

# Determinants of Stunting Among Children Under Five Years in Indonesia: Evidence from the 2021-2022 Demographic and Health Survey

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## ABSTRACT

At the global level, the prevention of stunting is one of the Sustainable Development Goals (SDGs). Indonesia is currently working towards achieving the second Sustainable Development Goal, which entails ending hunger, ensuring food security, improving nutrition, and supporting sustainable agriculture. As a part of this objective, efforts are being made to decrease the prevalence of stunting in children by 2025. Attention towards stunting is crucial as it can adversely affect children's physical and cognitive development well into adulthood if not addressed appropriately. This paper conducted a literature review from various sources, with a focus on google scholar and prioritizing sources from the last five years, as well as research on the population in Indonesia. It was determined through the analysis of several sources that maternal, child, and environmental factors pose various risks for stunting in Indonesia. Maternal factors that may play a role in child development include the mother's age, upper arm circumference, height, breastfeeding or complementary feeding practices, early initiation of breastfeeding and food quality during pregnancy. A history of low birth weight or prematurity, male sex, neonatal illness, frequent and recurrent diarrhea, infectious diseases, and lack of immunization are among the child factors associated with developmental outcomes. Factors such as living in a low socio-economic environment, limited family education, especially maternal education, insufficient household income, open defecation in rivers, gardens or inadequate latrines, consumption of untreated drinking water and high exposure to pesticides are also associated with the prevalence of stunting.

**Keywords:** Stunting, Health, Child

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## 1. INTRODUCTION

According to 2019 data from the World Health Organization (WHO), South-East Asia has the highest prevalence of stunting among children under five (31.9%) in the world, second only to Africa (33.1%). Of the six countries in South-East Asia, Indonesia ranks sixth, with a stunting prevalence rate of 36.4%, following Bhutan, Timor Leste, Maldives, Bangladesh, and India.

In 2021, 24.4% of young children in Indonesia were stunted, according to the Indonesian Nutrition Status Survey (SSGI) conducted by the Ministry of Health (Kemenkes), which means that nearly a quarter of the country's toddlers suffered from stunting last year. Notably, this percentage has decreased compared to the previous years. It is predicted that the prevalence of

stunting in Indonesia in 2020 will be 26.92%. In Indonesia, the prevalence of stunting increased to 37.2% in 2013 and 30.8% in 2018, as shown by recent trends. Nevertheless, the numbers have begun to decrease in recent years. According to the Indonesian Nutrition Status Survey (SSGI) conducted in 2022, the stunting rate dropped from 24.4% in 2021 to 21.6% in 2022.

At the global level, the reduction of stunting is a key target of the Sustainable Development Goals (SDGs). In Indonesia, we are currently pursuing the second SDG, which is to end hunger, achieve food security and improved nutrition, and support sustainable agriculture. The target under this goal is to decrease stunting by 2025. Goal 2 is closely linked to Goal 3, which strives to ensure healthy lives and well-being for people of all ages.

Stunting remains a significant issue in Indonesia's nutrition landscape. In 2018, the Basic Health Survey (Riskesdas) reported that the stunting rate was 30.8%, significantly higher than the National Medium-Term Development Plan (RPJMN) target of 19% by 2024. Stunting has a higher prevalence in comparison to other nutrition-related challenges such as undernutrition, wasting, and obesity.

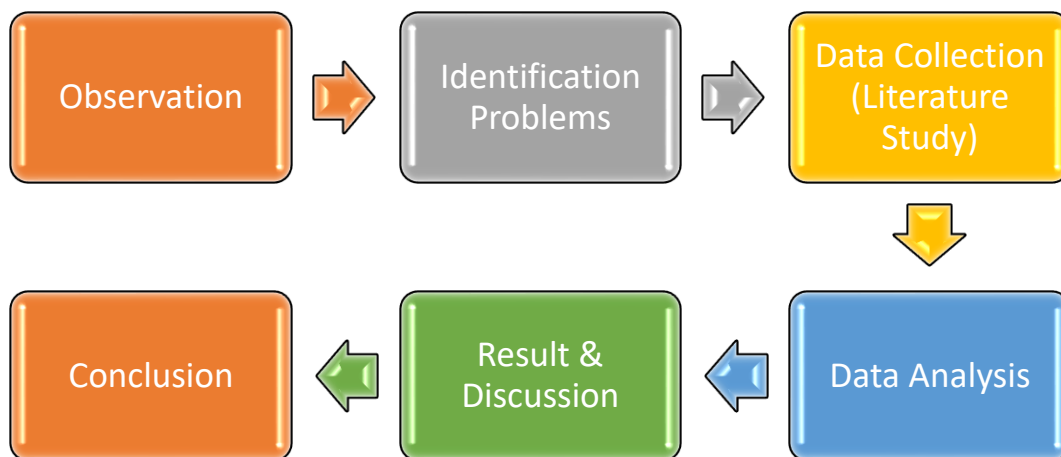
Stunting is defined as a nutritional condition of young children who are classified as short or tall for their age. There are many causes of stunting, including socioeconomic conditions, maternal nutrition during pregnancy, childhood disease, and inadequate infant feeding. These causes tend to be long-lasting (chronic).

Stunting deserves greater attention because it can affect children well into adulthood, particularly by increasing the risk of stunted physical and cognitive development if not properly addressed. In the short term, stunting can decrease learning ability resulting from inadequate cognitive development. In the long term, it can reduce children's quality of life in adulthood due to limited opportunities for better education, employment, and income. Furthermore, individuals may face an increased risk of developing non-communicable diseases, including diabetes, hypertension, cancer, and others, later in life if they become obese.

The purpose of this paper is to present an overview of common causes and risk factors in Indonesia. The paper is made by conducting a literature review from various sources, especially searched using a search engine, namely google scholar, by prioritizing sources from the last five years and research conducted on the population in Indonesia. It is hoped that this paper can be taken into consideration in making policies for related populations, especially children in Indonesia.

## **2. METHOD**

In this research, the method used is a literature study that searches, collects, and analyzes the essence of various available reference sources, such as research journals, journal reviews, annual reports, books, and data related to stunting published within the last 5 years. The search strategy for literature involved the utilization of reputable online databases, namely, Pubmed, DOAJ, Garuda Portal, and Google Scholar. English and Indonesian keyword combinations, such as "stunting," "related factors," "children," "determinant factors," "stunting incidence," "stunting factors," and "stunting toddlers," were entered to enhance sensitivity and specificity of the search results.



Graphic 1. Flowchart Study Literature

### 3. RESEARCH AND DISCUSSION

Based on research conducted by the World Health Organization (WHO) on diverse global backgrounds, stunting in children can be attributed to various factors. Two primary contributors include external circumstances from the community or country environment, as well as internal factors such as conditions within the child's home.



Figure 1. WHO (2020)

It is important to acknowledge that a country and its society can significantly influence stunting in children within that particular country. External factors such as culture, education,

healthcare, economics, politics, agriculture, food systems, water, sanitation, and environmental conditions have a significant impact. However, internal factors within the child's home, such as adequate childcare, exclusive breastfeeding, optimal complementary feeding, maternal health, housing conditions, low food quality, food and water safety, and infections also require attention.

Stunting in children can be attributed to a number of factors, according to research conducted by the World Health Organization (WHO) in a variety of settings around the world. Two of the main contributing factors are external circumstances from the environment of the community or country, as well as internal factors such as the conditions in the child's home.

It is important to acknowledge that a country and its society can significantly influence stunting in children within that particular country. External factors like culture, education, health, economy, politics, agriculture, food systems, water, sanitation and environmental conditions have significant influence. Internal factors, including adequate care, exclusive breastfeed, optimal complementary feeding, maternal health, housing conditions, low dietary quality, food and water safety, and infections, must also be considered.

Stunting arises from a multitude of interrelated factors, not solely from inadequate nutrition for pregnant women or toddlers. Several studies in Indonesia have explored stunting risk factors, which may commence during conception due to maternal factors. Mothers with insufficient knowledge about health and nutrition from pregnancy through childbirth are heavily implicated in stunting their offspring. During pregnancy, receiving quality Ante-Natal Care (health services for mothers during pregnancy), Post-Natal Care (health services for mothers after childbirth), and early education are essential. These are linked to the consumption of sufficient iron supplements during pregnancy, exclusive breastfeeding, and optimal complementary feeding.

In 2013, the attendance rate of children at Posyandu in Indonesia declined to 64% from 79% in 2007, leading to inadequate access to immunization services for children. Furthermore, due to the high cost of nutritious food in Indonesia, most Indonesians are still unable to access nutritious food and clean drinking water. This is compounded by the lack of access to clean water and sanitation.

A study from Purwestri et al. (2018) in the Demak district of Central Java, Indonesia, identified child food intake as a risk factor for stunting. Central Java is one of Indonesia's primary rice growing regions, ranking sixth in rice productivity in 2013. Despite this, it ranks seventh in terms of chronic child malnutrition. In 2015, a study was conducted in three sub-districts of Demak with the highest rice production and the worst under-five nutritional status.

The selected children were aged 6 to 60 months, breastfed, and from farming families. Data was collected on their dietary intake and nutritional status was measured. It was found that almost one-third (31.9%) of the 335 children in the study were stunted. Interestingly, food accessibility was similar for all children, regardless of their nutritional status. However, households with non-stunted children had significantly higher food quality with regards to energy, calcium, and iron intake. Additionally, the consumption of unhealthy snacks was found to be a contributing factor to inadequate food intake.

In their 2017 study, Aryastami et al. (2017) analyzed data from RISKESDAS 2010 to examine the association between low birth weight, child feeding practices, neonatal illness, and stunting in Indonesian young children between the ages of 12 and 23 months. Bivariate and multivariate logistic regression were used to analyze the data, with a sample size of 3024 children.

The study found that the prevalence of stunting among Indonesian children under the age of five (12-23 months) was 40.4%. Early initiation of breastfeeding and exclusive breastfeeding were reported in 42.7% and 19.7% of infants, respectively. 68.5% of infants were given early complementary feeding. Multivariate analysis showed that low birth weight (LBW) infants

were 1.74 times more likely to stunt than normal weight infants. Boys were 1.27 times more prone to stunting than girls. Infants who had a history of neonatal illness were 1.23 times more susceptible to stunting. In addition, poverty is significantly associated with stunting as another indirect variable.

The study found that low birth weight (LBW), male gender, history of newborn disease, and poverty were factors associated with stunting among children aged 12-23 months in Indonesia, with LBW being the most important determinant of stunting.

In the Brebes District of Central Java, Wellina et al. (2016) conducted further research using a case-control method with a sample of 77 stunted and 77 normal children aged 12-24 months. The study utilized structured questionnaires and interviews to collect data on birth weight, birth length, disease status, and pesticide exposure.

The results showed that factors such as low energy adequacy, low protein and zinc intakes, low birth weight, and high pesticide exposure were associated with stunted growth among children aged 12-24 months in Brebes District. These variables accounted for 45% of the observed stunting. Notably, the most significant risk factor for stunted growth was high exposure to pesticides.

Maehara et al. (2019) conducted a cross-sectional survey of 2,160 adolescent girls and boys in Klaten and West Lombok districts in 2017. The study collected data on a range of variables, including nutritional status, socio-demographic characteristics, morbidity, dietary intake, and physical activity, among others.

Results showed approximately 25% of adolescent girls and 21% of boys suffered from stunting while 5% of girls and 11% of boys were underweight. Moreover, 11% of girls and boys were overweight. Higher socioeconomic status and parental education were associated with lower odds of stunting.

Another research conducted by Kartini, et al. (2019) analyzed pesticide exposure in children with stunting, especially at school age, namely 8-12 years. The research was conducted in the Bulakamba area of Central Java in 2019, which is an agricultural zone. The case-control methodology was utilized, and a sample size of 160 children (48 stunted and 112 controls) was used. The exposure to pesticides was assessed based on its history in the perinatal, infancy, and childhood stages. Additional variables were measured such as thyroid stimulating hormone (TSH), insulin-like growth factor-1 (IGF-1), haemoglobin, zinc, albumin, dietary adequacy (energy and protein), history of infection, low birth weight and maternal height.

The study's findings indicated a significant relationship between exposure to high levels of pesticides and stunting. Furthermore, the results showed that pesticide exposure was an independent risk factor for stunting in children.

In 2018, Huriah, et al (2018) conducted research in Bantul, Yogyakarta, Indonesia using the case-control method. The case group consisted of 23 children while 91 children were included in the control group. Data were collected by interviewing mothers with children ranging in age from 6-59 months. The study found diarrhea to be a significant determinant of child stunting in rural areas. This is due to environmental factors, which are among the risk factors for stunting.

Research on primary school children in North Sumatra Province, specifically in Medan city and Langkat Regency, indicates a high prevalence of stunting. The study utilized a cross-sectional approach analysis and included a total sample of 400 children aged 8-13 years in July - October 2017. Data were collected through questionnaires and anthropometric assessments, revealing a stunting prevalence of 38.87% among primary school children in the area. The factors associated included maternal education, income, occupation, energy intake, and protein intake. Of these, energy intake was the dominant factor.

The findings of Lestari et al.'s (2018) study revealed common risk factors for stunting in children under 5 years of age in East Lombok, West Nusa Tenggara. The study employed a

case-control observational analysis method and was conducted in 31 posyandu facilities in the designated region from April to May 2018. The study comprised 186 children with low birth weight (LBW), birth length, exclusive breastfeeding, history of infectious diseases, maternal age at pregnancy, maternal upper arm circumference at pregnancy, and family income as independent variables. A questionnaire collected and analyzed the data, showing that stunting risk was higher with a history of LBW, maternal age at pregnancy  $<20$  or  $\geq 35$  years, and a history of infectious disease. Biases were avoided, and precise wording was used to ensure grammatical correctness. Consistent citation and footnote style were employed.

A questionnaire collected and analyzed the data, showing that stunting risk was higher with a history of LBW, maternal age at pregnancy  $<20$  or  $\geq 35$  years, and a history of infectious disease. High family income, birth length, exclusive breastfeeding, and maternal upper arm circumference at pregnancy  $\geq 23.5$ cm all reduced the risk of stunting.

According to a study conducted by Sajalia, et al. (2018), North Lombok Regency on the island of Lombok is known to have high rates of stunting due to community behaviors, particularly poor sanitation. One contributing factor is the practice of defecating in public areas like rivers or gardens. Additionally, a lack of maternal knowledge results in sick children often receiving care from traditional healers rather than medical services. In one study, public service announcements produced by the North Lombok District Health Office were examined to provide information on poor sanitation practices and their association with stunting.

Likewise, studies by Liem et al. (2019) and Torlesse et al. (2016) have demonstrated a link between open defecation and higher incidence of stunting. This is because human excreta can serve as a breeding ground for flies and other insects, which in turn can spread disease-causing bacteria to surfaces in the home, particularly on utensils. This potentially exposes humans to the risk of diarrhea. In the case of young children suffering from repeated or chronic diarrhea, there is a possibility of stunted growth due to poor absorption of essential nutrients in the body. Additionally, this condition can impair the functioning of intestinal walls, leading to a decrease in the absorption of necessary nutrients. In addition, human waste can also contaminate the surrounding environment. Thus, the impact is not only on the individual or family, but also on those around them.

Previous research conducted by Irwansyah et al. (2016) in West Lombok Regency analyzed the correlation between adolescent pregnancy and stunting in children aged 6-23 months. The sample size included 110 children, with stunted and non-stunted children serving as controls. The analysis demonstrated a significant relationship between adolescent pregnancy and stunting incidence. Pregnancy in adolescence paired with short maternal height, low birth weight, and low maternal education increases the likelihood of stunting.

Another study conducted by Helmyati et al. (2017) in West Lombok regency compared the population of gut microbes between normal-height and stunted children attending primary schools in the region. The sample was composed of 115 elementary school students aged 9-12 years, and the researchers collected data on height by age and conducted gut microbiota analysis using fecal samples. The stunting group had significantly lower levels of Lactobacillus bacteria than the normal group, according to t-test results. The numbers of Bifidobacteria, Enterobacter, and E. coli showed no significant differences between the two. However, the trend was toward lower levels of Bifidobacteria and higher levels of Enterobacter and E. coli bacteria in the stunting group.

The study findings are consistent with previous research by Gough, et al. (2015) and Owino, et al. (2016), indicating that bacterial overgrowth in the small intestine is associated with poor hygiene and stunted growth. The underlying mechanism is likely to be related to the frequent occurrence of diarrhea, which triggers the proliferation of harmful bacteria in the intestine due to infection, dysfunction of the intestinal tract due to environmental factors, and weakened immunity. Moreover, the reduction of probiotics in the gastrointestinal tract may

result in inflammation, malabsorption of nutrients, and stunted growth. In addition, the reduction of probiotics in the gastrointestinal tract can lead to inflammation, malabsorption of nutrients, and stunted growth. In addition, the combination of diarrhea-related infections and inadequate nutrition can disrupt the balance of microbiota in the gastrointestinal tract, impeding nutrient absorption and consequently increasing the risk of stunting.

Some previous studies, including research conducted by Budiastutik and Rahfiludin (2019), also conducted a review of various literature sources. The literature review conducted by Budiastutik et al. revealed risk factors for stunted growth in developing countries. Birth length was found to be a risk factor 16.43 times, low maternal education 3.27 times, children living in rural areas 2.45 times, LBW 4.5 times, lack of ANC 3.4 times, absence of immunization 6.38 times, and non-exclusive breastfeeding 4.0 times.

Another literature study conducted by Beal and colleagues (2018) found that several factors are important determinants of stunting in Indonesia. These include non-exclusive breastfeeding in the first 6 months, low household socioeconomic status, inadequate latrines in households, untreated drinking water, preterm birth, short birth length, low maternal height, and low education.

According to literature review, factors affecting stunting in children under 5 include maternal education level. Setiawan (2018) found a strong relationship between maternal education and child stunting incidence, indicating the importance of maternal education in promoting child health, especially nutrition. People with higher levels of education have greater knowledge about maintaining a healthy body and implementing a nutritious diet. They also tend to avoid harmful habits, such as smoking and drinking alcohol, which ultimately leads to better overall health.

They also tend to avoid harmful habits, such as smoking and drinking alcohol, which ultimately leads to better overall health. They also tend to avoid harmful habits, such as smoking and alcohol consumption, which ultimately leads to better overall health. Furthermore, educated mothers are more likely to make informed decisions that positively affect their and their children's nutritional intake and overall health, according to research conducted by Husnaniyah et al. (2020). In addition, mothers with higher education are expected to improve family finances, which in turn can increase family income and improve the quality of nutritional intake for children.

A study conducted by Rahayu, et al., (2018) found that toddlers with mothers who have limited knowledge tend to face a greater risk of stunting. Similarly, research by Sastria, et al. (2019) showed a significant association between parental knowledge of toddler stunting and child stunting incidence. When parents lack knowledge about prevention and proper child nutrition, the resulting risk of stunting is 11.13 times higher. Research conducted by Olsa, et al. (2017) explores the close link between knowledge and education. Higher education tends to result in a broader understanding of various topics.

However, insufficient education does not necessarily mean that mothers lack the knowledge necessary to provide adequate nutrition for their families. High levels of curiosity can inspire mothers to seek information on proper nutrition choices to ensure the health of their children. Uliyanti et al. (2017) found that maternal nutritional knowledge is positively associated with nutritional status. Consistent with their findings, higher levels of nutritional knowledge among mothers are related to better nutritional status outcomes.

Rahayu et al. (2018) found that toddlers who were not exclusively breastfed had a higher risk of stunting. Simultaneously, Mugiati et al. (2018) explained that exclusive breastfeeding, which means breast milk given from birth to six months of age, plays a crucial role in child growth by reducing and preventing infectious diseases and stunting. Research findings from Yuniarti et al. (2019) suggest that exclusive breastfeeding may contribute to stunting

risk. Notably, the majority of stunted children were not exclusively breastfed, and those who did not exclusively breastfeed had almost 20 times higher risk of stunting.

According to Kurniadi, R. (2019), children who received complementary foods at 6 months of age were less likely to experience stunting than children who received complementary foods before or after 6 months of age. Children who received complementary foods before or after 6 months of age were potentially 3.78 times more likely to experience stunting than children who received complementary foods at 6 months of age, according to a study by Teferi, M. B. et al. (2016). As infants grow, accompanied by increases in body weight and length, research by Angkat (2018) and Hasan & Kadarusman (2019) suggests that their needs for energy and other nutrients also increase. To meet these increased nutritional requirements, it is necessary to supplement breast milk with complementary foods that contain at least 360 kcal per 100g. Research conducted by Beal et al. (2017) indicated that low-quality food, inadequate feeding practices, and food and water safety issues are all associated with stunting and suboptimal complementary feeding in Indonesia.

According to Agustia et al. (2018), a history of infectious disease is a risk factor for stunting, with the statistical tests showing an Odds Ratio (OR) of 3.400. This indicates that toddlers who have had infectious diseases have a 3.4 times higher likelihood of stunting than those who have not. Additionally, Tando (2012) clarified in Ariati's (2019) study that the health condition of toddlers, encompassing the frequency and duration of illnesses, also plays a role in the likelihood of stunting in children. Nutritional status and incidence of infection relate to each other reciprocally. Toddlers undergoing inadequate nutrition have a higher risk of contracting diseases as their immune system weakens, increasing their susceptibility to illnesses. Conversely, if infectious diseases occur frequently, a person may become malnourished due to a decrease in appetite.

This report highlights that toddlers from low-income families face a 5.385 times higher risk of stunting compared to those from families with sufficient income. Limited purchasing power for nutrient-rich foods due to low economic status puts them at risk of macro and micronutrient deficiencies, which can lead to stunting in children. The risk of stunting increases when nutrient deficiencies are prevalent in pregnant women or toddlers. Research indicates that stunting is prevalent in families with low socioeconomic status. Low understanding of nutrition and diet management, as well as poor personal hygiene practices, contribute to stunting among the disadvantaged. Various studies suggest that family income has a significant impact on the occurrence of stunting in children under five. Family income affects the fulfillment of energy and protein intake for children, and it is also closely linked to the provision, access, and distribution of sufficient food for families, which may contribute to stunted growth.

#### **4. CONCLUSION**

Based on the identification and review of multiple sources, it can be concluded that risk factors for stunting in Indonesia consistently stem from maternal, child, and environmental factors. The incidence of stunting tends to increase when a mother's age during pregnancy is under 20 or over 35 years old, her upper arm circumference during pregnancy is equal to or greater than 23.5cm, when she experiences pregnancy during her adolescence, and when her height is below average. This continues after the mother's delivery with respect to breast or complementary feeding. Evidence suggests that stunting risk is higher when there has been no breastfeeding initiated early, no exclusive breastfeeding, early introduction of complementary foods before six months, or low-quality diet in terms of energy, protein, calcium, iron, and zinc intake. Children's growth and development may be disrupted, leading to stunting, if they have a history of low birth weight (BBLR) or prematurity, experience male gender, neonatal disease,



frequent and recurrent diarrhea, infectious diseases, or do not receive immunizations. Environmental factors also contribute to stunting. Low socioeconomic status, lack of family income, inadequate family education - particularly among mothers, open defecation in places such as rivers or gardens or in insufficiently maintained latrines, untreated drinking water, and high exposure to pesticides are all contributing factors. The analysis results from these various sources should be considered by readers and policymakers in order to improve the implementation of stunting prevention programs in Indonesia. This will contribute towards a better future for Indonesian children and the nation as a whole.

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