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# The Role of Maternal Literacy in Child Health Outcomes in Developing Countries: A Systematic Review

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## ABSTRACT

**Introduction/Main Objectives:** Child health remains a major public health priority in developing countries. Maternal literacy has been recognized as a modifiable determinant influencing child health through caregiving practices and health-related decision-making. **Background Problems:** Although several studies have examined maternal literacy and child health outcomes, the evidence has not been systematically synthesized across different research settings or geographical contexts. **Novelty:** This review provides a comprehensive synthesis of the association between maternal literacy and child health outcomes in developing country contexts. **Research Methods:** A systematic review was conducted following PRISMA guidelines using cross-sectional studies published between 2015 and 2026. Articles were retrieved from PubMed, ScienceDirect, Springer, and Garuda databases, and methodological quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools. **Finding/Results:** Ten studies met the inclusion criteria. Higher maternal literacy—including health, nutrition, food, electronic, and oral health literacy—was consistently associated with improved child health outcomes. Significant associations were observed with complete child immunization ($p = 0.042$; aOR = 0.21; 95% CI: 0.17–0.73), improved child nutritional status ($p < 0.05$), reduced odds of childhood overweight and obesity (aOR = 0.29; 95% CI: 0.17–0.51; $p < 0.001$), optimal early childhood development (aOR = 2.16; 95% CI: 1.29–3.61), and lower dental caries prevalence ($p < 0.05$). **Conclusion:** Maternal literacy plays a critical role in shaping child health and development, highlighting its importance as a target for child health interventions in developing countries.

## ARTICLE INFO

**Keywords:**
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## INTRODUCTION

Child health remains a major public health priority, particularly in developing countries, which continue to face a high burden of malnutrition, delayed development, and preventable infectious diseases (World Health Organization, 2020). In 2024, an estimated 150.2 million children under five years of age were stunted, representing approximately 23.2% of the global under-five population, indicating that undernutrition persists as a widespread public health problem despite ongoing global efforts. At the national level, a similar pattern is evident in Indonesia, where the most recent national survey reported a stunting prevalence of 19.8% among children under five in 2024, declining from 24.4% in 2021, yet still considerably above the national target of approximately 14% (Kementerian Kesehatan, 2024b, 2024a, 2025). This persistent burden of stunting underscores the continued vulnerability of children in developing country settings. The consequences of undernutrition extend beyond impaired physical growth, as it increases susceptibility to infectious diseases and is ultimately reflected in child mortality indicators. The under-five mortality rate, a key measure for tracking progress toward the Sustainable Development Goals (SDGs), declined globally to 37 per 1,000 live births in 2023; however, this figure remains above the SDG target of 25 per 1,000 live births by 2030 (UNICEF, 2025). These trends highlight the urgent need for effective and sustainable interventions that address the underlying determinants of child undernutrition and mortality, particularly in developing countries.

In this context, maternal literacy has emerged as a critical and modifiable determinant of child health. Maternal literacy refers to a mother's ability to access, understand, evaluate, and apply information related to health, nutrition, and child care (Diallo et al., 2023). Adequate maternal literacy enables mothers to make informed decisions regarding infant and young child feeding practices, utilization of preventive health services, hygiene behaviors, and timely health-seeking for their childrenLee et al., 2019; Oflu & Yalcin, 2024) . In contrast, limited maternal literacy may constrain knowledge acquisition and hinder the effective translation of health information into appropriate caregiving practices, thereby increasing children's vulnerability to malnutrition, infectious diseases, and delayed development (Taylor et al., 2019).

The influence of maternal literacy on child health outcomes can be understood through the Knowledge–Attitude–Practice (KAP) framework, which posits that literacy facilitates knowledge acquisition, forms the foundation for attitude development, and subsequently shapes health-related behaviors (Lai et al., 2021). Higher maternal literacy facilitates a better understanding of health information, fosters positive attitudes toward child nutrition, immunization, and preventive care, and ultimately promotes healthier caregiving practices (Hashemzadeh et al., 2025; Jiregna et al., 2024). Through this pathway, maternal literacy serves as a key mechanism linking health information to tangible improvements in child health and development.

Although several studies have examined the relationship between maternal literacy and child health outcomes, the existing evidence has not yet been systematically compiled and synthesized with consideration of research settings or geographical contexts. Therefore, this systematic review aims to synthesize and critically appraise the available evidence on the association between maternal literacy and child health and development outcomes in developing countries.

## METHOD, DATA, AND ANALYSIS

### 1. Study Design

This study used a systematic review study design. This study used secondary data in the form of data obtained from the results of previous studies. The time range of the selected articles was between 2015 and 2026. Article searches were conducted for a maximum period of one month. The study data were

searched from systematic and comprehensive databases, including PubMed, Science Direct, Springer, and Garuda. The search process was conducted using keywords: "maternal literacy" OR "mother literacy" OR "maternal health literacy" AND "child health" OR "child development"AND "Developing Countries" OR "LMIC".

2. **Inclusion Criteria**
   The inclusion criteria in this study were English full-text articles. The study designs included were cross-sectional studies. The research subjects were mothers and their children. Selected articles discussed maternal literacy as the intervention and child health outcomes as the study outcomes. The studies were conducted in developing countries or low- and middle-income countries (LMICs).
3. **Exclusion Criteria**
   The exclusion criteria in this study included articles employing experimental study designs, such as randomized controlled trials; articles published before 2015; and articles classified as grey literature.
4. **Operational Definition of Variables**
   The article search and selection process was carried out by considering eligibility criteria defined using the PICO model. The population in this study consisted of mothers and their children. The intervention or exposure was maternal literacy, including basic literacy, health literacy, nutrition literacy, electronic health literacy, and oral health literacy. The comparison was between mothers with low literacy levels and those with adequate or high literacy levels. The outcomes were child health and development indicators.
   Maternal literacy was defined as the mother's ability to access, understand, evaluate, and apply information related to health, nutrition, and child care. Child health were defined as measurable indicators reflecting the physical growth, developmental status, and preventive health conditions of children.
5. **Data Analysis**
   Data processing and synthesis were conducted following the PRISMA guidelines. The systematic review process included study identification, screening, eligibility assessment, and inclusion. During the identification stage, relevant articles were searched from electronic databases using predefined keywords. In the screening stage, duplicate records were removed, and titles and abstracts were reviewed to exclude irrelevant studies. Full-text articles were then assessed for eligibility based on the inclusion and exclusion criteria.

   All studies that met the eligibility criteria were included and assessed for methodological quality using the Joanna Briggs Institute (JBI) Critical Appraisal Tools appropriate for cross sectional study design. Studies were excluded if the main variables were not clearly measured, the data analysis was inappropriate, or important influencing factors were not considered, based on the JBI critical appraisal. The included studies were summarized in a descriptive characteristics table, presenting information on authors, year of publication, country, study design, population, intervention, and outcomes

## RESULT AND DISCUSSION

The study selection process, including identification, screening, and eligibility assessment, is summarized in the PRISMA flow diagram (Figure 1).

**Figure 1.** Prisma Flow Diagrams

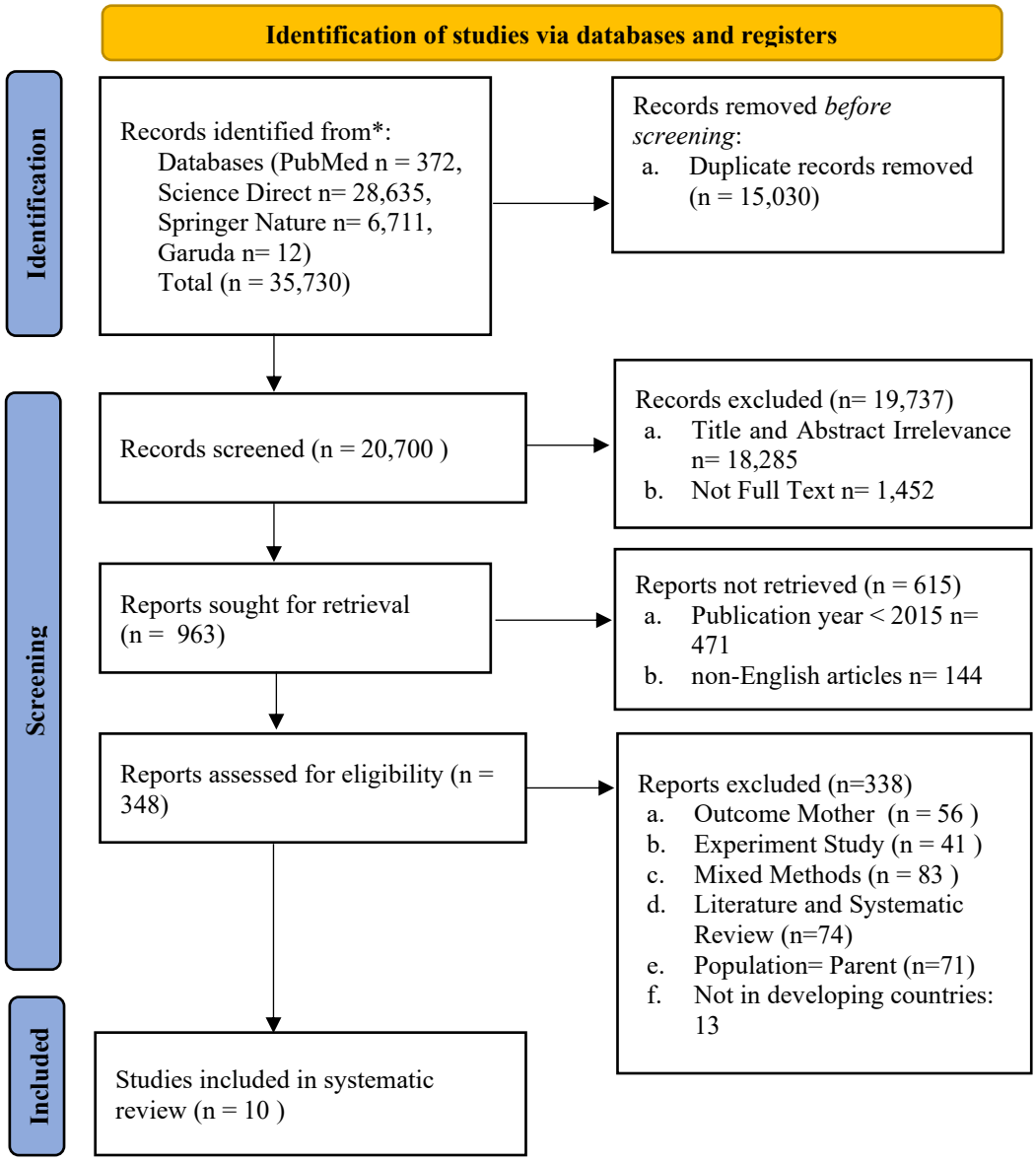



Figure 1 illustrates the PRISMA-based study selection process. A total of 35,730 records were identified from electronic databases, including PubMed (n = 372), ScienceDirect (n = 28,635), Springer Nature (n = 6,711), and Garuda (n = 12). After removing 15,030 duplicate records, 20,700 records remained for screening. During title and abstract screening, 19,737 records were excluded due to irrelevance to the study objectives. The main reasons for exclusion were title and abstract irrelevance (n = 18,285) and unavailability of full-text articles (n = 1,452). Consequently, 963 reports were sought for retrieval. A total of 615 reports were not retrieved, primarily due to publication year prior to 2015 (n = 471) and non-English publication (n = 144). As a result, 348 full-text articles were assessed for eligibility. Following full-text assessment, 338 reports were excluded for the following reasons: outcomes focusing on mothers (n = 56),

experimental study design (n = 41), mixed-methods approach (n = 83), literature reviews or systematic reviews (n = 74), study populations consisting of parents (n = 71), and not in developing countries (13). Ultimately, 10 studies met all inclusion criteria and were included in the final systematic review.

The quality of cross-sectional studies was assessed using the Critical Appraisal tools developed by the Center for Evidence-Based Medicine and the Joanna Briggs Institute (JBI). The JBI critical appraisal checklist for cross-sectional studies consists of eight key questions, which evaluate whether: (1) the criteria for inclusion in the sample were clearly defined; (2) the study subjects and setting were described in detail; (3) the exposure was measured in a valid and reliable way; (4) objective and standard criteria were used for measuring the condition; (5) potential confounding factors were identified; (6) strategies to address confounding factors were stated; (7) outcomes were measured in a valid and reliable manner; and (8) appropriate statistical analysis was used. Each item was scored as 1 if the criterion was met ("yes") and 0 if it was not met, unclear, or not applicable. The results of the critical appraisal assessment are presented in the following table.

**Table 1.** Assessment of the Quality of The Role of Maternal Literacy in Child Health Outcomes in Developing Countries

| Author (Year) | List of Questions Checklist | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Phommachanh et al (2021) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Maheri et al (2022) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Oflu & Yalcin (2024) | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 7 |
| Diallo et al (2023) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Jiregna et al (2024) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Marandi et al (2025) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Hashemzadeh et al (2025) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Solak et al (2025) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Johri et al (2016) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Lee et al (2019) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |

Source: Primary Study

The results of the critical appraisal showed that all included studies had high methodological quality, with JBI scores ranging from 7 to 8, indicating a low risk of bias. All studies were therefore deemed suitable for inclusion in the systematic review. Subsequently, the characteristics of the included studies were examined. As shown in Figure 2, most of the studies were conducted in Asia (n = 8), followed by Africa (n = 3). This distribution indicates that the existing evidence is largely concentrated in low- and middle-income countries within these regions. A detailed description of the study characteristics is presented in Table 2.

**Figure 2.** Map of Research Area

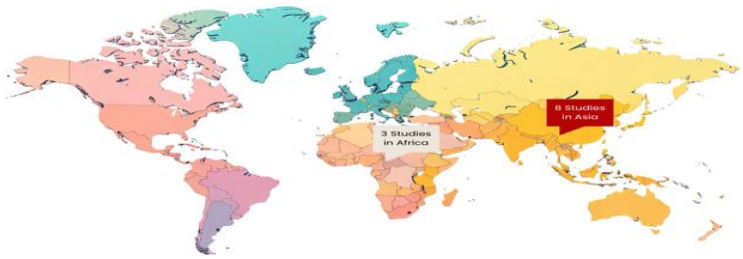


**Table 2.** Description of Primary Study

| No | Author (Year) | Country | Study Design | P* | I* | C* | O* |
|---|---|---|---|---|---|---|---|
| 1 | Phommachanh et al (2021) | Laos | cross-sectional | Mothers with children under five years (n=384) | Maternal health literacy | Mothers with inadequate vs. adequate levels of maternal health literacy | Maternal health literacy level measured across access, understanding, appraisal, and application domains (index score 0–50). Adequate MHL was also associated with complete child vaccination (p = 0.042). |
| 2 | Maheri et al (2022) | Iran | Cross-sectional study | Mothers with children under 5 years old (n=368) | Maternal nutritional literacy | Mothers with insufficient/borderline nutritional literacy vs sufficient nutritional literacy | Maternal nutritional literacy was significantly associated with child anthropometric indices: lower maternal literacy scores were observed among mothers of children with wasting (WHZ; p=0.004), underweight (WAZ; p=0.023), and stunting (HAZ; p=0.001); significant associations were also found between anthropometric indices and socio-economic and child health factors |
| 3 | Oflu & Yalcin (2024) | Turkey | Cross-sectional study | Mothers with children aged 36–59 months (n = 440 mother–child pairs) | Maternal electronic health literacy (eHL) | Mothers with sufficient eHL vs limited/insufficient eHL | Children of mothers with sufficient eHL were significantly more likely to be ECDI on track (AOR = 2.16; 95% CI: 1.29–3.61), receive adequate support for learning (AOR = 3.23; 95% CI: 1.69–6.18), and have adequate daily meals and snacks (AOR = 2.43; 95% CI: 1.56–3.78) |
| 4 | Diallo et al (2023) | Senegal | Cross-sectional study (secondary analysis of DHS 2019) | Mother aged 15–49 years and their children under five years | Maternal literacy | Literate vs illiterate women | Women's literacy significantly reduced the risk of child stunting (OR=0.81; p<0.05) and underweight (OR=0.72; p<0.01), and increased odds of DPT vaccination (OR=1.69; p<0.05), particularly in rural areas |

| No | Author (Year) | Country | Study Design | P* | I* | C* | O* |
|---|---|---|---|---|---|---|---|
| 5 | Jiregna et al (2024) | Ethiopia | Cross-sectional study | Mothers and their children (n = 411) | Maternal health literacy (MHL) | Adequate vs inadequate MHL | Most mothers had inadequate maternal health literacy (71.3%). In multivariable analysis, adequate maternal health literacy was significantly associated with completion of basic child immunization (AOR = 0.21; 95% CI: 0.17–0.73; p = 0.01). |
| 6 | Marandi et al (2025) | Iran | Cross-sectional study | Mothers and their children aged 6–9 years (n = 223 mother–child pairs) | Maternal oral health literacy (OHL) | Higher vs lower maternal OHL | Higher maternal OHL was significantly associated with lower dental caries in children according to the CAST index, both in primary molars (p < 0.001) and permanent first molars (p = 0.006). |
| 7 | Hashemzadeh et al (2025) | Iran | Cross-sectional study | Mothers and their children aged 6–12 years (n = 327 mother–child pairs) | Maternal food and nutrition literacy (FNL) | Poor vs good maternal FNL; food-secure vs food-insecure households | Good maternal FNL was significantly associated with a reduced likelihood of childhood overweight/obesity (OR = 0.29; 95% CI: 0.17–0.51; p < 0.001). Moderate/severe food insecurity increased the odds of overweight/obesity (OR = 4.64; 95% CI: 1.75–12.29). |
| 8 | Solak et al (2025) | Turki | Cross-sectional study | Mothers and their children aged 40–120 months (n = 113 mother–child pairs) | Maternal oral literacy | Higher vs lower maternal food/health literacy | Maternal oral literacy was not significantly associated with children's DMFT scores (p = 0.748). However, higher maternal health literacy was an independent predictor of higher child DMFT in multivariable regression (B = 0.04; 95% CI: 0.01–0.08; p = 0.025). |
| 9 | Johri et al (2016) | India | Cross-sectional study | Mothers and children aged 12–23 months (n = 1,773 | Maternal health literacy | High vs low maternal health literacy | High maternal health literacy was significantly associated with lower odds of severe stunting (rural AOR = 0.50; 95% CI: 0.33–0.74; p = 0.001; urban AOR = 0.58; 95% CI: 0.35–0.94; p = 0.028) and severe |

| No | Author (Year) | Country | Study Design | P* | I* | C* | O* |
|---|---|---|---|---|---|---|---|
| | | | | mother–child pairs) | | | underweight (rural AOR = 0.57; 95% CI: 0.38–0.87; p = 0.009; urban AOR = 0.48; 95% CI: 0.25–0.91; p = 0.025); no significant association with severe wasting |
| 10 | Lee et al (2019) | Ethiopia & India | Cross-sectional study | Mothers and their children aged 4–5 years from Ethiopia (n = 1,157) and India (n = 1,455) | Maternal literacy | High vs low maternal health literacy | In Ethiopia, maternal literacy was significantly associated with completion of four basic vaccinations (AOR = 2.27; 95% CI: 1.18–4.39; p < 0.01). In India, maternal literacy was not independently significant, but presence of a state-run health center was strongly associated with full vaccination (OR = 6.60; 95% CI: 1.57–27.70; p < 0.01). |

*Note: P*= Population; I*= Intervention; C*=Comparation ; O*= Outcomes*

A total of ten articles examined the relationship between maternal literacy and child health outcomes. The outcomes assessed across the studies included child nutritional status, immunization coverage, early childhood development, and oral health. A summary of the study characteristics is presented in Table 2.

**Maternal Health Literacy for Complete Child Vaccination**

Several studies demonstrated a significant association between maternal health literacy and complete child vaccination outcomes. Phommachanh et al (2021) reported that adequate maternal health literacy was significantly associated with complete child vaccination (p = 0.042). Similarly, Jiregna et al (2024) found that adequate maternal health literacy was significantly associated with completion of basic child immunization (aOR = 0.21; 95% CI: 0.17–0.73; p = 0.01). In addition, Lee et al (2019) showed that maternal literacy was significantly associated with full child vaccination in Ethiopia, whereas in India, the availability of health services played a more dominant role than maternal literacy alone (aOR = 2.27; 95% CI: 1.18–4.39; p < 0.01).

**Maternal Nutritional and Food Literacy for Child Nutrition Outcomes**

Several studies demonstrated a significant association between maternal nutritional and food literacy and child nutrition outcomes. Maheri et al (2022) reported that maternal nutritional literacy was significantly associated with child anthropometric indicators, including wasting, underweight, and stunting. Mothers of children with wasting, underweight, and stunting had significantly lower nutritional literacy scores compared with mothers of well-nourished children (wasting: p = 0.004; underweight: p = 0.023; stunting: p = 0.001).

Consistent with these findings, Hashemzadeh et al (2025) found that adequate maternal food and nutrition literacy had a protective effect against childhood overweight and obesity, even in food-insecure households. Children of mothers with good food and nutrition literacy had significantly lower odds of being overweight or obese (aOR = 0.29; 95% CI: 0.17–0.51; $p < 0.001$). In contrast, moderate to severe household food insecurity substantially increased the odds of childhood overweight or obesity (aOR = 4.64; 95% CI: 1.75–12.29).

Similarly, Johri et al (2016) demonstrated that higher maternal health literacy was significantly associated with lower odds of severe undernutrition among children in both rural and urban settings in India. Higher maternal health literacy was associated with reduced odds of severe stunting (rural: aOR = 0.50; 95% CI: 0.33–0.74; $p = 0.001$; urban: aOR = 0.58; 95% CI: 0.35–0.94; $p = 0.028$) and severe underweight (rural: aOR = 0.57; 95% CI: 0.38–0.87; $p = 0.009$; urban: aOR = 0.48; 95% CI: 0.25–0.91; $p = 0.025$). However, no significant association was observed between maternal health literacy and severe wasting. In addition, Oflu & Yalcin (2024) reported that higher maternal electronic health literacy was positively associated with appropriate child feeding practices. Children of mothers with sufficient electronic health literacy were more likely to receive adequate daily meals and snacks (aOR = 2.43; 95% CI: 1.56–3.78)

**Maternal Electronic Health Literacy for Early Childhood Development**

The study conducted by Oflu & Yalcin (2024) demonstrated that maternal electronic health literacy (eHealth literacy) was positively associated with early childhood development outcomes. Children of mothers with sufficient eHealth literacy were significantly more likely to be developmentally on track, as measured by the Early Childhood Development Index (aOR = 2.16; 95% CI: 1.29–3.61). In addition, adequate maternal eHealth literacy was strongly associated with appropriate learning support at home, with children of mothers with sufficient eHealth literacy having more than three times higher odds of receiving adequate learning support (aOR = 3.23; 95% CI: 1.69–6.18). These findings highlight the important role of maternal digital health literacy in supporting optimal early childhood development.

**Maternal Oral Health Literacy for Child Oral Health Outcomes**

Several studies demonstrated an association between maternal oral health literacy and child oral health outcomes, although the findings were not entirely consistent across studies. Marandi et al (2025) reported that higher maternal oral health literacy was significantly associated with a lower prevalence of dental caries among children, as measured using the CAST index in both primary and permanent molars ($p < 0.05$). In multivariable analysis, maternal oral health literacy remained a significant predictor of lower dental caries prevalence ($p < 0.05$), while maternal education level and socioeconomic status were also significantly associated with oral health literacy ($p < 0.05$). In contrast, Solak et al (2025) found that maternal food literacy was not significantly associated with children's DMFT scores ($p > 0.05$). However, maternal health literacy emerged as an independent predictor of children's DMFT scores in multivariable regression analysis, showing a statistically significant association ($p < 0.05$).

Higher maternal literacy is directly associated with improved child health outcomes. Adequate maternal literacy plays a crucial role in preventing various forms of child malnutrition, including stunting, wasting, and underweight, as well as overweight and obesity (Hashemzadeh et al., 2025; Maheri et al., 2022). Moreover, maternal literacy contributes to optimal child development, the prevention of dental caries, and increased coverage of basic childhood immunization (Jiregna et al., 2024; Lee et al., 2019; Marandi et al., 2025; Oflu & Yalcin, 2024; Phommachanh et al., 2021). This association reflects the ability of literate mothers to better access, understand, and apply information related to health, nutrition, and child care.

Health literacy (HL) represents a key individual competency that enables individuals to effectively manage and influence the determinants of health (Omidvar et al., 2021). It encompasses the ability to access, comprehend, and apply health-related information in health-related decision-making processes (Ahmadi & Karamitanha, 2023). Health literacy is closely linked to knowledge acquisition, as it determines how effectively individuals transform health information into health related behaviour (Ahmadi & Karamitanha, 2023).

These findings are consistent with the Knowledge–Attitude–Practice (KAP) theory, health literacy functions as a foundational mechanism through which knowledge is developed. Adequate health literacy enhances individuals' understanding of health information, which subsequently shapes their attitudes toward health and ultimately influences their health-related practices (Kang & Bagaoisan, 2024; Lai et al., 2021). Conversely, limited health literacy restricts knowledge formation, weakens positive attitudes, and increases the likelihood of unhealthy behaviors. This theoretical pathway is supported by empirical evidence showing that parents with low health literacy are more likely to engage in obesogenic behaviors, contributing to poorer health outcomes among children (Kang & Bagaoisan, 2024).

In addition, the relationship between health literacy and health behavior can be further explained by the Health Belief Model (HBM) (Alyafei & Easton-Carr, 2024). According to this model, individuals with adequate health literacy are better able to recognize health risks (perceived susceptibility and severity), understand the benefits of preventive actions (perceived benefits), and overcome barriers to adopting healthy behaviors (perceived barriers). Limited health literacy, on the other hand, impairs risk perception and decision-making, thereby reducing engagement in preventive health behaviors (Alyafei & Easton-Carr, 2024).

## CONCLUSION AND SUGGESTION

This systematic review demonstrates that maternal literacy, including nutritional, food, oral health, and electronic health literacy, is consistently associated with a wide range of child health outcomes. Higher levels of maternal literacy are linked to improved child nutritional status, reduced risks of stunting, wasting, underweight, overweight, and obesity, better oral health outcomes, enhanced early childhood development, and higher coverage of basic childhood immunization. These findings indicate that maternal literacy plays a critical role in shaping maternal knowledge, attitudes, and health-related behaviors, which subsequently influence child health and development.

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## Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used artificial intelligence (AI)–assisted tools to support language refinement, grammar checking, and improvement of clarity and readability of the text. The authors take full responsibility for the content of the manuscript and confirm that AI tools were not used for data analysis, interpretation of results, or generation of scientific conclusions.

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