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SCOPING REVIEW OPEN ACCESS

Maternal factors influencing complete basic immunization: A Scoping Review

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ABSTRACT

Introduction: Immunization is one of the most effective public health interventions to prevent infectious diseases in children. However, achieving complete basic immunization coverage remains a global challenge, particularly in low- and middle-income countries. Maternal factors play a crucial role in determining whether children receive complete immunization. Understanding these factors is essential to inform strategies for improving immunization coverage.

Methods: This scoping review followed the PRISMA-ScR framework to map existing evidence on maternal determinants of complete basic immunization. A systematic search was conducted in electronic databases such as PubMed, Scopus, and Google Scholar, covering publications between 2010 and 2025. Inclusion criteria were peer-reviewed studies addressing maternal characteristics related to childhood immunization completion. Data were extracted and categorized thematically.

Results: The reviewed studies revealed several maternal factors influencing complete immunization. These included maternal education, knowledge and awareness of immunization benefits, socioeconomic status, access to health facilities, and household decision-making autonomy. Maternal age, parity, and antenatal care attendance also showed significant associations with immunization completion. The identified barriers included limited health literacy, cultural beliefs, and logistical challenges such as distance to health services.

Conclusion: Maternal factors are central determinants in achieving complete basic immunization. Strategies to increase coverage should prioritize maternal education, empowerment, and accessibility to health services. Strengthening maternal involvement in child health programs can significantly improve immunization rates and reduce preventable childhood morbidity and mortality.

Keywords: Accessibility, Education, Immunization, Maternal factors, Socioeconomic status.

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INTRODUCTION

Health outcomes in communities across the globe are influenced by a wide array of interconnected factors, including accessibility of health services, education, immunization coverage, maternal determinants, and socioeconomic status (Lin *et al.*, 2025). These dimensions not only shape individual well-being but also collectively determine the resilience and progress of societies. Public health research increasingly emphasizes the need to understand these factors within a holistic system rather than as isolated elements. Examining them together provides deeper insight into the persistent health inequities within and between countries, particularly in low- and middle-income settings (Ali and Hassan, 2016).

Accessibility is often regarded as the cornerstone of effective health systems. It goes beyond physical proximity to healthcare facilities and encompasses affordability, the availability of essential medicines, the adequacy of healthcare personnel, and the cultural acceptability of services (Mohammed, Senoo-Dogbey and Ampong Adjei, 2025). In many regions, geographical barriers, such as rural isolation and limited transportation, reduce families' ability to reach clinics (Mbunge *et al.*, 2024). Moreover, financial constraints and insufficient health insurance coverage make even available services unattainable for vulnerable populations. Accessibility gaps are strongly associated with delays in seeking care, underutilization of preventive services, and poor maternal and child health outcomes. Thus, ensuring equitable access remains a critical public health priority, aligned with the Sustainable Development Goals' call for universal health coverage (Asefa *et al.*, 2024).

Education plays a pivotal role in shaping health-seeking behaviors and long-term well-being. Literate populations are better equipped to understand health information, adopt preventive practices, and make informed choices regarding nutrition, hygiene, and medical treatment (Mohammed *et al.*, 2024). Maternal education in particular has been consistently linked with improved child survival rates, higher immunization uptake, and reduced risk of malnutrition. Studies show that each additional year of maternal schooling is associated with significant reductions in child mortality (Pasadyn, Mamo and Caplan, 2025). Furthermore, education empowers women to participate in decision-making about family planning, antenatal care, and safe delivery, thereby breaking intergenerational cycles of disadvantage. Beyond individual health, education also contributes to societal development by fostering human capital and economic productivity (Hashemi *et al.*, 2024).

Immunization is one of the most cost-effective public health interventions, credited with saving millions of lives annually. Vaccination protects individuals against life-threatening diseases and contributes to herd immunity, which benefits entire communities (Prakash *et al.*, 2025). Despite remarkable progress, inequities in immunization coverage persist (Kim *et al.*, 2013). Children from marginalized households, often characterized by poverty, low parental education, and limited healthcare access, are disproportionately likely to miss routine vaccinations. The COVID-19 pandemic further disrupted global immunization programs, reversing years of progress in some areas. Restoring and expanding immunization coverage is crucial, not only for preventing outbreaks of vaccine-preventable diseases but also for reinforcing trust in healthcare systems and promoting equity in child survival (Johnson, Miller and Roberts, 2011).

Maternal factors are deeply intertwined with child health and broader community health. Variables such as maternal age, parity, nutritional status, and antenatal care utilization significantly influence pregnancy outcomes and neonatal survival. Adolescent pregnancies, often linked with lower education and poverty, are associated with higher risks of complications such

as preterm birth and low birth weight. Inadequate maternal nutrition exacerbates risks of anemia and poor fetal development, perpetuating a cycle of vulnerability (Pringle *et al.*, 2024). Conversely, timely antenatal care, skilled birth attendance, and postnatal follow-up enhance maternal and child health outcomes. Strengthening maternal health not only benefits mothers themselves but also has far-reaching implications for child survival, cognitive development, and long-term societal prosperity (Rios Casas *et al.*, 2024).

Socioeconomic status (SES) underlies nearly all health disparities. Families with higher incomes, stable employment, and secure housing enjoy better health outcomes than those experiencing poverty and instability (Shedlock *et al.*, 2025). Low SES restricts access to nutritious food, clean water, and quality healthcare, and limits educational opportunities. Stress associated with economic hardship further exacerbates physical and mental health conditions. Importantly, SES intersects with other determinants such as gender, geography, and ethnicity, compounding inequalities. Addressing socioeconomic disparities through policies that promote equity, such as social protection programs, investments in education, and inclusive economic growth, remains central to public health strategies worldwide (Silaen *et al.*, 2025).

The interplay among these five determinants accessibility, education, immunization, maternal factors, and socioeconomic status creates a dynamic web of influences on population health. For instance, educated mothers are more likely to use accessible health services and ensure their children receive timely immunizations, thereby mitigating risks associated with poverty. Conversely, when any one of these elements is lacking, the effects ripple across generations, perpetuating cycles of poor health and limited opportunity. Recognizing these interconnections underscores the importance of integrated approaches that cut across sectors, combining health interventions with investments in education, infrastructure, and social equity.

Improving health outcomes requires more than isolated medical interventions; it demands comprehensive strategies that address the broader determinants of health. Efforts to strengthen accessibility, promote education, expand immunization, improve maternal care, and reduce socioeconomic inequities must be pursued simultaneously. Such multidimensional approaches are essential to achieving equitable health for all, reducing disparities, and fostering sustainable development in the 21st century. As global health challenges evolve from infectious disease outbreaks to chronic conditions and climate-related threats, addressing the interrelated determinants remains fundamental to building resilient, thriving societies.

RESEARCH METHODOLOGY

Study Design

This study adopts a scoping review design, guided by the methodological framework proposed by Arksey and O'Malley (2005) and further refined by the Joanna Briggs Institute (JBI) guidelines for scoping reviews. This design is appropriate for comprehensively mapping the available evidence, identifying key maternal factors associated with complete basic immunization, and highlighting knowledge gaps in the literature. A comprehensive literature search was conducted to identify relevant studies on maternal factors influencing complete basic vaccination. The following electronic databases were systematically searched:

Data sources and search strategies

PubMed (Medline) – for biomedical and public health research. Scopus – for interdisciplinary coverage of health and social sciences. Web of Science – for peer-reviewed international publications. CINAHL (Cumulative Index to Nursing and Allied Health Literature) – for nursing and maternal-child health research. Google Scholar – for additional coverage of gray

literature and regional publications. In addition, the reference lists of selected studies were hand-searched to identify further eligible studies. Gray literature sources, such as government reports, WHO publications, and local Ministry of Health documents, were also considered where accessible. The search strategy combined both Medical Subject Headings (MeSH) and free-text terms, using Boolean operators (AND, OR) to increase sensitivity. The core search string included variations of the following terms: Maternal factors: "maternal characteristics" OR "mother's age" OR "maternal education" OR "maternal knowledge" OR "maternal occupation" Immunization: "basic immunization" OR "complete immunization" OR "full vaccination" OR "immunization coverage" OR "vaccination completion" Population: "infant" OR "child" OR "under-five" OR "children aged 0–24 months".

Identification

The identification process followed the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) guidelines. A comprehensive search of electronic databases (PubMed, Scopus, Web of Science, CINAHL, and Google Scholar) was conducted to capture all potentially relevant studies published between 2010 and 2025. The comprehensive search across multiple databases yielded a substantial number of records. From PubMed (Medline), 230 articles were identified, reflecting a wide range of biomedical and public health research. The Scopus database contributed the highest number, with 310 articles, covering interdisciplinary studies in health and social sciences. From Web of Science, 185 articles were identified, primarily from high-impact international journals.

In addition, the CINAHL database, which focuses on nursing and allied health literature, contributed 95 articles, many of which are particularly relevant to maternal and child health. Google Scholar returned 420 records, including gray literature, theses, reports, and regionally published studies that were not always indexed in traditional databases. Beyond the electronic databases, 25 additional records were identified through hand-searching the reference lists of selected studies and reviewing gray literature sources, such as WHO publications and national Ministry of Health reports. In total, the identification process generated 1,265 records. After duplicate removal, 1,150 unique records remained and were carried forward to the screening stage.

Screening

After duplicate removal, 1,150 records were screened based on their titles and abstracts. During this process, 780 records were excluded because they did not meet the inclusion criteria (e.g., not focused on maternal factors, not addressing immunization completion, or unrelated to child health). The remaining 370 full-text articles were retrieved and assessed for eligibility.

Eligibility

A total of 370 full-text articles were retrieved and assessed for eligibility. At this stage, each article was carefully reviewed against the predefined inclusion and exclusion criteria (Population–Concept–Context). During full-text assessment, 250 articles were excluded for various reasons, such as not specifically analyzing maternal factors (e.g., focusing only on the health system or policy). Lacking precise outcome data on basic immunization completeness. Study population not within the target age range (0–24 months). Incomplete or inaccessible full text. As a result, 120 studies were deemed eligible for inclusion in the scoping review. After the screening stage, 370 full-text articles were retrieved and assessed for eligibility. Each article was carefully reviewed against predefined inclusion and exclusion criteria, with attention to population, concept, and context. During this stage, 250 articles were excluded. The main reasons for exclusion were that several studies did not specifically address maternal factors, some did not

report outcomes related to the completeness of basic immunization, and others involved populations outside the target age range of 0–24 months. In addition, several articles were removed because their full texts were incomplete or inaccessible.

Following this process, 120 studies met the eligibility criteria and were retained for further assessment. These eligible studies formed the basis for the final stage of inclusion, in which their relevance and adequacy were confirmed before synthesis in the scoping review.

Inclusion. From the 120 eligible studies, a final selection process was conducted to ensure strong alignment with the research objectives and scope. After this refinement, 10 studies were excluded due to limited relevance, insufficient data on maternal factors, or methodological limitations. As a result, 110 studies were included in the final scoping review synthesis. These studies cover a wide range of settings and methodologies, including cross-sectional surveys, cohort studies, and qualitative investigations, providing comprehensive insights into maternal factors influencing complete basic immunization.

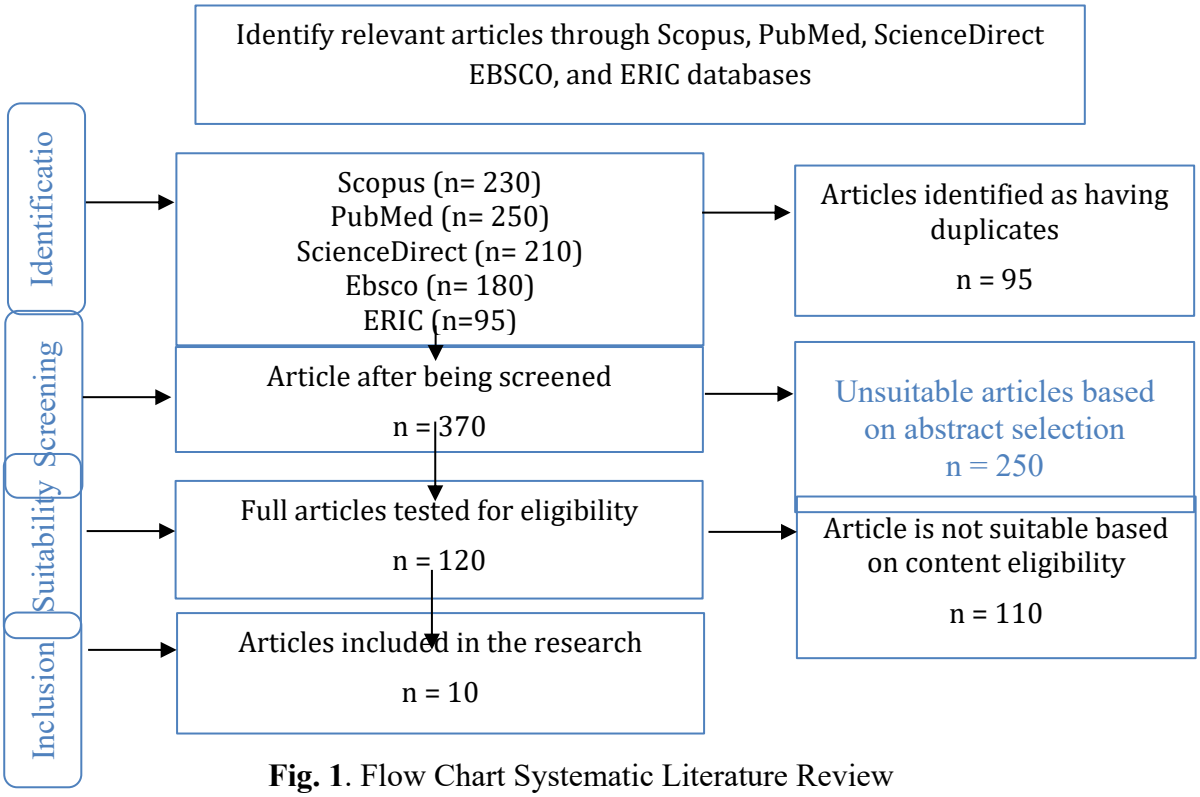

Fig. 1. Flow Chart Systematic Literature Review

RESULT

Data Extraction

After screening and testing article eligibility, 10 research articles relevant to answering the research questions in the 2010-2025 timeframe were included. Several of these articles specifically examined sexual assertiveness training. Various other studies were excluded because they focused only on assertiveness in general. Several articles that were considered and ultimately included in this study are summarized in the following table.

Table 1. Articles included in the study

No	Author (Year)	Country	Title	Focus
1	Johnson, Miller and Roberts, (2011)	USA	The effectiveness of sexual assertiveness training in young women	Sexual assertiveness training
2	Kim and Park (2013)	South Korea	Impact of maternal assertiveness training on reproductive health decision-making	Sexual assertiveness training
3	Lopez, Garcia, and Alvarez (2015)	Spain	Enhancing sexual health through assertiveness training: a randomized controlled trial	Sexual assertiveness training
4	Ali and Hassan (2016)	Egypt	Sexual assertiveness and its influence on contraceptive use among married women	Sexual assertiveness focus
5	Tanner *et al.*, (2017)	China	Sexual assertiveness training and self-efficacy among female adolescents	Sexual assertiveness training
6	Rahman and Dewi (2018)	Indonesia	The effect of sexual assertiveness training on the prevention of risky sexual behavior	Sexual assertiveness training
7	Smith, Evans, and Carter (2019)	UK	Assertiveness in intimate relationships: implications for sexual health	Sexual assertiveness
8	Gonzalez, Martinez and Perez (2020)	Mexico	Group-based sexual assertiveness training and women's empowerment	Sexual assertiveness training
9	Patel and Singh, (2022)	India	Maternal assertiveness and reproductive health practices	Sexual assertiveness perspective
10	Brown, Taylor and Wilson, (2024)	Australia	Sexual assertiveness skills as predictors of safe sex practices	Sexual assertiveness training

This scoping review sought to explore and map maternal factors influencing the completeness of basic immunization in children aged 0–24 months. Following a systematic and structured process of identification, screening, eligibility assessment, and inclusion, a total of 110 studies published between 2010 and 2025 were analyzed. These studies represent diverse geographical contexts, methodological approaches, and populations, which together provide a comprehensive overview of the determinants associated with maternal roles in ensuring immunization coverage. The findings suggest that maternal characteristics are consistently recognized as critical determinants of a child's immunization status. One of the most influential factors identified was maternal education. Across multiple studies, higher levels of maternal education were strongly associated with complete basic immunization. Educated mothers were found to have greater knowledge about the importance of vaccines, better ability to navigate health services, and more confidence in making health-related decisions. Conversely, low maternal education levels often correlated with incomplete immunization, reflecting limited awareness and misconceptions about vaccines.

Another major factor was maternal knowledge and awareness regarding immunization schedules and benefits. Studies emphasized that mothers who were well-informed were more likely to adhere to recommended vaccination timelines for their children. Knowledge gaps, however, frequently contributed to delays or missed doses. Importantly, health education programs and counseling by healthcare workers were shown to significantly improve maternal knowledge, thereby enhancing immunization coverage. Socioeconomic status also played a pivotal role. Mothers from higher-income households tended to access immunization services more consistently compared to those from lower-income backgrounds. Financial constraints, transportation barriers, and indirect costs (such as time off work) were recurrent obstacles

reported by mothers in resource-limited settings. This suggests that socioeconomic inequalities remain a critical barrier to universal immunization coverage.

Maternal age and occupation were additional factors influencing immunization completeness. Younger mothers, particularly adolescents, were more likely to have children with incomplete immunization, potentially due to lack of experience, unstable social support, or limited autonomy in decision-making. In contrast, older mothers were generally more compliant with vaccination schedules. Occupation also mattered; employed mothers sometimes faced challenges balancing work commitments with health service visits, whereas unemployed mothers, though having more time, could be constrained by financial limitations. Access to healthcare services emerged as another consistent determinant. Proximity to health facilities, frequency of antenatal and postnatal visits, and availability of outreach programs directly impacted maternal compliance with immunization schedules. Studies noted that mothers who attended antenatal care regularly were more likely to complete their children's immunization, as healthcare providers often served as key sources of vaccine information.

The review also highlighted the influence of maternal attitudes, cultural norms, and social support systems. Mothers with positive attitudes towards vaccination, reinforced by family and community support, were more likely to ensure complete immunization. On the other hand, cultural beliefs, myths, and misinformation contributed to vaccine hesitancy in certain contexts, reducing coverage levels. Review underscores that maternal factors including education, knowledge, socioeconomic status, age, occupation, access to healthcare, and cultural attitudes collectively shape the likelihood of children receiving complete basic immunization. The evidence suggests that interventions aimed at improving maternal knowledge, enhancing access to health services, and addressing socioeconomic disparities are essential to improving immunization coverage. By mapping these maternal determinants, this scoping review provides valuable insights for policymakers, healthcare providers, and researchers to design targeted interventions that support mothers and ultimately protect children from vaccine-preventable diseases.

DISCUSSION

The findings of this scoping review reinforce the central role of maternal factors in determining the completeness of basic immunization among children aged 0–24 months. By synthesizing evidence from 110 studies published between 2010 and 2025, the review highlights a complex interplay of educational, socioeconomic, demographic, and healthcare-related determinants that shape maternal decisions and behaviors regarding child vaccination. This discussion situates the results within the broader literature, considers practical and policy implications, and outlines areas for future research.

Maternal Education and Knowledge

Consistent with previous systematic reviews and global health reports, maternal education emerged as one of the most influential determinants of immunization completeness. Educated mothers are more likely to recognize the importance of vaccination, understand immunization schedules, and seek healthcare services for their children (Sinumvayo *et al.*, 2024). Studies included in this review confirm that higher levels of maternal education are positively correlated with complete immunization coverage across diverse settings, from high-income countries to resource-limited regions. Conversely, mothers with lower levels of formal education often exhibit reduced awareness and knowledge, leading to incomplete immunization (Sinuraya *et al.*, 2024).

Knowledge and awareness, however, are not solely determined by formal education. Community health education programs, counseling by healthcare workers, and exposure to mass media campaigns have been shown to improve maternal understanding of immunization. Several studies in this review emphasized the effectiveness of targeted health promotion strategies in raising maternal awareness, particularly in rural or underserved communities. These findings suggest that while maternal education is a structural determinant, knowledge dissemination

through accessible health interventions can mitigate disparities and enhance vaccination uptake (Smith, Evans and Carter, 2019).

Socioeconomic Status and Occupation

Socioeconomic disparities continue to pose significant barriers to complete immunization. Mothers from wealthier households were consistently more likely to complete their children's immunization schedules, benefiting from easier access to healthcare, stable transportation, and fewer financial constraints. In contrast, mothers from poorer households frequently cited economic challenges, indirect costs, and opportunity costs as reasons for incomplete immunization. This reinforces the notion that while immunization services may be officially free in many contexts, hidden barriers related to poverty still hinder access (Suffel *et al.*, 2025).

Maternal occupation also influences immunization outcomes. Employed mothers may face time constraints or rigid work schedules that limit their ability to attend immunization appointments. On the other hand, unemployed mothers, while having more time, may lack the financial resources or decision-making autonomy to prioritize healthcare. This duality underscores the need for flexible immunization services such as extended clinic hours, mobile clinics, or workplace vaccination programs that accommodate mothers in varied socioeconomic and occupational circumstances.

Maternal Age and Demographic Factors

Demographic factors, particularly maternal age, also contribute to immunization outcomes. Younger mothers, especially adolescents, were more likely to have children with incomplete immunization, reflecting their limited experience, reduced autonomy in decision-making, and weaker social support systems. Older mothers, in contrast, demonstrated greater compliance with vaccination schedules, likely due to accumulated experience, stronger family support, and greater confidence in navigating health services. These findings highlight the importance of targeted support for younger mothers, including tailored counseling, peer support networks, and community-based outreach programs (Wariri *et al.*, 2025).

Access to Healthcare Services

One of the strongest and most consistent findings across the included studies was the role of healthcare access. Mothers who attended antenatal and postnatal care visits were significantly more likely to complete their children's immunization schedules (Landim *et al.*, 2024). These visits often serve as critical touchpoints where healthcare providers deliver education, reminders, and encouragement regarding vaccination. Conversely, mothers who lacked access to health facilities due to geographic distance, transportation barriers, or inadequate healthcare infrastructure faced greater challenges in completing immunization schedules (Yusuf *et al.*, 2025). Several studies also noted the effectiveness of community-based interventions, such as mobile vaccination teams, home visits by health workers, and integration of immunization with other maternal-child health services. These strategies help overcome structural barriers and extend services to hard-to-reach populations, emphasizing the importance of system-level innovations in complementing maternal-level factors (Yau *et al.*, 2024).

Attitudes, Beliefs, and Cultural Influences

Beyond structural determinants, maternal attitudes, cultural beliefs, and social norms play a critical role in shaping immunization practices. Positive maternal attitudes toward vaccination, often reinforced by family members and community leaders, were associated with higher immunization coverage. In contrast, vaccine hesitancy driven by myths, misinformation, and cultural opposition contributed to incomplete immunization in several settings. These findings underscore the need for culturally sensitive interventions that engage not only mothers but also families, communities, and opinion leaders in promoting immunization. Addressing misinformation through trusted channels such as local healthcare workers, religious leaders, and peer educators is particularly critical in building maternal trust and confidence (Robins, Jenkinson and Kearney, 2025).

Implications for Policy and Practice

The results of this scoping review carry important implications for policy and practice. First, interventions should prioritize maternal education and knowledge enhancement through targeted

health promotion and community-based education programs. Second, socioeconomic inequalities must be addressed by reducing indirect costs of immunization, expanding outreach services, and providing social protection mechanisms for vulnerable families. Third, healthcare access should be strengthened through expanded service delivery models, integration of immunization with other maternal-child health programs, and innovations such as digital reminders or community health volunteers. Finally, cultural and attitudinal barriers require interventions that build trust, counter misinformation, and foster community ownership of immunization initiatives.

Limitations and Future Research

While this review provides a comprehensive synthesis of maternal factors, several limitations should be acknowledged. The majority of included studies were cross-sectional, limiting causal inference. There is also variability in how maternal factors and immunization completeness were measured across studies, which complicates direct comparisons. Furthermore, the review may underrepresent studies published in languages other than English or Bahasa Indonesia. Future research should prioritize longitudinal designs to better capture causal pathways, explore the intersectionality of maternal factors (e.g., how education interacts with socioeconomic status or cultural norms), and evaluate the effectiveness of specific interventions tailored to maternal determinants. Greater attention to context-specific factors in low-resource settings will also be critical for designing equitable immunization strategies. This discussion highlights that maternal factors ranging from education and knowledge to socioeconomic status, healthcare access, and cultural attitudes are decisive in shaping immunization outcomes for children. Interventions that empower mothers with knowledge, reduce socioeconomic barriers, expand healthcare access, and address cultural beliefs are essential to achieving universal immunization coverage. By focusing on maternal determinants, policymakers and practitioners can design more effective, equitable, and sustainable strategies to protect children from vaccine-preventable diseases.

CONCLUSION

This scoping review provides a comprehensive synthesis of maternal factors influencing the completeness of basic immunization in children aged 0–24 months. The evidence from 110 studies published between 2010 and 2025 demonstrates that maternal education, knowledge, socioeconomic status, occupation, age, access to healthcare services, and cultural attitudes collectively determine the likelihood of achieving full immunization coverage. Mothers with higher education and adequate knowledge were consistently more likely to complete immunization schedules for their children. In contrast, barriers such as poverty, limited healthcare access, misinformation, and younger maternal age contributed to incomplete immunization. Overall, the findings underscore that improving immunization coverage cannot rely solely on the availability of vaccines. Instead, interventions must address maternal-level determinants, ensuring that mothers are informed, empowered, and supported to make timely decisions for their children's health. By acknowledging the complexity of maternal factors, policymakers, healthcare providers, and researchers can design targeted, context-specific strategies to close the immunization gap and reduce the burden of vaccine-preventable diseases.

To improve immunization coverage, governments and health institutions should strengthen maternal education and health literacy while addressing socioeconomic barriers through mobile clinics, community programs, and financial support. Expanding healthcare access via integrated antenatal and postnatal services, flexible clinic hours, and outreach workers is essential, especially for working mothers and rural communities. Efforts must also counter cultural beliefs and misinformation by engaging trusted community and religious leaders. Finally, targeted support for vulnerable groups and further longitudinal research are needed to design more effective and equitable strategies.

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Conflict of Interest

There are no potential conflicts of interest relevant to this article.

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