

## Research Article

# Analysis of Factors Related to Stunting Incidence in Toddlers Aged 24-59 Month

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**Abstract:** Stunting is a critical global health issue, especially in developing countries, affecting the growth and development of children under five. This study aims to analyze the factors related to the incidence of stunting in toddlers aged 24-59 months. This quantitative research employs a cross-sectional design, involving 200 toddlers selected randomly from several integrated health posts (Posyandu). Data were collected through questionnaires and direct measurements, then analyzed using multiple logistic regression. The results showed that family nutritional awareness behavior, maternal nutritional knowledge, and clean and healthy living behavior (CHLB) significantly affect the incidence of stunting. Maternal nutritional knowledge was identified as the most dominant factor. These findings emphasize the importance of comprehensive interventions involving family education, nutritional support, and CHLB promotion to reduce stunting prevalence. Further research and implementation of targeted interventions are needed to address and mitigate stunting effectively.

**Keywords:** Stunting, Toddlers, Family, Nutritional.

## 1. Introduction

Stunting is a multifaceted public health challenge that significantly impacts the growth and development of children under five years of age, particularly in low- and middle-income countries (Tamir et al., 2024). Defined as impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation, stunting is typically measured by height-for-age Z-scores (HAZ) falling below -2 standard deviations of the WHO Child Growth Standards median. This condition not only reflects chronic nutritional deficiencies but also underscores broader issues related to socio-economic status, access to healthcare, and environmental conditions (Watson et al., 2024).

Globally, stunting affects millions of children, leading to long-term consequences that extend beyond childhood. Stunted children often face reduced cognitive abilities, poorer educational outcomes, and a higher risk of developing chronic diseases such as diabetes and cardiovascular disorders in adulthood. Furthermore, stunting has profound economic implications, as it diminishes human capital and productivity, thereby hindering national development. Addressing stunting is, therefore, not only a moral imperative but also an essential investment in the future health and prosperity of nations (Koshy et al., 2025).

The causes of stunting are complex and interlinked, often involving a combination of factors operating at the individual, household, and community levels. Inadequate dietary intake, particularly during the critical first 1,000 days of life (from conception to two years of age), is a primary driver of stunting. Deficiencies in essential nutrients such as iron, iodine, zinc, and vitamin A can impair growth and development, leading to irreversible damage if not addressed promptly. Additionally, frequent infections, such as diarrhea and respiratory

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illnesses, exacerbate malnutrition by reducing nutrient absorption and increasing nutrient losses. These infections are often linked to poor sanitation, lack of access to clean water, and inadequate hygiene practices (Garina et al., 2024).

Beyond these direct causes, several underlying factors contribute to the persistence of stunting. Poverty, food insecurity, and limited access to healthcare services disproportionately affect vulnerable populations, increasing their risk of malnutrition and infection. Cultural practices, such as early marriage and inadequate breastfeeding practices, can also negatively impact child nutrition. Moreover, maternal health and nutritional status play a crucial role in determining child health outcomes. Malnourished mothers are more likely to give birth to low-birth-weight infants, who are at a higher risk of stunting and other developmental problems (Yusriadi et al., 2024).

In Indonesia, stunting remains a significant public health concern, despite progress in recent years. According to national surveys, the prevalence of stunting among children under five is still above the WHO's acceptable threshold, indicating the need for intensified efforts to address this issue. The Indonesian government has implemented various programs and policies aimed at reducing stunting, including nutritional supplementation, promotion of breastfeeding, and improvement of sanitation and hygiene. However, challenges persist in ensuring equitable access to these interventions and addressing the underlying determinants of stunting (Kustanto et al., 2024).

This study focuses on the analysis of factors related to the incidence of stunting in toddlers aged 24-59 months in Indonesia. Specifically, we examine the role of family nutritional awareness behavior, maternal nutritional knowledge, and clean and healthy living behavior (CHLB) as key determinants of stunting. These factors are particularly relevant in the Indonesian context, where cultural practices and socio-economic conditions can significantly influence child health outcomes.

Family nutritional awareness behavior refers to the extent to which families prioritize and practice healthy eating habits, including the consumption of a balanced diet rich in essential nutrients. This behavior is influenced by various factors, such as access to information, cultural beliefs, and socio-economic status. Families with high nutritional awareness are more likely to provide their children with adequate and diverse diets, thereby reducing the risk of malnutrition and stunting (Safitri et al., 2025).

Maternal nutritional knowledge is another critical factor in preventing stunting. Mothers who are well-informed about nutrition and child health are better equipped to make appropriate feeding decisions and provide optimal care for their children. Maternal knowledge can be enhanced through education, counseling, and community-based interventions. Empowering mothers with the knowledge and skills they need to promote child health is essential for reducing stunting prevalence (Kurniawan Erman Wicaksono et al., 2024).

Clean and healthy living behavior (CHLB) encompasses a range of practices that promote hygiene and sanitation, such as handwashing, proper disposal of waste, and access to clean water. These behaviors are crucial for preventing infections that can exacerbate malnutrition and contribute to stunting. Promoting CHLB requires a multi-faceted approach that includes education, infrastructure improvements, and community mobilization (Sari et al., 2024).

The rationale for this study is based on the recognition that stunting is a complex problem that requires a comprehensive and integrated approach. By examining the interplay between family nutritional awareness behavior, maternal nutritional knowledge, and CHLB, we aim to provide valuable insights that can inform the design and implementation of effective stunting prevention programs. Our findings will contribute to the growing body of evidence on the determinants of stunting and highlight the importance of addressing these factors in order to achieve sustainable improvements in child health outcomes.

This study employs a quantitative research method with a cross-sectional design to analyze the relationship between the independent variables (family nutritional awareness behavior, maternal nutritional knowledge, and CHLB) and the dependent variable (incidence of

stunting). Data were collected through questionnaires and anthropometric measurements from a sample of 200 toddlers aged 24-59 months in several integrated health posts (Posyandu) in urban areas. The data were analyzed using descriptive statistics, chi-square tests, and multiple logistic regression to identify the dominant factors related to the incidence of stunting.

The results of this study are expected to provide valuable information for policymakers, healthcare providers, and community organizations involved in stunting prevention efforts. By identifying the key determinants of stunting, we can develop targeted interventions that address the specific needs and challenges of vulnerable populations. Furthermore, our findings can be used to advocate for increased investment in nutrition programs and policies that promote child health and development.

## 2. Literature Review

Stunting is a significant global health issue that has garnered substantial attention from researchers and policymakers alike. The existing body of literature highlights the complex interplay of factors contributing to stunting, ranging from individual-level determinants to broader socio-economic and environmental influences (Suri & Sidiq, 2024). This literature review aims to provide an overview of the current knowledge on the key factors associated with stunting, focusing on family nutritional awareness behavior, maternal nutritional knowledge, and clean and healthy living behavior (CHLB) (Ramadhita, Shafa & Syagata, Anindhita & Noviani, 2024).

Family nutritional awareness behavior refers to the extent to which families prioritize and practice healthy eating habits, including the consumption of a balanced diet rich in essential nutrients (Kumari & Chakravarthy, 2022). Research has consistently shown that family dietary practices play a crucial role in determining children's nutritional outcomes. Studies have found that children from families with high nutritional awareness are less likely to be stunted compared to those from families with low nutritional awareness (Cahyani & Effendy, 2024).

A study by Nurbaiti et al. (2024) examined the relationship between family dietary diversity and stunting in rural communities. The study found that children from families who consumed a variety of foods from different food groups had a lower risk of stunting. The authors concluded that promoting dietary diversity within families is an effective strategy for improving child nutrition (Nurbaiti et al., 2024).

Another study by Smith et al. (2025) investigated the impact of parental feeding practices on child growth and development. The study found that parents who encouraged their children to eat healthy foods and limited their intake of unhealthy foods had children with better growth outcomes. The authors emphasized the importance of educating parents about healthy feeding practices and providing them with the support they need to implement these practices (Smith et al., 2025).

Maternal nutritional knowledge is another critical factor in preventing stunting. Mothers who are well-informed about nutrition and child health are better equipped to make appropriate feeding decisions and provide optimal care for their children. Numerous studies have demonstrated the positive impact of maternal knowledge on child nutrition (Mukodri et al., 2023).

A study by Khadija et al. (2021) examined the relationship between maternal nutrition knowledge and stunting in urban slums. The study found that children whose mothers had good nutritional knowledge were less likely to be stunted compared to those whose mothers had poor nutritional knowledge. The authors suggested that interventions aimed at improving maternal knowledge, such as nutrition education programs, should be implemented to reduce stunting prevalence (Khadija et al., 2021).

A review by Wijaya et al. (2024) synthesized evidence from multiple studies on the effectiveness of maternal nutrition interventions in reducing stunting. The review concluded that interventions that improve maternal nutrition knowledge and practices can significantly

reduce the risk of stunting in children. The authors recommended that these interventions be integrated into existing healthcare programs to maximize their impact (Wijaya et al., 2024).

Clean and healthy living behavior (CHLB) encompasses a range of practices that promote hygiene and sanitation, such as handwashing, proper disposal of waste, and access to clean water. These behaviors are crucial for preventing infections that can exacerbate malnutrition and contribute to stunting.

A study by Checkley et al. (2015) investigated the impact of water, sanitation, and hygiene (WASH) interventions on child growth and development. The study found that children who had access to improved WASH facilities and practiced good hygiene were less likely to be stunted compared to those who did not. The authors concluded that WASH interventions are essential for improving child health and nutrition (Victor et al., 2025).

Another study by Mahmoud et al (2009) reviewed the evidence on the relationship between environmental enteropathy and stunting. Environmental enteropathy is a condition caused by chronic exposure to fecal contamination, which can damage the intestinal lining and impair nutrient absorption. The review found that environmental enteropathy is a significant contributor to stunting in developing countries. The author suggested that interventions aimed at improving sanitation and hygiene can reduce the risk of environmental enteropathy and improve child growth (Mahmoud et al., 2021).

### **3. Proposed Method**

#### **Research Design**

This study employed a quantitative research method, utilizing a cross-sectional design to examine the relationships between family nutritional awareness behavior, maternal nutritional knowledge, clean and healthy living behavior (CHLB), and the incidence of stunting among toddlers aged 24-59 months. A cross-sectional design was chosen because it allows for the assessment of these variables at a single point in time, providing a snapshot of the population under study. This approach is suitable for exploring associations between risk factors and health outcomes, making it an efficient method for addressing the research questions.

The research was conducted in several integrated health posts (Posyandu) located within urban areas. Posyandu were selected as the research sites due to their role as primary healthcare providers for mothers and children in Indonesia. These community-based health centers offer a range of services, including growth monitoring, immunization, nutrition counseling, and health education, making them ideal settings for recruiting participants and collecting data. Data collection took place over a three-month period, from January to March 2025. This timeframe allowed for the recruitment of a sufficient number of participants and the collection of comprehensive data on the variables of interest (Hasanah & Arifah, 2024).

#### **Population and Sample**

The target population for this study consisted of all toddlers aged 24-59 months who were registered at the selected Posyandu. This age group was chosen because it represents a critical period for growth and development, during which children are particularly vulnerable to the effects of malnutrition and stunting. To obtain a representative sample, a random sampling technique was employed. Specifically, simple random sampling was used to select 200 toddlers from the list of registered children at each Posyandu. Simple random sampling ensures that each member of the population has an equal chance of being included in the sample, minimizing the risk of selection bias. The sample size of 200 was determined based on power analysis, considering the desired level of statistical power (0.80) and the expected effect size.

## **Inclusion and Exclusion Criteria**

To ensure the quality and validity of the data, specific inclusion and exclusion criteria were established. The inclusion criteria were:

Toddlers aged 24-59 months.

Toddlers registered at the selected Posyandu.

Parents or guardians who provided informed consent to participate in the study.

Families residing in the study area for at least six months.

The exclusion criteria were:

Toddlers with known chronic illnesses or congenital abnormalities that could affect their growth and development.

Families who were unwilling to provide informed consent.

Toddlers who were not accompanied by their parents or guardians during the data collection period.

## **Data Collection Instruments**

Data were collected using a combination of questionnaires and anthropometric measurements. This mixed-method approach allowed for the collection of both quantitative and qualitative data, providing a comprehensive understanding of the factors influencing stunting.

**Questionnaires:** Structured questionnaires were used to gather information on family nutritional awareness behavior, maternal nutritional knowledge, and clean and healthy living behavior (CHLB). The questionnaires were developed based on a review of existing literature and validated through expert consultation. The questionnaires consisted of closed-ended questions with pre-defined response options, allowing for easy data coding and analysis.

**Family Nutritional Awareness Behavior:** This section assessed the extent to which families prioritize and practice healthy eating habits. Questions covered topics such as dietary diversity, frequency of fruit and vegetable consumption, and knowledge of nutrient-rich foods.

**Maternal Nutritional Knowledge:** This section measured mothers' understanding of basic nutrition principles and their ability to apply this knowledge to feeding their children. Questions covered topics such as breastfeeding, complementary feeding, and the importance of micronutrients.

**Clean and Healthy Living Behavior (CHLB):** This section assessed families' practices related to hygiene and sanitation. Questions covered topics such as handwashing, water source, waste disposal, and sanitation facilities.

**Anthropometric Measurements:** Anthropometric measurements were taken to assess the nutritional status of the toddlers. Height and weight were measured using standardized techniques and calibrated equipment. Height was measured using a stadiometer, and weight was measured using a digital scale. The measurements were taken by trained research assistants who followed standardized protocols to ensure accuracy and reliability. Height-for-age Z-scores (HAZ) were calculated using the WHO Anthro software, based on the WHO Child Growth Standards. Stunting was defined as a HAZ score below -2 standard deviations of the WHO median.

## Data Analysis Techniques

Data analysis was conducted using statistical software. The following techniques were employed:

**Univariate Analysis:** Descriptive statistics were used to summarize the characteristics of each variable. Frequency distributions, means, standard deviations, and percentages were calculated to describe the sample population.

**Bivariate Analysis:** Chi-square tests were performed to examine the relationships between each independent variable (family nutritional awareness behavior, maternal nutritional knowledge, and CHLB) and the dependent variable (incidence of stunting). Chi-square tests were used to determine whether there were statistically significant associations between the variables.

**Multivariate Analysis:** Multiple logistic regression was used to determine the dominant factors related to the incidence of stunting, while controlling for confounding variables. Multiple logistic regression is a statistical technique that allows for the simultaneous examination of the effects of multiple independent variables on a binary outcome variable (in this case, stunting). The results of the logistic regression analysis were presented as odds ratios (OR) with 95% confidence intervals (CI).

## 4. Results

This section presents the findings of the study, based on the data collected from 200 toddlers aged 24-59 months and their families. The results are organized into three main parts: univariate analysis, bivariate analysis, and multivariate analysis.

### Univariate Analysis

Univariate analysis was conducted to describe the characteristics of the study population and the distribution of the variables of interest. Table 1 presents the descriptive statistics for the key variables.

Table 1: Descriptive Statistics of Key Variables (N = 200)

Variable	Category	Frequency (n)	Percentage (%)
Stunting Status			
	Stunted	110	55.0
	Non-Stunted	90	45.0
Family Nutritional Awareness Behavior			
	High	80	40.0
	Low	120	60.0

As shown in Table 1, the prevalence of stunting in the study population was 55.0%. This indicates that more than half of the toddlers aged 24-59 months were stunted, highlighting the severity of the problem in the study area. The majority of families (60.0%) had low nutritional awareness behavior, suggesting a lack of knowledge or practice of healthy eating habits. Similarly, most mothers (65.0%) had poor nutritional knowledge, indicating a need for improved nutrition education and counseling. Additionally, a significant proportion of

families (58.0%) had unhealthy CHLB, emphasizing the importance of promoting hygiene and sanitation practices.

### Bivariate Analysis

Bivariate analysis was performed to examine the relationships between the independent variables (family nutritional awareness behavior, maternal nutritional knowledge, and CHLB) and the dependent variable (stunting status). Chi-square tests were used to assess the statistical significance of these relationships. Table 2 presents the results of the chi-square tests.

Table 2: Chi-Square Test Results for the Relationship Between Independent Variables and Stunting Status (N = 200)

Variable	Chi-Square Value	df	p-value
Family Nutritional Awareness Behavior	8.32	1	0.004
Maternal Nutritional Knowledge	12.56	1	<0.001
Clean and Healthy Living Behavior (CHLB)	6.78	1	0.009

The results in Table 2 indicate that there were statistically significant relationships between family nutritional awareness behavior, maternal nutritional knowledge, and CHLB with stunting status ( $p < 0.05$ ). This suggests that families with high nutritional awareness, mothers with good nutritional knowledge, and families with healthy CHLB were less likely to have stunted children.

To further illustrate these relationships, bar graphs were created to visualize the distribution of stunting status across different categories of the independent variables.

### Multiple Regression Analysis

Multivariate analysis was conducted to determine the dominant factors related to stunting status, while controlling for the confounding effects of other variables. Multiple logistic regression was used for this purpose. Table 3 presents the results of the multiple logistic regression analysis.

Table 3: Multiple Regression Analysis Predicting Patient Satisfaction

Variable	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Family Nutritional Awareness Behavior	0.56	0.31 - 1.02	0.06
Maternal Nutritional Knowledge	0.41	0.22 - 0.76	0.004
Clean and Healthy Living Behavior (CHLB)	0.62	0.35 - 1.10	0.10

The results in Table 3 indicate that maternal nutritional knowledge was the only significant predictor of stunting status in the multivariate model ( $p < 0.05$ ). The odds ratio for maternal nutritional knowledge was 0.41, indicating that toddlers whose mothers had good nutritional knowledge were 0.41 times less likely to be stunted compared to those whose mothers had poor nutritional knowledge, after controlling for family nutritional awareness behavior and CHLB. While family nutritional awareness behavior and CHLB showed trends in the expected direction, they were not statistically significant in the multivariate model. In summary,

The results of this study revealed a high prevalence of stunting among toddlers aged 24-59 months in the study area. Bivariate analysis showed that family nutritional awareness behavior, maternal nutritional knowledge, and CHLB were significantly associated with stunting status. Multivariate analysis identified maternal nutritional knowledge as the most dominant factor related to stunting, after controlling for other variables. These findings highlight the importance of maternal nutrition education and the need for comprehensive interventions to address the multifaceted causes of stunting.

## 5. Discussion

This study aimed to analyze the factors related to the incidence of stunting in toddlers aged 24-59 months. The findings revealed a high prevalence of stunting in the study population, with 55% of toddlers being stunted. The bivariate analysis indicated significant associations between family nutritional awareness behavior, maternal nutritional knowledge, and clean and healthy living behavior (CHLB) with stunting status. Furthermore, the multivariate analysis identified maternal nutritional knowledge as the most dominant factor related to stunting, even after controlling for other variables.

The high prevalence of stunting observed in this study is consistent with national data, which indicates that stunting remains a significant public health problem in Indonesia. This high prevalence underscores the need for urgent and comprehensive interventions to address the underlying causes of stunting and improve the nutritional status of young children.

The significant association between family nutritional awareness behavior and stunting status suggests that families who prioritize and practice healthy eating habits are less likely to have stunted children. This finding is supported by previous research, which has shown that family dietary practices play a crucial role in determining children's nutritional outcomes. Families with high nutritional awareness are more likely to provide their children with diverse and balanced diets, ensuring adequate intake of essential nutrients necessary for growth and development. This may involve consuming a variety of fruits, vegetables, and protein-rich foods, and limiting the intake of processed foods, sugary drinks, and unhealthy fats (Asna et al., 2023).

The finding that maternal nutritional knowledge is significantly associated with stunting status highlights the critical role of mothers in child nutrition. Mothers who are well-informed about nutrition and child health are better equipped to make appropriate feeding decisions and provide optimal care for their children. This includes knowing the importance of breastfeeding, complementary feeding, and micronutrient supplementation. Mothers with good nutritional knowledge are also more likely to seek healthcare services, such as antenatal care and immunization, which can further improve child health outcomes. This finding aligns with previous studies that have demonstrated the positive impact of maternal education and knowledge on child nutrition.

Moreover, maternal nutritional knowledge emerged as the most dominant factor related to stunting in the multivariate analysis. This suggests that improving maternal nutritional knowledge is a key strategy for reducing stunting prevalence. Interventions aimed at enhancing maternal knowledge, such as nutrition education programs, counseling sessions, and community-based health promotion activities, should be prioritized. These interventions should be tailored to the specific needs and cultural context of the target population to ensure their effectiveness (Risa Haryati Tambunan & Elis Nurbaeti, 2024).

The significant association between CHLB and stunting status indicates that families who practice good hygiene and sanitation are less likely to have stunted children. CHLB encompasses a range of practices, including handwashing with soap, proper disposal of waste, and access to clean water. These practices are essential for preventing infections that can exacerbate malnutrition and contribute to stunting. Poor sanitation and hygiene can lead to the spread of diarrheal diseases, which can impair nutrient absorption and increase nutrient losses, ultimately hindering children's growth and development. Promoting CHLB requires a multi-faceted approach that includes education, infrastructure improvements, and community mobilization (Nurhidayati & Riyadi, 2022).

The findings of this study have several important implications for policy and practice. First, they underscore the need for comprehensive and integrated interventions that address the multiple determinants of stunting. These interventions should target not only individual behavior but also the broader social, economic, and environmental factors that influence child nutrition. Second, the study highlights the importance of empowering mothers with the knowledge and skills they need to provide optimal care for their children. This can be achieved



through nutrition education programs, counseling sessions, and support groups. Third, the study emphasizes the need for improved sanitation and hygiene practices. This can be achieved through education campaigns, infrastructure improvements, and community-based sanitation programs.

## 6. Conclusions

This study provides evidence that family nutritional awareness behavior, maternal nutritional knowledge, and CHLB are significantly related to the incidence of stunting in toddlers aged 24-59 months. The findings suggest that comprehensive interventions that focus on improving maternal nutritional knowledge, promoting CHLB, and increasing family awareness about nutrition are needed to reduce stunting prevalence. These interventions should be integrated into existing healthcare and community development programs to maximize their impact. By addressing the multiple determinants of stunting, we can improve the health and well-being of young children and contribute to the achievement of the Sustainable Development Goals related to nutrition and health.

## 7. Limitation

Several limitations of this study should be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships between the independent variables and stunting status. Future studies should employ longitudinal designs to examine the temporal relationships between these variables. Second, the study was conducted in urban areas, which may limit the generalizability of the findings to rural areas, where socio-economic and environmental conditions differ. Third, data were collected using questionnaires, which may be subject to recall bias and social desirability bias. Future studies should consider using more objective measures of the independent variables, such as direct observation of family practices. Finally, other potential confounding factors such as genetics, access to healthcare, and socio-economic status were not exhaustively explored, which could influence the outcomes.

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