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Determinants of Stunting in Children Under Five: A Literature Review

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ABSTRACT

Background: Stunting is a chronic growth disorder in young children caused by long-term malnutrition, which affects not only physical growth but also cognitive development and the quality of human resources. The prevalence of stunting in Indonesia remains at 19.8% according to the 2024 SSGI, still far from the national target of 14.2% by 2029. Objective: This article aims to review factors associated with the incidence of stunting in infants, including maternal factors, child factors, as well as environmental and socioeconomic factors. Methods: A literature review was conducted by searching for relevant articles in electronic databases (Google Scholar) using the keywords "causes of stunting," "stunting in infants," and "risk factors for stunting" in both Indonesian and English. Ten articles were selected based on inclusion criteria: publication dates from 2021 to 2025, discussing factors causing stunting in infants, and being academic journals. The articles were analyzed using a matrix table. Results: Maternal factors (education, nutritional knowledge, and maternal age), child factors (exclusive breastfeeding, nutritional intake, history of infectious diseases, and dietary patterns), as well as environmental and socioeconomic factors (sanitation, family income, parenting practices, and access to health services) were identified as factors associated with the incidence of stunting in infants. Conclusion: Stunting in infants is influenced by a variety of interrelated factors. Recommended prevention programs include improving mothers' knowledge and education regarding child nutrition, promoting exclusive breastfeeding, routine monitoring of infant growth and development, improving environmental sanitation, and enhancing family economic well-being through community-based intervention programs.

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INTRODUCTION

Stunting is a condition characterized by impaired growth and development in children caused by inadequate nutritional intake, frequent exposure to infections, and insufficient psychosocial stimulation (Organization, 2015). According to the Ministry of Health, stunting is a chronic nutritional disorder resulting from long-term inadequate nutrient intake, typically caused by feeding practices that do not meet the child's nutritional needs. This condition is not merely a physical growth disorder but is also closely associated with structural and functional brain damage, various cognitive deficits, and delayed maturation of the central nervous system, which can have long-term effects extending into adulthood (Soliman et al., 2021). In line with this, (Rahayu et al., 2022a) emphasize that stunting is a malnutrition problem among infants and toddlers caused by various factors and affecting not only physical growth but also the overall quality of human capital. Globally, the issue of stunting remains far from resolved. Recent data indicate that as many as 149 million children under the age of five worldwide were affected by this condition in 2022, with half of all child deaths attributed to malnutrition (Organization, 2024). Low- and middle-income countries, including Indonesia, bear the largest proportion of this burden. (Wardita et al., 2021)explain that nutritional status is a critical health indicator, with the toddler age group being particularly vulnerable to nutritional issues, especially stunting—a condition of growth failure in toddlers due to chronic malnutrition, resulting in height that does not correspond to their age. Stunting that has occurred and is not followed by catch-up growth can lead to persistent growth impairments. This condition constitutes a public health issue as it is associated with increased risks of illness, mortality, and developmental delays in children, both motor and cognitive (Rahmadhita, 2020). (Daracantika et al., 2021) indicate that stunting can affect the biological development of the brain and nervous system, contributing to reduced cognitive abilities in children, including lower performance on intelligence tests, both verbal and non-verbal.

At the national level, Indonesia has made commendable progress, although the remaining challenges are still significant. Results from the 2024 Indonesian Nutrition Status Survey (SSGI) indicate that the national stunting prevalence has been reduced to 19.8% (Indonesia, 2025)wi, equivalent to over 4.48 million infants, a decrease of 1.7% compared to 21.5% in 2023. Additionally, 377,000 new cases of stunting among infants were successfully prevented). Nevertheless, this achievement remains quite far from the national target of 14.2% set in the Medium-Term National Development Plan (RPJMN) to be achieved by 2029 (Ministry of Health of the Republic of Indonesia, 2025). (Pertiwi & Hendrati, 2023) In their study in East Java, it was found that various factors contributing to stunting—including parenting practices, Healthy Living Behaviors (HLB), economic status, education, birth history, history of infectious diseases, and maternal pregnancy history—which vary across regions, constitute one of the main obstacles in slowing the national decline in stunting rates.

Maryati et al. (2023) explain that this failure to thrive in infants is essentially a manifestation of the accumulation of long-term nutritional deficiencies, which subsequently disrupts physical function and increases susceptibility to disease. (Rosha et al., 2020) identified the direct causes of stunting, including: the provision of colostrum and exclusive breastfeeding that has not been supplemented with adequate complementary feeding, the provision of pre-lactational formula as a substitute for breast milk that has not yet been produced postpartum, the continued use of processed foods beyond one year of age, which fails to meet nutritional needs as the child grows, insufficient protein intake, and a history of recurrent infections. Indirect causes include low family socioeconomic status and poor environmental sanitation, which increase the risk of children contracting infectious diseases. From the perspective of determining factors, various studies in Indonesia indicate that a history of recurrent infections, the absence of exclusive breastfeeding, a history of low birth weight, and low family socioeconomic status are the most consistently associated factors with stunting in infants. On the other hand, Yanti et al. (2020) emphasize that indirect variables such as limited maternal education, inadequate caregiving practices, poor sanitation conditions, and low household food security further exacerbate the risk of stunting in children.

Given the complexity and multifactorial nature of stunting, a comprehensive review that synthesizes recent evidence is essential to inform more targeted interventions. Various studies have identified a wide range of contributing factors, including maternal education, exclusive breastfeeding, nutritional intake, history of infectious diseases, family income, environmental sanitation, and access to health services (Maryati et al., 2023; Rahayu et al., 2022a; Sunarti et al., 2024; Nur et al., 2024). However, these factors are often examined in isolation, without an integrated analysis across multiple domains simultaneously. Therefore, this study aims to identify and analyze the determinants of stunting in children under five, encompassing maternal factors, child-related factors, and environmental and socioeconomic factors, based on studies conducted in Indonesia from 2021 to 2025 (Andini et al., 2025; Maharani, 2024; Ratnaningsih & Indrawati, 2025; Widyawati et al., 2023; Lala et al., 2024; Slodia et al., 2022). The novelty of this review lies in its integration of the most recent nationally relevant literature from diverse regions across Indonesia within a unified analytical framework, providing a more holistic and up-to-date understanding of stunting determinants to support the development of effective, evidence-based prevention strategies.

METHOD

This literature review was conducted in the following stages: defining the PICO question (Problem, Intervention, Comparison, Outcome), searching for articles, evaluating relevant articles, and analyzing and synthesizing the articles. Relevant articles were searched for in the Google Cendekia electronic database using the keywords "causes of stunting," "stunting in toddlers," and "risk factors for stunting" in both Indonesian and English. Ten articles were selected based on the following inclusion criteria: published within the last 5 years (2021–2025), addressing the factors causing stunting in infants, and being academic journal articles. Content analysis was performed using a matrix table, comparing research methods, study subjects and settings, as well as the variables examined, which included maternal knowledge, parenting practices and feeding patterns, exclusive breastfeeding, low birth weight (LBW), history of infectious diseases, nutrient intake, environmental sanitation, family income, parental education, and access to health services, as well as their relationship with the incidence of stunting in infants.

RESULTS AND DISCUSSION

Table 1. Summary of Research Findings on Stunting Risk Factors in Toddlers in Indonesia (2022–2025)

Author (Year)	Method & Sample	Key Findings
Maryati, Annisa, & Amira (2023)	Quantitative retrospective; saturated sampling (n=30); Palasari Village, Ciater District	Dominant factors: history of infectious disease (37%), low birth weight (23%), insufficient protein intake (53%), insufficient energy intake (33%), no exclusive breastfeeding (40%), low maternal education (57%), low paternal education (50%), low

Author (Year)	Method & Sample	Key Findings
		family economic status (70%).
Rahayu, Yunariyah, & Jannah (2022)	Quantitative descriptive survey; purposive sampling (n=114); Penambangan Village, Semanding Health Center, Tuban	The largest contributing factors were: basic maternal education (52.6%), household income below the regional minimum wage (76.3%), and no exclusive breastfeeding (78.1%).
Maharani (2024)	Quantitative analytical survey; simple random sampling (n=71 toddlers aged 1–5 years); Mpunda Health Center working area	Family economic status was the primary cause of stunting; higher stunting prevalence was associated with lower household income.
Sunarti, Kurniati, Amartani, & Lestari (2024)(Sunarti et al., 2024)	Quantitative cross-sectional; purposive sampling (n=167 toddlers); Serawai Health Center working area	Significant associations found with: maternal knowledge (p=0.008), family income (p=0.011), posyandu attendance (p=0.022), basic sanitation facilities (p=0.031), and nutritional intake (p=0.022).
Ratnaningsih & Indrawati (2025)	Mixed-method phenomenological design; SQ-FFQ and in-depth interview; purposive and snowball sampling (n=14 informants); Denpasar City, Bali	Direct stunting factors included low intake of energy, carbohydrates, fat, and iron. Protein, zinc, and vitamin A intake were classified as adequate.
Nur, Kurniawan, & Hakim (2024)	Descriptive quantitative; univariate analysis based on BKKBN 2023 data; Citimbang Village, Salem District, Brebes Regency, Central Java	Significant associations found with: access to clean water and proper latrines, family income, access to health services, parental education level, and employment status.
Slodia, Ningrum, & Sulistiyani (2022)	Observational analytic case-control; chi-square and logistic regression (n=56 toddlers); Cepu District, Kapuan Health Center	The strongest factor was insufficient energy intake (p=0.03). Nutritional intake and history of infection were associated with stunting. Environmental sanitation showed no direct association.
Widyawati, Siswanto, & Afandi (2023)	Observational analytic cross-sectional; chi-square and multivariate analysis (n=119 mothers with infants aged 6–36 months); Pabelan District	Parenting practices were identified as a significant risk factor for stunting (p=0.010).
Andini, Mamlukah, Marliana, & Russiska (2025)	Quantitative analytic observational cross-sectional; total sampling (n=136 toddlers aged 6–59 months); Bantarujeg Health Center, Majalengka Regency	Factors significantly associated with stunting: maternal age (p=0.001), maternal education (p=0.005), maternal employment status (p=0.026), and access to health facilities.
Lala, Purnamasari, & Sastrapra wira (2024)	Descriptive cross-sectional design (n=36 toddlers); Baregbeg Health Center working area	Most stunted toddlers had: history of exclusive breastfeeding (80.56%), low birth weight (86.11%), history of diarrheal infection (86.11%), poor dietary patterns (77.78%), non-varied diet (88.88%), low parental income (86.11%), and moderate maternal education (55.56%).

Source: compiled from various studies, 2022–2025

Ten articles were analyzed using a matrix table (Table 1) to examine the variables studied in each research study and their relationship to the incidence of stunting. Of the 10 articles, 8 employed a cross-sectional study design, one used a case-control design, and one utilized a mixed-methods approach

with a phenomenological design. All 10 articles originated from Indonesia, with research locations spread across various regions, ranging from West Java, Central Java, East Java, Bali, to Sulawesi. The analysis results were grouped into three categories: (1) maternal factors, (2) child factors, and (3) environmental and socioeconomic factors.

The Relationship Between Maternal Factors and the Prevalence of Stunting

Maternal factors—including maternal education, maternal knowledge, and maternal age—were found to be associated with the prevalence of stunting in several of the analyzed articles.

Maternal education was the most frequently discussed factor. A study by (Rahayu et al., 2022) showed that the majority of mothers with stunted toddlers had only a primary education, accounting for 52.6%. The study by Maryati, Annisa, and Amira (2023) reinforces this finding by noting that 57% of mothers of stunted toddlers had low levels of education. Mothers with low levels of education tend to have limited access to and understanding of nutritional information, making them less capable of implementing good parenting practices for their children.

Mothers' knowledge has also been shown to be significantly associated with stunting. A study by (Sunarti et al., 2024) found that mothers' knowledge is significantly associated with stunting (p=0.008). Mothers with good nutritional knowledge are better able to select and provide nutritious foods appropriate for their children's growth and development, thereby reducing the risk of stunting.

In addition to education and knowledge, a mother's age has also been shown to be associated with the incidence of stunting. A study by (Andini et al., 2025) found that a mother's age is significantly associated with the incidence of stunting (p=0.001). Mothers who become pregnant at too young or too old an age are at risk of giving birth to babies with suboptimal health conditions, which can subsequently contribute to the occurrence of stunting.

Practical Implication: It is recommended that community-based nutrition education programs targeting mothers be strengthened, particularly for young mothers and those with low educational backgrounds, through regular counseling sessions at community health posts (posyandu) and integration with the Family Hope Program (PKH), in order to improve maternal nutritional knowledge and reduce the risk of stunting in children.

The Relationship Between Child-Related Factors and the Prevalence of Stunting

Child-related factors, including exclusive breastfeeding, nutritional intake, history of infectious diseases, and dietary patterns, have been found to be closely associated with the prevalence of stunting.

Exclusive breastfeeding is one of the factors consistently identified across several studies. A study by(Rahayu et al., 2022a) showed that nearly all mothers of stunted toddlers did not practice exclusive breastfeeding, at 78.1%. A study by (Maryati et al., 2023)also noted that 40% of stunted toddlers did not receive exclusive breastfeeding. Exclusive breastfeeding provides complete nutrients and immunoglobulins essential for a child's growth and immune system, so its absence increases the risk of stunting.

Inadequate nutrient intake has also been proven to be a dominant cause of stunting. Research by (Ratnaningsih & Indrawati, 2025)identified that the direct factors contributing to stunting are low intake of energy, carbohydrates, fats, and iron in toddlers. Research by (Slodia et al., 2022) demonstrated that inadequate energy intake is the strongest factor causing stunting (p=0.03). Research by (Sunarti et al., 2024) further confirmed that nutritional intake is significantly associated with the occurrence of stunting (p=0.022). (Maryati et al., 2023) noted in greater detail that 33% of stunted infants had insufficient energy intake and 53% had insufficient protein intake.

A history of infectious diseases was also found to be associated with stunting in several studies. A study by (Slodia et al., 2022) demonstrated that a history of infection in infants is significantly associated with stunting. The study by (Maryati et al., 2023) noted that 37% of stunted toddlers had a history of infectious diseases, while the study by Lala, Purnamasari, and Sastraprawira (2024) found that 86.11% of stunted toddlers experienced infectious diarrhea. Recurrent infectious diseases cause the body to lose nutrients and disrupt the absorption process, thereby hindering a child's growth.

Poor dietary habits also contribute to stunting in children. A study by (Lala et al., 2024) indicates that the majority of stunted toddlers have poor dietary habits (77.78%) and lack dietary variety (88.88%). This lack of dietary diversity prevents children from obtaining sufficient micronutrients and macronutrients to support optimal growth.

Practical Implication: It is recommended that health workers and cadres actively promote exclusive breastfeeding through lactation counseling programs and provide guidance on diverse and balanced complementary feeding, while also strengthening early detection and treatment of infectious diseases in toddlers through routine immunization and improved hygiene practices at the household level.

The Relationship Between Environmental and Socioeconomic Factors and the Prevalence of Stunting

Environmental and socioeconomic factors, including environmental sanitation, household income, access to health services, and child-rearing practices, have been shown to be associated with the prevalence of stunting.

Environmental sanitation has been found to be associated with stunting in several studies. A study by (Sunarti et al., 2024) found that basic sanitation facilities were significantly associated with the incidence of stunting (p=0.031). A study by (Nur et

al., 2024) reinforced these findings by showing that access to clean water and ownership of adequate toilets were significantly associated with the incidence of stunting. Poor sanitation conditions increase exposure to infection-causing pathogens, which ultimately chronically hinder children's growth.

Low household income has consistently been found to be associated with stunting in nearly all the articles analyzed. A study by (Rahayu et al., 2022b) showed that 76.3% of parents of stunted toddlers had incomes below the minimum wage. A study by Maryati et al. (2023) noted that 70% of families with stunted toddlers had low economic status, and a study by Lala et al. (2024) found an even higher figure, with 86.11% of stunted toddlers coming from families with low income. A study by (Sunarti et al., 2024) confirmed a significant association between family income and stunting (p=0.011). Low-income families face limited purchasing power for nutritious food, thereby increasing the risk of macro- and micronutrient deficiencies in their toddlers.

Access to healthcare services has also been shown to play a role in stunting incidence. A study by (Andini et al., 2025) found that access to healthcare facilities is associated with stunting incidence, while (Sunarti et al., 2024) demonstrated that visits to community health posts are significantly associated with stunting (p=0.022). Routine monitoring of growth and development enables early detection of nutritional problems, allowing for intervention before stunting becomes more severe.

Parental caregiving practices are also a factor that cannot be ignored. Research by (Widyawati et al., 2023) found that parenting practices are a significant risk factor for stunting (p=0.010). (Maharani, 2024) concluded that low family socioeconomic status is associated with suboptimal parenting practices, meaning these two factors are interrelated in increasing the incidence of stunting among infants and toddlers.

Practical Implication: It is recommended that family income improvement interventions, such as conditional social assistance or entrepreneurship training, be integrated with nutrition programs to support the effectiveness of reducing stunting rates. In addition, local governments should accelerate the provision of clean water access and proper sanitation facilities in high-risk areas, while also strengthening the role of posyandu as an integrated monitoring and early intervention hub for child growth and development.

CONCLUSION

Stunting in young children is a health issue influenced by a variety of interrelated factors. Maternal factors, including low educational attainment, limited nutritional knowledge, and high-risk maternal age; child-related factors, such as failure to provide exclusive breastfeeding, inadequate nutritional intake, history of infectious diseases, and poor dietary patterns; as well as environmental and socioeconomic factors, such as inadequate sanitation, low family income, suboptimal parenting practices, and limited access to health services, all have a significant association with the incidence of stunting in infants.

Efforts to prevent and reduce stunting rates are a shared responsibility involving parents, health workers, and the government. Recommended programs include improving mothers' knowledge and education regarding child nutrition, promoting exclusive breastfeeding, routinely monitoring toddlers' nutritional intake and growth and development at community health posts (posyandu), improving environmental sanitation, and enhancing family economic well-being through integrated, community-based intervention programs.

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