

# Determinants of Stunting Incidents in Toddlers in Indonesia: Literature Review

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## Abstract

**Background:** Stunting is a chronic nutritional problem that occurs in children in Indonesia which must be treated seriously and continuously. In Southeast Asia, Indonesia ranks second out of 11 countries for the incidence of stunting with a prevalence of 30% after Timor Leste. **Aim:** This study aims to analyze the factors that contribute to stunting in Indonesian toddlers. **Method:** This study is a review of the literature. The sources were retrieved using the keywords "stunting" AND "determinants" AND "Indonesia" from a variety of databases, including PubMed, Scopus, and Science Direct. The study must address the causes of stunting, be carried out in Indonesia, be written in English, and be published between 2018 and 2023, among other requirements for inclusion. **Results:** 388 articles total 129 from Pubmed, 84 from Scopus, 201 from Science Direct, and 3530 from Science Direct were discovered by the database search. Out of all these databases, only fifteen papers were suitable for this study's inclusion. **Conclusion:** Maternal factors, child factors, feeding factors and household factors are determining factors for stunting in toddlers.

Keywords : stunting, determinant, Indonesia, toddlers

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## 1. Background

A youngster who is too short or extremely short, falling below -2 SD from the WHO growth standard [1] is considered stunted. 155 million children under the age of five suffer from stunting [2]. Stunting affects 154.8 million children under the age of five worldwide [3]. Stunting affects most children in underdeveloped and impoverished nations like Indonesia [4]. According to the Basic Health Research (Riskesmas) data from 2018, 30.8% of toddlers in Indonesia suffer from stunting [5]. With a rate of 30% in 2020 [6]. Indonesia has the second-highest prevalence of stunted toddlers in Southeast Asia. The National Medium Term Development Plan (RPJMN) for 2020–2024, however, calls for a 14% reduction in stunting [7]. Many factors significantly contribute to stunting in toddlers. Factors associated with stunting in children under five may not be the same from one country to another. Area of residence is a basic factor for stunting in Madagascar [8]. In Timor Leste, male children are more at risk of experiencing stunting [9]. In Vietnam, the factor most strongly associated with stunting is children with uneducated mothers [10]. The variable low birth weight also influences the incidence of stunting in India [11].

One of the second Sustainable Development Goals' objectives is stunting (SDGs). Due to inadequate nutrition, stunting can happen while the fetus is still in the womb and will impact development for the first two years of life at the very least. It is said that the 0–24 month range is a critical window that influences life quality. Poverty is typically the primary cause of stunting. In children, stunting is indicative of malnutrition, particularly during the first 1,000 days of life. Childhood stunting can have detrimental effects and last a lifetime. A number of long-term effects, including slowed cognitive development, diminished learning capacity, and decreased productivity at work, are intimately linked to stunting [12]. Children that are stunted may experience pain, impairment, and stunted physical growth. Children are the country's future generation, and it is expected of them to mature, flourish, and contribute to society. Problems that children face during their formative years will have an impact on the future quality of the country.

In order for government officials and healthcare professionals to develop health promotion initiatives that will lower the prevalence of stunting, it is necessary to address factors that contribute to the incidence of stunting. Aside from that, the issue of stunting is worth talking about because of its long-term effects on the caliber of future human resources, its medium-term effects on cognitive development, and its grave short-term effects on toddlers' risk of morbidity.

**2. Metode**

The method used is a literature review using databases from various research journals. The data collection process was carried out through the Science Direct, NCBI PubMed, and Scopus databases. The inclusion criteria used for data collection were research articles related to factors related to stunting in Indonesia, full text articles, English language articles, journal publications in 2018-2023, and research conducted in Indonesia. The exclusion criteria in this review were published articles that were accessed only in the form of abstracts and articles that were not in accordance with the research objectives.

**3. Results**

**Table 1.** Several research articles related to factors related to the incidence of stunting

<b>Researcher/ Year</b>	<b>Title</b>	<b>Purpose</b>	<b>Research Design</b>	<b>Results</b>
Permatasari et al (2023)	The association of sociodemographic, nutrition, and sanitation on stunting in children under five in rural area of West Java Province in Indonesia.	The purpose of this study is to examine the connection between stunting and sociodemography, nutrition, and sanitation in Indonesia's West Java Province's rural districts.	Cross sectional study	The incidence of stunting in toddlers is influenced by factors such as the age of the child, the style of birth, the height of the mother, and vitamin A. The dominant factor is maternal height, with an AOR of 2940 (95% CI: 1,333-6,484).

Anastasia et al (2023)	Determinants of stunting in children under five years old in South Sulawesi and West Sulawesi Province: 2013 and 2018 Indonesian Basic Health Survey	This study uses data from the Basic Health Research (Riskesdas) for the years 2013 and 2018 to identify the factors that contribute to stunting in children under five in the provinces of South Sulawesi and West Sulawesi.	Cross-sectional study	According to a 2013 survey conducted in South Sulawesi Province, birth weight, children aged 12-23 months, mother's weight, and families with two children under five were the main causes of stunting in children under five. The mother's weight, women with no formal education or only an elementary education, moms with a junior high school education, mothers with a height of less than 151 cm, mothers with a height of 151-160 cm, children aged 12-23 months, and birth weight were the decisive factors in the 2018 study. According to a 2013 survey, children between the ages of 12 and 23 months, toddlers living in low-income households, and toddlers living in households with three or more toddlers were the main causes of stunting in toddlers in West Sulawesi Province. Maternal BMI, maternal weight, moms with no formal education or only an elementary school education, women with a junior high school education, mothers with a high school education, children aged 12-23 months, male gender, and acute respiratory infection were the decisive factors in the 2018 study.
Suratri et al (2023)	Risk Factors for Stunting among Children under Five Years in the Province of East Nusa Tenggara (NTT), Indonesia	Using secondary data from Basic Health Research (RISKESDAS) 2018, this study attempts to investigate the risk factors for stunting in East Nusa Tenggara	Cross-sectional study	The findings of the bivariate test indicate a substantial correlation between the prevalence of toddler stunting and the age group, mother's level of education, and residing in a rural location. A child's age between 12 and 23 months is the main cause of stunting.

		Province, Indonesia.		
Muliani et al (2023)	Determinants of stunting in children aged 24-59 months: a case-control study	Identify the factors that contribute to stunting in infants between the ages of 24 and 59 months.	Case control study	The following factors have been linked to stunting in children between the ages of 24-59 months: a history of exclusive breastfeeding, a history of low birth weight deliveries, and a history of chronic energy deficiency (KEK).
Permatasari et al (2023)	The Determinants of Stunting in the Under-five in Three Municipalities in the Special Capital Region of Jakarta	This research aims to: examine the determinants of stunting among toddlers in three municipalities in the Special Capital Region of Jakarta, Indonesia	Cross sectional study	The determining factors for stunting in children under five are family income, maternal and child health services, birth weight, immunization records, and balanced nutrition practices.
Nugroho et al (2023)	Social Determinants of Stunting in Indonesia	Research objective: To identify social factors related to the incidence of stunting in Indonesia.	Cross sectional study	Maternal education, parental employment and income, environment, social and family support, and health service factors are determining factors for stunting
Oginawati et al (2023)	The associations of heavy metals exposure in water sources to the risk of stunting cases	The purpose of this study is to investigate the connection between environmental variables and the prevalence of stunting in Bandung Regency.	Case control study	Stunting incidence is significantly correlated with As and Cd contents in sources of drinking water. There may be a strong correlation between the occurrence of stunting and lower parental education and family income levels.

Kusumajaya et al (2023)	Sociodemographic and Healthcare Factors Associated with Stunting in Children Aged 6–59 Months in the Urban Area of Bali Province, Indonesia 2018	This study's objective is to examine the sociodemographic variables and medical services linked to stunting in Bali's metropolitan areas.	Cross sectional study	The following factors are linked to stunting in urban children under five: the mother's educational attainment, prenatal care, iron pill use, having a large household, and having a toilet.
Arlinda et al (2022)	Determinant Factors of Stunting in West Pasaman District, West Sumatera Indonesia	The purpose of this study is to identify the factors that contribute to stunting in West Pasaman Regency.	Cross sectional study	Stunted toddlers are most usually afflicted with diarrhea. When compared to parenting and environment, the food variable had the largest indirect impact on the incidence of stunting.
Shofifah et al (2022)	Environmental Sanitation at Home and History of Infection Diseases As Risk Factors For Stunting In Toddlers In Drokilo Village, Kedungadem District, Bojonegoro Regency	The purpose of this study is to examine the connection between home environmental hygiene, a family history of infectious diseases, the risk of infectious diseases, and the prevalence of toddler stunting.	Case control study	There exists a correlation between the occurrence of stunting in children aged 12-59 months and male toddlers, as well as poor environmental sanitation and a history of infectious diseases.
Huriah et al (2021)	The Determinant Factors of Stunting Among Children in Urban Slums Area, Yogyakarta, Indonesia	The purpose of this study is to examine the factors that determine the prevalence of stunting in children under five who live in urban slums.	Case control study	Maternal employment and LBW variables are the two main factors influencing the incidence of stunting among toddlers in urban slum regions.

Mulyaningsih et al (2021)	Beyond personal factors: Multilevel determinants of childhood stunting in Indonesia	Examining the determinants in Indonesia at the household, subdistrict, and provincial levels is the goal of this study.	Crosssectional study	The likelihood of stunting in children varies significantly based on features at the provincial and sub-district levels. Stunting was linked to individual-level variables such as diarrheal illnesses, low birth weight, and male offspring. Height and number of school years attended by the mother are factors that indicate the likelihood of stunting. The place of residence, availability to basic infrastructure, and household wealth quartile are factors linked to stunting in households (WASH).
Rizky M and Sutjiati E (2021)	Low intake of essential amino acids and other risk factors of stunting among under-five children in Malang City, East Java, Indonesia	Analyzing the amount of essential amino acid intake (EAAs) and risk factors for stunting in children under five is the goal of this study.	Case control control	Stunting is more common among children who don't get enough EAAs, have low birth weights, live in households with monthly incomes below the minimum wage, and don't nurse their babies to completion.
Cameron et al (2021)	Childhood stunting and cognitive effects of water and sanitation in Indonesia	The purpose of this study is to investigate the association between stunting and children's cognitive development and low-income households' access to community clean water and sanitation facilities.	Cross sectional study	Stunting is more likely to occur in children who do not live in households with improved sanitation or in open defecation-free communities.

Febriani et al (2020)	Risk Factors and Nutritional Profiles Associated with Stunting in Children	This study aims to uncover different nutrients and risk factors related to stunting.	Case control study	Children who are stunted typically fall between the ages of 12 and 36 months. Low birth weight and stunting are linked.
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#### 4. Discussion

The literature review's findings indicate that a number of factors, including those related to mothers, children, feeding, and households, influence stunting in Indonesian children under the age of five.

##### Maternal Factors

Maternal factors that determine stunting consist of age, height, weight, BMI, education, history of CED, employment, iron consumption during pregnancy, routine antenatal care. The research results show that mothers over 35 years of age are more likely to have stunted children compared to mothers under 35 years of age. This is consistent with a study by Sudirman et al., 2023 [13], which demonstrates that moms who are at-risk (younger than 20 and older than 35) are more likely to give birth to children who are stunted. A mother who is too old has a risk of giving birth to a premature child [14]. Premature births frequently result in low birth weight babies, which increases the risk of stunting [15]. In addition, the maturity level of the mother's age influences patience in the process of nurturing and caring for children [16]. As mothers get older, they are able to increase their knowledge about children's nutrition so they don't just rely on previous experience in caring for children. Height is a form of growth that is intergenerational (passed down from mother to child). The results of this study are in line with research conducted by Gonete et al., 2021[17] which explains that mothers with short posture are 2.8 times more likely to give birth to babies with stunting. The protein and energy reserves possessed by short mothers tend to be lower, the reproductive organs are also smaller, causing space for fetal development to be narrower, so that fetal growth through the placenta and baby growth through the quantity and quality of breast milk are also disrupted [18]. Amaha et al., 2021 [19] revealed similar findings, showing a strong correlation between stunting and maternal height. Stunting is 2.5 times more likely to occur in mothers under 150 cm than in mothers above 160 cm. Mothers who are less than 150 cm run a 2.5 times higher risk of stunting than mothers who are taller than 160 cm.

Furthermore, infants born to underweight mothers may experience shortages in both macro and micronutrients. Underweight mothers have a higher chance of having difficult deliveries and generate less breast milk, which is bad for the health of the unborn child [20]. The study's findings indicate that moms with less education run a higher chance of producing children who are stunted. This is consistent with a study conducted in 2023 by Soofi et al., [21] which found that children whose moms have less education are more likely to experience stunting. Children born to mothers with poor levels of education are 1.57 times more likely to be stunted [22]. Insufficient maternal education is linked to childcare methods and feeding children food that is inadequately nutritious [23, 24]. Higher incomes can result from better education. A higher family income enables parents to give their kids the nourishment and medical attention they need [25]. Pregnant women may encounter nutritional issues such as iodine deficiency illnesses, low body mass index (BMI < 18.5), anemia, and CED

conditions [26]. Pregnant women who are malnourished will have CED, which will have an adverse effect on the physical condition of the fetus. According to Adila et al.'s research findings from 2023[27], KEK has an 11,278-fold increased chance of causing stunting. Pregnant women who experience chronic low energy levels put their fetus at risk for nutritional inadequacies, which lowers blood volume. Due to insufficient cardiac output, the placenta's blood supply will diminish, increasing the chance of giving birth to a child who has LBW or IUGR [28].

The majority of the moms in this study who had stunted children were housewives. Research by Mentari and Hermansyah, 2018 [29] indicates that children of unemployed moms are usually stunted. Though they have plenty of free time, mothers without jobs run the risk of developing nutritional health problems if they employ bad parenting practices, such as not regulating meal portions. In addition, mothers who choose not to work by default are unemployed, which means they cannot help their families buy healthy meals for their toddlers [30]. Work has a major impact on both the amount and quality of food [31]. Iron tablets are a dietary supplement that increases iron levels during pregnancy. The ANC program is responsible for providing these tablets. According to the findings, mothers who do not consume 90 iron tablets during their pregnancy may give birth to stunted children. The study by Orsango et al., 2021 [32], which demonstrated that iron supplementation can enhance fetal and maternal health by reducing the risk of stunting and low birth weight, also led to the same conclusion. An appropriate iron level in the body can lead to a healthy regeneration of mucosal cells, shielding the mother against anemia. According to the results, mothers who receive insufficient prenatal care six times during their pregnancy are more likely to have stunted children than mothers who receive adequate prenatal care. This is consistent with Walimah et al., 2022 [33], which demonstrates a link between the frequency of toddler stunting and Antenatal Care (ANC) visits. The risk of stunting is 4.9 times higher in cases of non-standardized ANC visits. In order to lower maternal mortality, antenatal care provides pregnant women with early detection and diagnosis of high-risk pregnancies and deliveries. Pregnant women who attend ANC will receive iron and folic acid supplements, nutritional counseling, and health education. This will ensure that the unborn child receives enough nutrition, which can lower the rise in toddler stunting incidence [34].

### **Child Factors**

The factor that causes stunting in this study is the child's age 12-23 months. A similar thing was also explained by Titaley et al., 2019 [35] who found that children aged 12-23 months had a greater chance of experiencing stunting. The results of the study on the age limit of 12-59 months show that the lower the child's age group, the greater the possibility that they are at risk of experiencing stunting. However, in children aged 0-11 months the risk of stunting is lower. The findings in this study prove that there is a relationship between male gender and the incidence of stunting. Research by Vonaesch et al., 2017 [36] shows that boys have around 1.7x higher risk of experiencing stunting than girls. Boys tend to be more active so they need a lot of energy, if food intake is insufficient it will increase stunting in children [37]. Numerous variables have been linked to stunting in Indonesia, according to earlier studies. Studies by Arini et al., 2020 [38] demonstrate a correlation between stunting and the incidence and length of diarrhea and ARI. A number of factors, including as maternal education, smoking behaviors, household density, nutritional status, and immunization status, can affect the risk of acute respiratory infections (ARI) in children under five years old [39]. A child's body will trigger an immune reaction if they come into contact with a virus or other infectious agent. Energy needs will rise when this immunological response is stimulated. On the other hand, infectious

diseases will cause energy loss in children, so this mechanism proves that nutritional status and ARI influence each other. Toddlers with infectious disorders will have altered eating habits, which will impede their growth. There is a strong correlation between birth weight and long-term growth and development. Low birth weight is a sign of chronic malnourishment, ill health, inadequate medical treatment, and pregnancy [40]. According to research by Aryastami et al., 2017 [41], infants born with LBW had a 1.74 fold increased risk of stunting between the ages of 12 and 23 months. Infants with low birth weight usually have difficulty keeping up with their fast growth. Stunted children are those who grow more slowly than typical. Stunting is known to be another effect of a vitamin A deficiency. Osteoblasts may produce less bone matrix in the event of a vitamin A deficiency, which would impede remodeling and ultimately interfere with bone formation [42]. This is consistent with a study by Ssentongo et al., 2020 [43], which found a strong link between toddler stunting incidence and vitamin A insufficiency. The direct effect of vitamin A on growth regulation or greater vulnerability to infectious illnesses explains the link between stunting and vitamin A deficiency. Immunization is a useful public health strategy for lowering the prevalence of infectious disease morbidity and mortality. According to research findings by Fajariyah and Hidajah, 2020 [44], children between the ages of 2 and 5 who had an incomplete immunization history were 1.78 times more likely to suffer from stunting. Immunizations boost a toddler's immune system and help prevent infections that can be avoided by immunization. Children who do not receive vaccinations are more likely to contract infectious infections, which will lower their appetite and hinder their growth [45]. Since a toddler's development at this stage of life impacts their future growth, it is necessary to monitor each toddler's development in order to identify abnormalities early on.

### **Feeding Factors**

The first food that is thought to be the best source of nutrients for infants is breast milk. The optimal fluid for neonates is breast milk, as it contains all the necessary macronutrients and bioactive substances to ensure comprehensive nourishment [46]. Additionally, breast milk contains a variety of immunological components that aid in the development of the body's immunity [47]. Breastfeeding exclusively has been shown to increase a child's chances of survival and wellbeing [48]. Furthermore, exclusive breastfeeding can enhance early growth and shield kids against chronic illnesses [49]. The practice of exclusive breastfeeding and the incidence of stunting are related, according to research by Sahdani et al., 2021 [50] ( $p=0.047$ ). According to studies by Rilyani et al., 2021 [51], there is a noteworthy correlation between the prevalence of stunting and exclusive breastfeeding. If toddlers are fed exclusively breast milk, their nutritional demands for height and weight are satisfied.

### **Household Factors**

One of the elements that determines the prevalence of stunting is the number of children. These results are consistent with studies by Siswati et al., 2023 [52], which found that the risk of stunting increases 30% greater in households with two or more children. The number of children and stunting are associated. This condition is linked to inadequate nutrition due to improper feeding, moms' lack of time to spend with each child, and unbalanced household financial distribution. A lack of access to WASH facilities is linked to a number of health and nutritional issues, like as stunting, which is caused by digestive system diseases brought on by poor environmental cleanliness and sanitation, which can redirect growth energy toward the body's defenses against infection [53]. Clean water sources for drinking can be divided into two categories, according to Sinatrya and Muniroh, 2019 [54] unprotected water

(rivers, wells, rainwater reservoirs) and protected water (PDAM, bottled mineral water/refillable water). To break the cycle of disease transmission, using healthy latrines is a good idea. According to Mia et al.'s research (2022) [55], toddlers from households with unprotected sources of drinking water are more likely to suffer from stunting. Furthermore, the absence of a toilet in a home promotes open defecation, which contaminates the surrounding area and water sources [56]. Stunting is positively correlated with children between the ages of 24 and 59 months who live in homes without proper toilets or whose feces are disposed of unsafely, according to research by Woldesenbet et al., 2023 [57]. The prevalence of stunting is strongly correlated with socioeconomic circumstances. The availability of food in the household is influenced by socioeconomic factors, particularly money. A low family food supply increases the risk of stunting in children by 3.64 times [58]. It is challenging to reduce the number of cases of stunting because poor households typically have relatively little understanding of the importance of eating nutritious food [59]. Family income, which is the primary factor influencing food quality, is referred to as family economic status. Consequently, family side dishes will become better as family income rises [60]. A high family income will eventually decide nutritional status and improve access to healthcare. Incidents of stunting are more frequent in rural areas [61]. The high rate of early marriage in rural communities has an impact on stunting [62]. Early marriage is frequently accompanied by a lack of physical preparation in young moms, which makes it more likely for them to become pregnant without considering the fetus's needs [63]. Stunting is more common in children from low-income households and those who reside in rural areas. Thus, especially in rural regions, programs need to be implemented to raise behavior and understanding surrounding eating patterns. The prevalence of stunting in children is influenced by family dynamics and parenting styles. Families have a significant part in enhancing the health of children. The number of family members is a factor in the frequency of stunting in children, and households with more than four individuals will also have an indirect impact on the amount and distribution of food in the household [64]. Families with a big number of people typically exhibit poor quality food consumption. Nonetheless, additional Argentinean study indicates that children raised in big families had a lower risk of stunting compared to those raised in smaller families [65]. The benefit of having kids in large households is that extended families may take better care of their members socially, including with food and medical attention. Other adults living in a large household can also help with childcare, material support, and health service utilization [66]. According to a study, family members living in extended homes in rural locations can help with household needs, such as taking care of young children [67].

## 5. Conclusion

It is shown that LBW and family wealth/income are the main predictors of stunting incidence in toddlers under five years old, based on many studies reported in 15 papers. The findings of this literature review indicate that factors associated with household food security include LBW and family income/wealth. The quality of family side dishes will rise along with family income, preventing LBW and meeting nutritional demands.

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