre-post study; 2 meta-analyses)	+10.1 pp (Kenya); +20.4 pp, adjusted RR 1.39 (95% CI 1.06–1.81) (Pakistan); positive but modest pooled effects	Low	Started high; downgraded for indirectness (not adolescent mothers, not MCV-specific) and inconsistency in effect size
Association between young maternal age and incomplete or delayed (measles) vaccination	6 (3 multilevel/cross-sectional; 1 cross-sectional; 1 cohort; 1 systematic review)	AOR 4.23 (95% CI 2.17–8.26) in Ethiopia; later MCV2 in China; less complete vaccination in Kinshasa; inverse association in North Shoa (AOR 9.12)	Very low	Started low; downgraded for inconsistency (opposite directions) and indirectness of some settings
Effect of community mobilisation on routine vaccination coverage in the DRC	2 (1 programme evaluation; 1 cross-sectional)	Full vaccination coverage rose from about 30–35% to 50–56% in nine provinces (Mashako Plan)	Very low	Started low; downgraded for risk of bias (no control group, administrative data)
Need for age-appropriate peer support among adolescent mothers (qualitative)	3 (2 qualitative; 1 programme description)	Adolescent mothers value and request support from peers of similar age and experience	Moderate confidence (CERQual)	Minor methodological limitations; moderate concerns about relevance (HIV context)

Note. aOR = adjusted odds ratio; CI = confidence interval; CERQual = Confidence in the Evidence from Reviews of Qualitative research; DRC = Democratic Republic of the Congo; GRADE = Grading of Recommendations, Assessment, Development and Evaluation; MCV = measles-containing vaccine; PMTCT = prevention of mother-to-child transmission of HIV; pp = percentage points; RCT = randomised controlled trial; RR = risk ratio.

4. Discussion

4.1 Key findings

This review yields two complementary conclusions. First, no published study has directly assessed the effect of community mentoring on measles vaccination coverage among children of adolescent mothers in the DRC; this absence of evidence underlines the originality of the research question. Second, the indirect evidence consistently points towards a beneficial effect: peer mentoring and community engagement programmes have produced meaningful gains in related maternal and child health outcomes, while young maternal age emerges as an important, although context-dependent, determinant of measles under-vaccination. The overall certainty of this evidence is, however, low to very low (Table 6).

4.2 Interpretation in the light of existing evidence

In Uganda, the mentor mother programme retained 71.2% of mother–infant pairs in care at 18 months, compared with 20.6% in the comparison group, a difference of about 50 percentage points (Igumbor et al., 2019). An effect of even a fraction of this size on MCV uptake would be of public health importance if the intervention were adapted to adolescent mothers. This capacity must, however, be interpreted with caution. Most of the data comes from programs for the prevention of mother-to-child transmission (PMTCT), in which mentors support adherence to antiretroviral treatment and regular biological monitoring. These tasks do not encompass the requirements for completing a full vaccination schedule. Extrapolating these findings to measles vaccination is therefore a reasoned hypothesis, not a demonstrated equivalence.

The qualitative study from Malawi adds a complementary perspective: adolescent mothers living with HIV explicitly asked to be accompanied by young women of their own age who understood their situation (Carbone et al., 2019). This expressed need for age-appropriate, personalised support is likely to extend beyond HIV care to other components of early motherhood, including childhood immunisation, and it strengthens the plausibility of a similar benefit for vaccination.

The North Shoa study deserves particular attention, because younger mothers (≤ 25 years) had higher MCV2 uptake than older mothers (Tadesse et al., 2022), contrary to the findings from Ethiopian national data (Kebede et al., 2025) and from Kinshasa (Boisson-Walsh et al., 2023). This contrast shows that the relationship between maternal age and vaccination is not fixed but is modulated by local factors, such as the organisation of services, community dynamics and existing targeted programmes, which vary between and within countries. Such heterogeneity is in itself a strong argument

for an empirical study in Binza Météo rather than a simple transposition of results obtained in other African settings.

The scarcity of direct evidence is consistent with the umbrella review by Jain et al. (2024), which synthesised 62 systematic reviews of interventions to improve routine childhood immunisation in low- and middle-income countries. In that review, interventions directed at mothers and caregivers, such as brief education sessions and written or pictorial reminders, were supported by robust evidence, whereas health-system and, above all, community-level interventions rested on limited, mostly narrative and heterogeneous evidence; none of the included reviews isolated community mentoring as a distinct intervention category. The gap identified here therefore also exists at the international level, and the proposed field research could contribute to the literature on community-based immunisation interventions.

In summary, this review documents that no study has yet combined community mentoring, measles vaccination coverage and adolescent motherhood in the Congolese context. This gap is not merely descriptive. It situates the research question at the intersection of two bodies of literature that have, until now, developed independently: peer mentoring in maternal and child health, and the sociodemographic determinants of measles vaccination. A field study in Binza Météo would therefore provide the first empirical test of a hypothesis that is rendered plausible by indirect data, but which cannot yet be confirmed or refuted by any direct evidence.

4.3 Practical implications

Should future research confirm a positive effect of community mentoring on MCV coverage among children of adolescent mothers, several implications would follow for the Binza Météo Health Zone and for the national immunisation programme. First, a peer mentoring scheme designed for adolescent mothers could be integrated into the existing network of RECOs established under the Mashako Plan, thereby building on available community structures instead of creating new ones (Lame et al., 2023). Second, the youngest mothers could be prioritised for follow-up and catch-up vaccination, given the epidemiological evidence of their vulnerability. Third, any scale-up should be accompanied by a cost-effectiveness analysis informed by the cost estimates available from international evaluations of community engagement (Jain et al., 2022).

4.4 Strengths and limitations

The main strength of this review lies in the breadth of the related literature examined, which made it possible to construct a structured argument despite the absence of direct evidence and to establish the novelty of the research question. In addition, the risk of bias of every study was

formally assessed with the JBI checklists and AMSTAR-2, and the certainty of evidence was rated with GRADE, in line with the PRISMA 2020 statement.

Several limitations must also be acknowledged. First, because no directly comparable study was found, the synthesis relies on extrapolation from adjacent fields, mainly HIV/PMTCT mentoring and community engagement in general. Second, the maternal-age determinants were documented in settings that may differ substantially from Binza Météo, so their relevance for adolescent mothers in Kinshasa remains to be demonstrated. Third, although several databases, registries and websites were searched, Scopus, Embase and CINAHL were not consulted, and some relevant studies may have been missed. Fourth, the routine coverage figures for Binza Météo come from DHIS2, whose quality depends on the completeness and accuracy of data entry in health facilities and at the health zone central office. Fifth, selection bias is possible, as most included studies concerned formal programmes or institutional registers, which may over-represent organised interventions and overlook undocumented informal community initiatives. Sixth, publication bias cannot be excluded, since studies reporting favourable effects of mentoring or community engagement are more likely to be published. Finally, restricting the search to English and French may have excluded relevant studies published in Portuguese, for example from Mozambique or Angola, or in other languages used in sub-Saharan Africa.

4.5 Implications for future research

A cluster-randomised controlled trial or a rigorous quasi-experimental study comparing MCV1 and MCV2 coverage between children of adolescent mothers supported by community peer mentors and children of adolescent mothers receiving standard care would directly address the evidence gap identified in this review. Vaccination status should be verified from vaccination cards or health facility registers rather than from maternal recall alone, in order to limit the measurement bias frequently reported in immunisation studies in sub-Saharan Africa. Such a study should also document implementation outcomes, such as acceptability, fidelity and cost, to inform any future scale-up.

5. Conclusion

This systematic review shows that, to date, no published research has examined the impact of community mentoring on measles vaccination coverage among children aged 9 to 23 months whose mothers are adolescents, whether in Binza Météo or elsewhere in the Democratic Republic of the Congo (Cheng, A., Ghanem-Uzqueda, A., Hoff, N. A., & al. (2022). This lack of documentation, rather than being a shortcoming, actually represents a point of originality within the scientific field of the research question posed. The

available indirect data, of low to very low certainty, which highlight the significant effects of peer mentoring on continuity of care, as well as the positive impacts of community engagement on vaccination, and the correlation between young maternal age and under-vaccination against measles, suggest that a community-based mentoring programme could have beneficial effects in this specific context. However, these findings are not sufficient to prove this hypothesis. Only rigorous field research carried out in the Binza Météo health zone would be able to transform this assumption into concrete evidence, capable of influencing vaccination policies in the Democratic Republic of the Congo.

List of abbreviations

AJOL – African Journals Online
 AMSTAR-2 – A MeaSurement Tool to Assess Systematic Reviews, version 2
 AOR – adjusted odds ratio
 BCG – bacille Calmette–Guérin
 CERQual – Confidence in the Evidence from Reviews of Qualitative research
 CI – confidence interval
 DHIS2 – District Health Information Software 2
 DHS – Demographic and Health Survey
 DRC – Democratic Republic of the Congo
 DTP – diphtheria–tetanus–pertussis vaccine
 EPI – Expanded Programme on Immunisation
 GRADE – Grading of Recommendations, Assessment, Development and Evaluation
 HIV – human immunodeficiency virus
 ICTRP – International Clinical Trials Registry Platform
 JBI – Joanna Briggs Institute
 LMICs – low- and middle-income countries
 MCH – maternal and child health
 MCV – measles-containing vaccine
 MCV1/MCV2 – first/second dose of measles-containing vaccine
 MeSH – Medical Subject Headings
 N.P. – not specified
 OR – odds ratio
 PACTR – Pan African Clinical Trials Registry
 Penta – pentavalent vaccine
 PICO(S) – Population, Intervention, Comparator, Outcome (Study design)
 PMTCT – prevention of mother-to-child transmission
 PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses
 PROSPERO – International Prospective Register of Systematic Reviews
 RCT – randomised controlled trial
 RECO – relais communautaire (community health volunteer)

RR – risk ratio
SWiM – Synthesis Without Meta-analysis
UNICEF – United Nations Children's Fund
WHO – World Health Organization

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Competing interests

The authors declare that they have no competing interests. A-S.L.M. and E.K.L. are co-authors of one included study (Landu Makesi et al., 2024), and J-P.K.T.N.N. is a co-author of another (Bokoko Bikoko et al., 2025); to limit any potential bias, these two studies were appraised by reviewers who had not been involved in them.

Availability of data, code and other materials

The review protocol is publicly available on PROSPERO (CRD420261476855). The template data collection form, the data extracted from the included studies, the data used for all syntheses and the risk-of-bias and GRADE assessment sheets are not publicly deposited but are available from the corresponding author on reasonable request. No analytic code was used, as no meta-analysis or statistical modelling was performed. All included studies are published or publicly accessible documents listed in the reference list.

Author contributions

A-S.L.M.: conceptualisation, methodology, literature search, study selection, data extraction, risk-of-bias assessment, formal analysis and writing – original draft. E.K.L.: study selection, data extraction, risk-of-bias assessment and writing – review and editing. G.N.V.: data curation, validation and writing – review and editing. A.B.K.: methodology, visualisation and writing – review and editing. J-P.K.T.N.N.: supervision, arbitration of disagreements as third reviewer and writing – review and

editing. L.M.B.B.: supervision, validation and writing – review and editing. All authors read and approved the final manuscript.

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