

Review Article

Determinants of stunting among children under five years: A systematic review

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Abstract

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Background: Stunting remains a major chronic nutritional problem among children under five years and reflects long-term growth failure caused by biological, maternal, socioeconomic, environmental, and child-related determinants. Although many observational studies have examined factors associated with stunting, the evidence remains dispersed across different countries, populations, and methodological designs. A systematic synthesis is therefore needed to identify recurring determinants and clarify the strength of available evidence.

Objective: This systematic review aimed to identify and synthesize determinants associated with stunting among children under five years of age based on recent observational studies.

Methods: A systematic review was conducted following the PRISMA 2020 reporting guideline. Literature searches were performed in PubMed, ScienceDirect, and Google Scholar for articles published between 2021 and 2026. The search combined keywords and Boolean operators related to stunting, determinants, risk factors, associated factors, and children under five. 15 studies were included in the final synthesis. Study quality was assessed using the Joanna Briggs Institute critical appraisal tools. Data were synthesized narratively and grouped into maternal, socioeconomic, environmental, and child-related determinants.

Results: The most consistently reported determinants were low maternal education, poor maternal nutritional status, short maternal stature, low household income, household food insecurity, poor sanitation, limited access to clean water, low birth weight, lack of exclusive breastfeeding, and inadequate complementary feeding practices. Most included studies demonstrated moderate methodological quality, although limitations remained in confounding control, sampling procedures, and causal interpretation.

Conclusion: Stunting among children under five is associated with recurring and interrelated determinants across multiple domains. Because most studies were observational and meta-analysis was not performed, findings should be interpreted as recurring associations rather than definitive causal evidence. Future longitudinal and intervention studies are needed.

Background

Stunting among children under five remains a major global public health problem because it reflects chronic linear growth failure caused by prolonged nutritional deficiency, recurrent infection, and inadequate care environments during early childhood (World Health Organization, 2023). UNICEF identifies stunting as a critical marker of child well-being because impaired growth in early life can reduce cognitive development, future productivity, and human capital across generations (UNICEF, 2023). The World Bank frames stunting as a development challenge because childhood undernutrition contributes to poverty,

educational disadvantage, and long-term economic loss in low- and middle-income countries (World Bank, 2023). Black et al. emphasize maternal and child undernutrition as a persistent global burden because biological, dietary, social, and health-system factors interact throughout the life course (Black et al., 2021). Victora et al. highlight the need to revisit maternal and child undernutrition because the determinants of stunting operate from preconception, pregnancy, birth, and the first two years of life (Victora et al., 2021).

Stunting in Indonesia shows a complex determinant pattern because child growth is influenced by maternal characteristics,

household conditions, feeding practices, sanitation, and access to health services (Aditia et al., 2023). National secondary data show that stunting risk among Indonesian children varies across regions and socioeconomic groups because household vulnerability and service inequality shape child nutrition outcomes (Anastasia et al., 2023). Determinant studies in Indonesia report that under-five stunting is associated with family background, maternal factors, dietary intake, and preventive health behavior in early childhood (Permatasari et al., 2023). A case-control study in Indonesia confirms the need for risk-based analysis because stunting among toddlers is linked to modifiable household and caregiving factors (Fibrianti et al., 2025). Mutiarasari et al. explain that determinant analysis is essential because stunting prevalence cannot be reduced through single-sector interventions alone (Mutiarasari et al., 2021).

Maternal factors play a central role in childhood stunting because maternal nutritional status, height, pregnancy condition, and caregiving capacity directly influence fetal growth and postnatal development (Flynn et al., 2021). Low birth weight increases the risk of stunting among children under five because impaired intrauterine growth can limit linear growth potential after birth (Huriah et al., 2021). Parenting patterns affect stunting prevention attitudes because caregivers determine feeding routines, hygiene practices, health-seeking behavior, and stimulation during the critical growth period (Amalia & Siahaan, 2025). Community education can strengthen maternal knowledge because accessible health information improves caregiver awareness of child health risks and preventive practices (Angraeni et al., 2025). Health cadres can support stunting prevention because community-based participation strengthens breastfeeding support, early detection, and family engagement at the primary care level (Deswani et al., 2025).

Household food insecurity contributes to child stunting because limited access to sufficient and diverse food reduces dietary quality and nutrient adequacy among young children (Mengesha et al., 2021). Sociodemographic factors increase stunting vulnerability because parental education, household wealth, residence, and family structure shape access to food, care, sanitation, and health services

(Mansur et al., 2021). Evidence from Bangladesh shows that stunting, wasting, and underweight share overlapping determinants because child undernutrition is embedded within household poverty and maternal disadvantage (Rahman et al., 2021). Evidence from Timor-Leste shows that stunting among children under five is associated with contextual risk factors because nutrition outcomes are influenced by household, maternal, and environmental conditions (Nomura et al., 2023). A case-control study among children aged 24–59 months confirms that stunting determinants require integrated interpretation because biological and social exposures accumulate during early childhood (Muliani et al., 2023).

Environmental determinants deserve specific attention because unsafe water, poor sanitation, and inadequate hygiene can increase infection exposure and impair nutrient absorption among children under five (Kuse & Debeke, 2023). Microbiological and physical drinking-water quality relate to stunting incidence because contaminated water can increase diarrheal disease risk and disrupt child growth processes (Rudy Ferdinand et al., 2025). Environmental sanitation influences stunting risk because poor household sanitation can sustain pathogen exposure and repeated infection in early childhood (Sarwoko, 2026). Multilevel evidence from Ethiopia shows that stunting determinants operate at child, maternal, household, and community levels because children live within layered ecological systems (Bitew et al., 2023). Factor analysis of stunting among children under five reinforces the need for multidimensional assessment because nutritional status is shaped by interrelated biological, behavioral, and environmental risks (Siska Damayanti et al., 2025).

Existing studies have identified many determinants of stunting, but the evidence remains dispersed across countries, populations, designs, and determinant domains, which limits the development of integrated conclusions for policy and practice (Aditia et al., 2023; Bitew et al., 2023; Nomura et al., 2023). A systematic review is therefore needed because it can synthesize maternal, child, household, socioeconomic, environmental, and health-service determinants within a comprehensive analytical framework (Black et al., 2021; Victora et al., 2021). This synthesis can support prevention strategies because policymakers and

health professionals require consolidated evidence to prioritize high-impact interventions for children under five (UNICEF, 2023; World Bank, 2023).

This article aims to systematically review the determinants of stunting among children under five.

Methods

Study Design

This study employed a systematic literature review design to identify, evaluate, and synthesize evidence on determinants associated with stunting among children under five years of age. The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guideline to ensure transparent reporting of the identification, screening, eligibility assessment, and inclusion process. The review protocol was not registered in PROSPERO or other systematic review registries. However, the review question, eligibility criteria, search strategy, data extraction variables, and synthesis approach were determined before article screening to minimize selection bias and improve methodological transparency.

Research Question

The research question was formulated using the PECO framework because this review focused on determinants or exposures rather than interventions. The population was children under five years of age. The exposures were maternal, socioeconomic, environmental, and child-related determinants that may be associated with stunting. The comparison referred to children without exposure to the determinant or comparison groups as defined in each included study. The outcome was stunting, defined as height-for-age z-score below -2 standard deviations according to WHO child growth standards. Based on this framework, the research question was: "What maternal, socioeconomic, environmental, and child-related determinants are associated with stunting among children under five years of age?"

Inclusion and Exclusion Criteria

The inclusion criteria in this review were full-text research articles published between 2021 and 2026, quantitative observational studies including cross-sectional, case-control, and cohort designs, and studies examining determinants, associated factors, or risk factors of stunting among children under five years of age. Studies were included if they clearly defined stunting as height-for-age z-score below -2 standard deviations according to WHO child growth standards. Articles published in English or Bahasa Indonesia and published in peer-reviewed national or international journals were also considered eligible. Studies were excluded if they were review articles, editorials, commentaries, opinion papers, conference abstracts, letters to the editor, duplicate articles, or studies that did not focus on children under five years of age. Studies were also excluded if they did not clearly report stunting as an outcome, used non-standard or unclear definitions of stunting, had incomplete methodological information, or were inaccessible in full text.

Search Strategy

A systematic literature search was conducted in PubMed, ScienceDirect, and Google Scholar. The search included articles published between 2021 and 2026. The search strategy combined keywords, synonyms, and Boolean operators related to stunting, determinants, risk factors, associated factors, and children under five. In PubMed, Medical Subject Headings (MeSH) and free-text terms were combined where applicable. The search string used in PubMed was: ("stunting" OR "linear growth failure" OR "growth disorder") AND ("determinants" OR "risk factors" OR "associated factors") AND ("children under five" OR "under-five children" OR "preschool children" OR "toddlers"). The search string used in ScienceDirect was: "stunting" AND ("determinants" OR "risk factors" OR "associated factors") AND ("children under five" OR "under-five children"). The search string used in Google Scholar was: "stunting determinants among children under five" OR "risk factors of stunting in under-five children". The search was limited to full-text

articles published in English or Bahasa Indonesia. All retrieved articles were screened for duplication before title, abstract, and full-text assessment.

Study Selection Process

The study selection process was conducted based on the PRISMA flow diagram, which consists of four stages: identification, screening, eligibility, and inclusion.

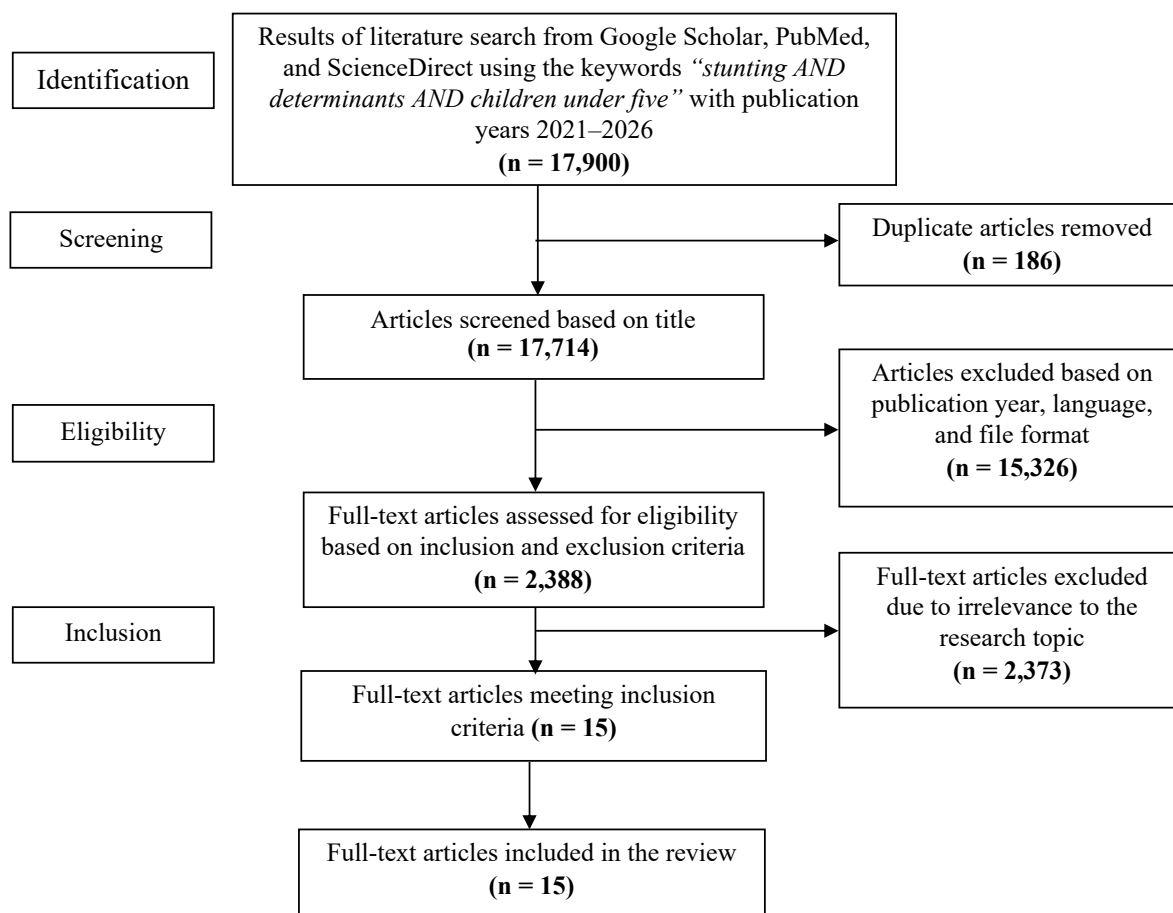


Figure 1. PRISMA Flow Diagram

Figure 1 illustrates the article selection process in this study based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. In the identification stage, a total of 17,900 articles were retrieved from database searches conducted in Google Scholar, PubMed, and ScienceDirect using predefined keywords.

In the screening stage, 186 duplicate articles were removed, leaving 17,714 articles that were subsequently screened based on their titles. At this stage, initial exclusion was performed to eliminate articles that were not relevant to the research topic.

During the eligibility stage, articles were further screened based on publication year, language, and availability of full text, resulting in the

exclusion of 15,326 articles. The remaining articles were then assessed for eligibility through full-text review based on the predefined inclusion and exclusion criteria, yielding 2,388 articles.

In the inclusion stage, 2,373 articles were excluded due to irrelevance to the research focus or lack of relevant findings. Ultimately, 15 articles met all inclusion criteria and were included in the final analysis. Therefore, a total of 15 relevant and high-quality full-text articles were reviewed in this study to identify the determinants of stunting among children under five years of age.

Quality Appraisal

The methodological quality of the included studies was assessed using the Joanna Briggs Institute Critical Appraisal Tools according to each study design. Cross-sectional studies were assessed using the JBI checklist for analytical cross-sectional studies, while case-control studies were assessed using the JBI checklist for case-control studies. The appraisal assessed key methodological aspects, including clarity of inclusion criteria, measurement of exposure and outcome, identification and management of confounding factors, validity of statistical analysis, and appropriateness of conclusions.

Quality appraisal was conducted independently by two reviewers. Each study was categorized as high, moderate, or low quality based on the proportion of fulfilled appraisal criteria. Studies were not excluded solely based on quality appraisal results; however, appraisal findings were considered in interpreting the strength and consistency of evidence.

JBI explains that its critical appraisal tools are used to assess the trustworthiness, relevance, and results of published papers, so mentioning the tool alone is not enough; the appraisal results should also be reported.

Data Extraction

Data were extracted using a standardized extraction form developed by the authors. The extraction form was piloted on several eligible articles before full data extraction to ensure consistency and completeness. The extracted information included author(s), year of publication, country or study location, study design, sample size, population characteristics, determinant variables, statistical analysis, adjusted or unadjusted findings, and key conclusions.

Data Synthesis

The extracted data were analyzed using a narrative synthesis approach because the included studies varied in terms of study design, population characteristics, determinant variables, statistical analysis, and reported findings. The determinants of stunting were grouped into four main domains, namely

maternal factors, socioeconomic factors, environmental factors, and child-related factors. The synthesis focused on identifying determinants that were repeatedly reported across studies and examining the consistency of findings across different settings. Determinants supported by repeated findings and adjusted analyses were interpreted as having stronger evidence, whereas determinants reported in only one or two studies or based only on bivariate analysis were interpreted cautiously. Because meta-analysis was not performed, this review did not calculate pooled effect estimates

Results

The methodological quality of the included studies was assessed using the Joanna Briggs Institute Critical Appraisal Tools. Overall, most studies demonstrated moderate methodological quality. The strengths of the included studies were the use of clear study objectives, defined populations, and appropriate statistical analyses. However, several studies had limitations, including insufficient control of confounding variables, limited explanation of sampling procedures, and reliance on cross-sectional designs that restricted causal interpretation. Therefore, the findings of this review were interpreted based on the consistency of reported determinants across studies and the methodological quality of the evidence. The findings of this study are presented in the following table 1.

Based on the synthesis, several determinants were repeatedly reported across multiple studies. Maternal education, maternal nutritional status, household income, sanitation, access to clean water, low birth weight, exclusive breastfeeding, and complementary feeding practices emerged as recurring determinants. Maternal and socioeconomic factors appeared most consistently across the reviewed studies, particularly maternal education, household income, and food security. Environmental determinants, including sanitation and clean water access, were frequently reported in studies from settings with limited WASH infrastructure. Child-related factors, especially low birth weight and suboptimal feeding

practices, were also repeatedly identified as important determinants.

However, the strength of evidence varied across determinants. Some factors were supported by adjusted analyses, whereas others were reported only through bivariate associations.

Table 1. Results of the Literature Review

Author (Year)	Country	Study Design	Sample	Variables Examined	Main Findings
Siddiqa et al. (2022)	Pakistan	Cross-sectional (secondary data)	12,708 children	Maternal education, socioeconomic status, breastfeeding, residence	Low maternal education, low income, and lack of exclusive breastfeeding increase the risk of stunting
Aditia et al. (2023)	Indonesia	Case-control	146 children	Exclusive breastfeeding, complementary feeding, infection, maternal knowledge	Lack of exclusive breastfeeding, poor complementary feeding, infection, and inadequate parenting increase stunting
Anastasia et al. (2023)	Indonesia	Cross-sectional (secondary data)	>4,000 children	Maternal BMI, child age, birth weight	Child age, birth weight, and maternal status significantly influence stunting
Bitew et al. (2023)	Ethiopia	Cross-sectional	32,816 children	Maternal education, socioeconomic status, sanitation	Individual and regional factors such as maternal education and sanitation influence stunting
Fibrianti et al. (2025)	Indonesia	Case-control	420 children	Low birth weight, breastfeeding, immunization, socioeconomic status	Low birth weight is the dominant determinant of stunting
Flynn et al. (2021)	Indonesia	Cross-sectional	Not specified	Maternal height, maternal nutritional status	Maternal nutritional status and height influence stunting
Huriah et al. (2021)	Indonesia	Case-control	71 children	Low birth weight, maternal occupation	Low birth weight is significantly associated with stunting
Kuse & Debeke (2023)	Ethiopia	Cross-sectional	7,960 children	Sanitation, water access, socioeconomic status, breastfeeding	Sanitation, clean water, and economic status are key determinants
Mengesha et al. (2021)	Ethiopia	Cross-sectional	660 children	Drinking water, diet, socioeconomic status	Unsafe water and food insecurity increase stunting
Mansur et al. (2021)	Bangladesh	Cross-sectional	6,170 children	Parental education, socioeconomic status	Low education and income increase stunting risk
Muliani et al. (2023)	Indonesia	Case-control	134 children	Exclusive breastfeeding, low birth weight, maternal chronic energy deficiency	Lack of exclusive breastfeeding and low birth weight increase stunting

Therefore, determinants reported consistently across several studies and supported by multivariable analysis should be interpreted as having stronger evidence than determinants identified in only one or two studies or based solely on unadjusted analysis.

Author (Year)	Country	Study Design	Sample	Variables Examined	Main Findings
Mutiarasari et al. (2021)	Indonesia	Case-control	520 children	Maternal knowledge, child illness history	Low maternal knowledge and child illness increase risk
Nomura et al. (2023)	Timor-Leste	Cross-sectional	4,581 children	Maternal height, socioeconomic status, breastfeeding	Maternal and economic factors significantly influence stunting
Permatasari et al. (2023)	Indonesia	Cross-sectional	460 children	Immunization, socioeconomic status, nutrition	Incomplete immunization increases stunting risk
Rahman et al. (2021)	Bangladesh	Cross-sectional	7,079 children	Socioeconomic factors	Economic and nutritional factors influence stunting

Based on Table 1, a total of 15 articles that met the inclusion criteria were analyzed in this study. These studies were conducted across various countries, including Indonesia, Ethiopia, Bangladesh, Pakistan, and Timor-Leste, indicating that research on the determinants of stunting has a global scope with diverse contextual backgrounds. In terms of study design, the majority of studies employed a cross-sectional approach, while several others used a case-control design. This suggests that most research on stunting focuses on identifying associations between risk factors and the occurrence of stunting at a specific point in time.

Overall, the synthesized findings indicate that the determinants of stunting can be categorized into several key factors, namely maternal factors, socioeconomic factors, environmental factors, and child-related factors. Maternal factors commonly identified include maternal education, nutritional status, maternal height, and breastfeeding practices. Several studies found that mothers with low educational levels and poor nutritional status are more likely to have children affected by stunting.

Socioeconomic factors were also consistently identified as important determinants across studies. Low household income, unstable parental employment, and household food insecurity contribute to an increased risk of stunting. These conditions affect the family's ability to provide adequate nutrition and access healthcare services. Furthermore, environmental factors such as poor sanitation

and limited access to clean water play a significant role in increasing the risk of stunting. Unhealthy environments increase the likelihood of infectious diseases, such as diarrhea, which can impair nutrient absorption in children.

Child-related factors also contribute to the occurrence of stunting, including low birth weight, child age, and suboptimal feeding practices, such as the lack of exclusive breastfeeding and inadequate complementary feeding. Several studies identified low birth weight as one of the most dominant risk factors for stunting. Overall, the findings of this literature review demonstrate that stunting is a multifactorial condition, in which multiple determinants interact with one another. Therefore, efforts to prevent and reduce stunting should be implemented through comprehensive approaches that address these various determinants.

Discussion

The findings of this systematic review indicate that stunting among children under five years is a multidimensional public health problem associated with maternal, socioeconomic, environmental, and child-related determinants. The reviewed studies consistently showed that low maternal education, poor maternal nutritional status, short maternal stature, low household income, household food insecurity, poor sanitation, limited access to clean water, low birth weight, lack of exclusive breastfeeding, and inadequate complementary feeding practices were repeatedly associated with stunting. These findings are consistent with the

broader understanding that stunting reflects long-term growth failure caused by prolonged nutritional deficiency, recurrent infection, inadequate caregiving, and unfavorable social and environmental conditions during early childhood (World Health Organization, 2023; UNICEF, 2023; Black et al., 2021; Victora et al., 2021).

Maternal factors were among the most frequently reported determinants in the included studies. Maternal education is an important factor because it influences a mother's ability to understand health information, access health services, make appropriate feeding decisions, and practice preventive childcare behaviors. Mothers with lower educational levels may have limited knowledge regarding exclusive breastfeeding, complementary feeding, hygiene practices, and early recognition of child illness. This finding is supported by Aditia et al. (2023), Permatasari et al. (2023), and Mutiarasari et al. (2021), who reported that maternal knowledge, parenting practices, and family-related factors were associated with stunting among children in Indonesia. Therefore, maternal education should be understood not only as a background characteristic but also as an enabling factor that shapes caregiving quality and child nutritional outcomes.

Maternal nutritional status and maternal height also appeared as important biological determinants of stunting. Poor maternal nutritional status can affect fetal growth during pregnancy and may increase the risk of adverse birth outcomes, including low birth weight. Short maternal stature may reflect a history of chronic undernutrition experienced by the mother during her own childhood, which can contribute to an intergenerational cycle of malnutrition. This interpretation is supported by Flynn et al. (2021), who emphasized the role of maternal nutrition and height in child stunting, and Nomura et al. (2023), who identified maternal and economic factors as important determinants of stunting among children under five. These findings suggest that stunting prevention should not begin only after a child is born, but should start earlier through nutrition improvement among adolescent girls,

women of reproductive age, and pregnant women.

Socioeconomic determinants were also consistently identified across the reviewed studies. Low household income, parental education, household food insecurity, and poverty can limit a family's ability to provide adequate food, access health services, maintain sanitation, and create a healthy home environment. Mansur et al. (2021) and Rahman et al. (2021) showed that sociodemographic and economic factors were associated with child undernutrition in Bangladesh. Similarly, Mengesha et al. (2021) found that household food insecurity contributed to child stunting in Ethiopia. These findings indicate that stunting is closely linked to social determinants of health. Families with limited economic resources often face overlapping vulnerabilities, including poor dietary diversity, reduced healthcare access, and inadequate living conditions. Therefore, nutrition interventions alone may be insufficient if poverty, food insecurity, and household vulnerability are not addressed.

Environmental determinants, particularly sanitation and access to clean water, were also important contributors to stunting. Poor sanitation and unsafe water increase children's exposure to pathogens, which may lead to recurrent diarrhea, intestinal infection, and impaired nutrient absorption. Kuse and Debeke (2023) reported environmental determinants of stunting among under-five children in Ethiopia, while Bitew et al. (2023) highlighted the role of individual and regional factors, including sanitation, in influencing stunting. In the Indonesian context, Rudy Ferdinand et al. (2025) found that microbiological and physical drinking water quality was related to stunting incidence, while Sarwoko (2026) emphasized the role of environmental sanitation in stunting risk. These findings support the view that water, sanitation, and hygiene interventions are essential components of stunting prevention programs.

Child-related factors, especially low birth weight and feeding practices, were also repeatedly associated with stunting. Low birth weight reflects suboptimal fetal growth and may

result from maternal malnutrition, anemia, infection, or inadequate antenatal care. Children born with low birth weight have limited nutritional reserves and may experience impaired growth during infancy and early childhood. Huriah et al. (2021) reported an association between low birth weight and stunting, while Fibrianti et al. (2025) identified low birth weight as a dominant determinant of stunting among children in Indonesia. This finding confirms that interventions to prevent stunting should include strengthening antenatal care, improving maternal nutrition, preventing anemia, and monitoring fetal growth during pregnancy.

Feeding practices were also central to child growth outcomes. Lack of exclusive breastfeeding and inadequate complementary feeding can increase the risk of nutrient deficiency and infection during the critical period of growth. Aditia et al. (2023) and Muliani et al. (2023) showed that lack of exclusive breastfeeding and poor complementary feeding practices were associated with stunting among children. Exclusive breastfeeding provides adequate nutrition and immune protection during infancy, while appropriate complementary feeding ensures sufficient energy, protein, and micronutrient intake after six months of age. Inadequate feeding practices may therefore disrupt linear growth, especially when combined with poverty, poor sanitation, and recurrent infection.

The findings of this review also show that determinants of stunting do not operate independently. Maternal education may influence feeding practices, hygiene behavior, and healthcare utilization. Low household income may contribute to food insecurity, poor sanitation, and limited access to health services. Poor environmental conditions may worsen the effect of inadequate nutrition by increasing infection exposure. This interaction among determinants is consistent with the multidimensional nature of child undernutrition described by Black et al. (2021), Victora et al. (2021), UNICEF (2023), and the World Bank (2023). Therefore, stunting prevention requires integrated interventions

that address both immediate causes, such as inadequate dietary intake and infection, and underlying causes, such as poverty, maternal education, food insecurity, sanitation, and healthcare access.

A critical issue in interpreting the findings is that most included studies used observational designs, particularly cross-sectional and case-control approaches. Such designs are useful for identifying associations, but they cannot fully establish causal relationships. For example, low socioeconomic status may contribute to stunting, but stunting may also worsen long-term household vulnerability through reduced developmental potential and productivity. Similarly, infection and poor nutrition may influence each other in a cyclical relationship. Because of this limitation, the determinants identified in this review should be interpreted as recurring associated factors rather than definitive causal factors. Stronger evidence requires longitudinal studies, intervention studies, and analyses that adequately control for confounding variables.

The practical implication of this review is that stunting prevention programs should prioritize determinants that are consistently reported and modifiable. These include improving maternal education, strengthening maternal nutrition, preventing low birth weight, promoting exclusive breastfeeding, improving complementary feeding practices, enhancing household food security, improving clean water access, and strengthening sanitation. Community-based strategies involving health workers, nurses, nutritionists, health cadres, families, and local stakeholders are needed to ensure that interventions reach vulnerable households. This is consistent with evidence from Deswani et al. (2025), who highlighted the importance of health cadres in supporting stunting prevention, and Angraeni et al. (2025), who emphasized the role of community education in improving maternal knowledge.

This review has several limitations. First, most included studies were observational, which limits causal interpretation. Second, the review did not conduct meta-analysis because the included studies varied in study design, sample

characteristics, determinant measurement, statistical analysis, and reported effect estimates. Third, some determinants were supported by adjusted analyses, while others were reported only through bivariate associations, making the strength of evidence uneven across determinants. Fourth, the included studies were conducted in different countries and contexts, so the dominant determinants may vary depending on local socioeconomic, cultural, environmental, and health-system conditions. Despite these limitations, this review provides a structured synthesis of recurring determinants of stunting among children under five and supports the need for comprehensive, multisectoral, and context-specific prevention strategies.

Conclusion and Recommendation

This systematic review found that stunting among children under five is associated with recurring and interrelated determinants across maternal, socioeconomic, environmental, and child-related domains. The most consistently reported determinants included low maternal education, poor maternal nutritional status, short maternal stature, low household income, food insecurity, poor sanitation, limited access to clean water, low birth weight, lack of exclusive breastfeeding, and inadequate complementary feeding practices.

These findings indicate that stunting is not only a nutritional problem but also a reflection of broader maternal, household, environmental, and social conditions. However, because most included studies were observational and meta-analysis was not conducted, this review cannot estimate pooled effect sizes or establish causal relationships. Therefore, the findings should be interpreted as a synthesis of recurring determinants rather than definitive causal evidence.

Stunting prevention strategies should prioritize determinants that were consistently reported across studies, particularly maternal education, maternal nutrition, household food security, WASH improvement, low birth weight prevention, exclusive breastfeeding, and appropriate complementary feeding. Multisectoral interventions involving health, nutrition, education, social protection, and environmental sectors are needed to address

these determinants comprehensively. Future studies should use longitudinal or intervention designs and report adjusted effect estimates to strengthen evidence on causal pathways and intervention effectiveness.

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Declaration of conflict of interest

The authors declare no competing interests.

Declaration on the Use of AI

The authors declare that no artificial intelligence tools were used in the preparation, writing, or editing of this manuscript.

Data Availability Statement

Data sharing is not applicable to this article.

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