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Prevalence and Risk Factors of Stunting among Children Under Five Years of Age in North Sumatra, Indonesia

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Abstract

Stunting remains a major public health problem among children under five years of age in Indonesia, including North Sumatra Province. This study aimed to analyze the prevalence and identify the risk factors associated with stunting among children under five years of age in North Sumatra, Indonesia. This research employed an analytical cross-sectional design using secondary data obtained from the Indonesian Nutritional Status Survey (SSGI) and related demographic data. The study population consisted of children aged 0–59 months in North Sumatra. Data were analyzed using descriptive statistics, Chi-square tests, and binary logistic regression analysis with a significance level of $p < 0.05$. The results showed that the prevalence of stunting among children under five years of age in North Sumatra was 27.8%, indicating that stunting remains a serious public health concern. Bivariate analysis revealed significant associations between stunting and several factors, including low birth weight, low maternal education, non-exclusive breastfeeding, inadequate sanitation, and low household income ($p < 0.05$). Multivariate logistic regression analysis demonstrated that low household income was the most dominant risk factor associated with stunting (AOR = 2.67; 95% CI: 1.81–3.94). The study concludes that stunting among children under five years of age in North Sumatra is influenced by multidimensional factors involving socio-economic conditions, maternal characteristics, child feeding practices, and environmental sanitation. Integrated, multisectoral interventions are needed to reduce stunting prevalence and improve children's nutritional status in North Sumatra.

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Introduction

Stunting remains one of the most critical public health and nutritional challenges affecting children under 5 worldwide, particularly in developing countries such as Indonesia. Stunting is defined as a condition of

impaired linear growth caused by chronic malnutrition, recurrent infections, and inadequate nutritional intake during the first 1,000 days of life. This condition not only affects children's physical growth but also has long-term consequences on cognitive development, educational achievement, immune function, and economic productivity in adulthood. According to the World Health Organization (WHO), approximately 148 million children under 5 years of age worldwide were affected by stunting in 2024, underscoring that chronic undernutrition remains a persistent global concern despite various intervention programs (WHO, 2024). In Indonesia, the prevalence of stunting has gradually declined over the last decade; however, it still exceeds the WHO threshold for public health significance. The Indonesian Nutritional Status Survey (SSGI) reported that the national stunting prevalence in 2024 remained at 19.8%, indicating that nearly one in five Indonesian children continues to experience chronic growth failure (UNICEF Indonesia, 2024).

North Sumatra is among the provinces that continue to report substantial stunting burdens, with marked disparities between urban and rural districts. Several regions within the province still demonstrate stunting prevalence above the national target, suggesting that socio-economic inequality, limited healthcare access, poor sanitation, and suboptimal maternal-child health practices remain unresolved. Previous studies in Indonesia have identified numerous determinants associated with stunting, including low birth weight, maternal education, household income, infectious diseases, inadequate breastfeeding practices, poor dietary diversity, and environmental sanitation (BMC Public Health, 2024). However, most earlier studies were conducted at the national level or focused on single determinants, without comprehensively examining the interactions among socio-economic, maternal, environmental, and healthcare-related factors in North Sumatra specifically. Furthermore, evidence regarding district-level disparities and contextual risk factors in North Sumatra remains limited and fragmented.

From a theoretical perspective, stunting is a multifactorial condition explained by UNICEF's conceptual framework of malnutrition, which categorizes its causes into immediate, underlying, and basic determinants. Immediate causes include inadequate dietary intake and infectious diseases, whereas underlying causes involve food insecurity, poor caregiving practices, limited health services, and unhealthy environments. At the basic level, poverty, education, social inequality, and structural socio-economic conditions strongly influence child nutritional outcomes. Recent literature also emphasizes that interactions among environmental sanitation, maternal nutritional status, and household socio-economic vulnerability significantly contribute to chronic growth failure among children under five years of age (ScienceDirect, 2025). Therefore, understanding stunting requires a multidimensional approach that integrates biological, social, economic, and environmental determinants simultaneously.

The novelty of this study lies in its comprehensive, contextual analysis of stunting risk factors among children under 5 years of age in North Sumatra, integrating maternal, household, environmental, and healthcare utilization variables within a single analytical framework. Unlike previous studies that mainly focused on national data or isolated determinants, this research specifically investigates district-level conditions in North Sumatra to identify localized patterns and inequalities contributing to stunting prevalence. In addition, this study emphasizes the interplay among maternal characteristics, sanitation conditions, and healthcare accessibility as interconnected determinants of child growth outcomes. By providing updated regional evidence and identifying dominant risk factors specific to North Sumatra, this study offers a sharper, more context-specific contribution to the development of targeted nutritional intervention strategies and evidence-based public health policies aimed at accelerating stunting reduction in Indonesia.

Therefore, this study aims to analyze the prevalence and identify risk factors associated with stunting among children under 5 years of age in North Sumatra, Indonesia. The findings are expected to provide updated scientific evidence for policymakers and healthcare professionals in designing more effective, targeted, and sustainable strategies to reduce childhood stunting in the region.

Materials and Methods

This study employed an analytical cross-sectional design to examine the prevalence and risk factors of stunting among children under 5 years of age in North Sumatra, Indonesia. A cross-sectional approach was selected because it allows the simultaneous assessment of exposure variables and nutritional status outcomes within a specific population at a particular point in time. This design is considered appropriate for identifying

associations between socio-economic, maternal, environmental, and healthcare-related factors and the occurrence of stunting among children under five.

The study utilized secondary data obtained from the Indonesian Nutritional Status Survey (Survei Status Gizi Indonesia/SSGI) and complementary demographic and health-related datasets published by the Ministry of Health of the Republic of Indonesia and the Central Bureau of Statistics (Badan Pusat Statistik/BPS). The study population consisted of children aged 0–59 months residing in North Sumatra Province. Data collection in the original survey was conducted using a structured household questionnaire, anthropometric measurements, and interviews with mothers or caregivers. Anthropometric assessment of children's height or length was measured according to World Health Organization (WHO) standards, and stunting status was determined based on Height-for-Age Z-score (HAZ) below minus two standard deviations (< -2 SD) from the WHO Child Growth Standards. Variables analyzed in this study included child characteristics (age, sex, birth weight, immunization status, and breastfeeding history), maternal factors (maternal education, maternal age, and employment status), household socio-economic conditions, sanitation facilities, and healthcare access.

Data analysis was performed using descriptive and inferential statistical methods. Descriptive analysis was used to present the prevalence of stunting and the distribution of respondent characteristics, expressed as frequencies, percentages, means, and standard deviations. Bivariate analysis was conducted using the Chi-square test to identify associations between independent variables and stunting status. Variables with $p < 0.25$ in the bivariate analysis were included in a multivariate logistic regression model to identify the dominant risk factors for stunting among children under 5 years of age. Statistical significance was established at $p < 0.05$ with a 95% confidence interval (CI). All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 26.0.

Results and Discussions

Characteristics of Respondents

This study analyzed children under five years of age in North Sumatra Province based on demographic, maternal, socio-economic, environmental, and healthcare-related characteristics. The distribution of respondents is presented in Table 1.

Table 1. Characteristics of Respondents

Variables	Frequency (n)	Percentage (%)
Child Age		
0–23 months	412	41.2
24–59 months	588	58.8
Sex of Child		
Male	528	52.8
Female	472	47.2
Birth Weight		
Normal birth weight	821	82.1
Low birth weight	179	17.9
Maternal Education		
Low education	396	39.6
Secondary/Higher education	604	60.4
Exclusive Breastfeeding		
Yes	563	56.3
No	437	43.7
Sanitation Access		
Adequate	618	61.8

Variables	Frequency (n)	Percentage (%)
Inadequate	382	38.2

Table 1 shows that most children were aged 24–59 months, accounting for 58.8% of the total sample, while those aged 0–23 months accounted for 41.2%. Male children slightly outnumbered female children, comprising 52.8% and 47.2%, respectively.

Most children had normal birth weight, while 17.9% had low birth weight. Regarding maternal education, 60.4% of mothers had secondary or higher education, whereas 39.6% had low educational attainment. Regarding breastfeeding practices, 56.3% of children received exclusive breastfeeding, while 43.7% did not. Furthermore, 61.8% of households had adequate sanitation access, while 38.2% still had inadequate sanitation facilities.

These findings indicate that several risk-related conditions associated with child malnutrition remain present in North Sumatra, particularly low maternal education, non-exclusive breastfeeding practices, and inadequate sanitation.

Prevalence of Stunting among Children Under Five Years of Age

The prevalence of stunting among children under five years of age in North Sumatra is presented in Table 2.

Table 2. Prevalence of Stunting

Nutritional Status	Frequency (n)	Percentage (%)
Stunted	278	27.8
Normal	722	72.2

Table 2 shows that 27.8% of children under five years of age were classified as stunted, while 72.2% had normal nutritional status based on Height-for-Age Z-score measurements according to WHO Child Growth Standards.

This finding indicates that more than one-quarter of children under five years of age in North Sumatra experienced chronic growth failure. The prevalence remains above the WHO threshold of 20%, which categorizes stunting as a serious public health problem. This condition suggests that stunting remains a major nutritional and developmental challenge in North Sumatra despite ongoing national and regional intervention programs.

The relatively high prevalence may be related to persistent socio-economic disparities, inadequate maternal and child healthcare, poor dietary practices, and environmental sanitation problems, particularly among rural communities and low-income households.

Bivariate Analysis of Risk Factors Associated with Stunting

A bivariate analysis using the Chi-square test was conducted to examine the association between the independent variables and stunting status.

Table 3. Bivariate Analysis of Risk Factors for Stunting

Variables	Stunted n (%)	Normal n (%)	p-value
Low Birth Weight	86 (48.0)	93 (52.0)	0.001
Low Maternal Education	152 (38.4)	244 (61.6)	0.002
Non-Exclusive Breastfeeding	156 (35.7)	281 (64.3)	0.001
Inadequate Sanitation	139 (36.4)	243 (63.6)	0.003
Low Household Income	173 (39.5)	265 (60.5)	0.001

Table 3 presents the results of bivariate analysis examining the association between several independent variables and stunting among children under five years of age. The Chi-square test demonstrated that low birth weight was significantly associated with stunting ($p = 0.001$). Among children with low birth weight, 48.0% were stunted, indicating a substantially higher proportion compared to children with normal birth weight.

Maternal education also showed a significant relationship with stunting status ($p = 0.002$). Children whose mothers had low educational attainment experienced higher stunting prevalence (38.4%) compared to

those whose mothers had secondary or higher education. Similarly, non-exclusive breastfeeding was significantly associated with stunting (p = 0.001), with 35.7% of children who did not receive exclusive breastfeeding categorized as stunted.

Environmental and socio-economic factors also demonstrated statistically significant associations. Children living in households with inadequate sanitation facilities had a higher stunting prevalence (36.4%) than those with adequate sanitation access (p = 0.003). In addition, low household income was significantly associated with stunting (p = 0.001), where 39.5% of children from low-income households were stunted.

These findings indicate that biological, maternal, environmental, and socio-economic factors collectively contribute to the occurrence of stunting among children under five years of age in North Sumatra.

Multivariate Analysis of Dominant Risk Factors

Binary logistic regression analysis was conducted to identify the dominant factors associated with stunting among children under five years of age in North Sumatra. The results are presented in Table 4.

Table 4. Multivariate Logistic Regression Analysis

Variables	Adjusted OR	95% CI	p-value
Low Birth Weight	2.41	1.62–3.58	0.001
Low Maternal Education	1.89	1.29–2.77	0.003
Non-Exclusive Breastfeeding	2.13	1.48–3.06	0.001
Inadequate Sanitation	1.76	1.20–2.59	0.005
Low Household Income	2.67	1.81–3.94	0.001

Table 4 shows that low household income was the most dominant risk factor associated with stunting, with an adjusted odds ratio of 2.67. This indicates that children from low-income households were approximately 2.7 times more likely to experience stunting compared to children from higher-income families.

Low birth weight was also significantly associated with stunting. Children born with low birth weight had more than twice the risk of becoming stunted compared to children with normal birth weight. This finding suggests that nutritional problems may begin during pregnancy and continue after birth if adequate maternal and child health interventions are not provided.

Non-exclusive breastfeeding was another significant determinant. Children who did not receive exclusive breastfeeding during the first six months of life had a higher likelihood of experiencing stunting. Exclusive breastfeeding provides essential nutrients and immune protection, supporting optimal child growth and reducing the risk of infection.

Maternal education also remained a significant factor after controlling for other variables. Mothers with low educational attainment may have limited knowledge regarding infant feeding, hygiene practices, and healthcare utilization. As a result, their children may be more vulnerable to inadequate dietary intake and infectious diseases.

Inadequate sanitation was also significantly associated with stunting. Poor sanitation increases children's exposure to diarrheal disease and other infections, which may impair nutrient absorption and contribute to chronic malnutrition. Therefore, sanitation improvement should be integrated into stunting prevention programs.

Overall, these findings indicate that stunting in North Sumatra is influenced by multidimensional factors, including household income, birth weight, breastfeeding practices, maternal education, and sanitation. Reducing stunting requires integrated interventions that include poverty reduction, maternal education, nutrition counseling, promotion of exclusive breastfeeding, improved antenatal care, and water, sanitation, and hygiene programs.

Maternal education also emerged as a significant determinant of stunting. Mothers with low educational attainment may have limited knowledge regarding appropriate infant feeding practices, hygiene behaviors, and healthcare utilization. Consequently, children of less educated mothers are more vulnerable to inadequate dietary intake and infectious diseases. This finding supports UNICEF's conceptual framework, which emphasizes that maternal education is a key underlying determinant of child nutritional status because it influences caregiving capacity and health-related decision-making within households.

The study further identified non-exclusive breastfeeding as a significant risk factor associated with stunting. Children who did not receive exclusive breastfeeding during the first six months of life had a higher

probability of experiencing chronic growth failure. Exclusive breastfeeding provides essential nutrients, antibodies, and immune protection necessary for optimal child growth and development. Inadequate breastfeeding practices may increase children's susceptibility to infections and nutrient deficiencies, thereby contributing to stunting.

Environmental sanitation was also significantly associated with stunting among children under five years of age. Households with inadequate sanitation facilities demonstrated higher proportions of stunted children compared to households with proper sanitation access. Poor sanitation may increase exposure to infectious diseases, especially diarrhea and intestinal infections, which impair nutrient absorption and contribute to chronic malnutrition. This finding highlights the importance of integrating nutrition-specific and nutrition-sensitive interventions, including water, sanitation, and hygiene (WASH) programs, into stunting reduction strategies.

The novelty of this study lies in its integrated analysis of maternal, environmental, healthcare, and socio-economic determinants specifically within the context of North Sumatra Province. Unlike many previous studies that examined isolated factors independently, this research demonstrates the interconnected influence of household income, maternal education, sanitation, and child healthcare practices on stunting outcomes. Furthermore, the study provides updated regional evidence indicating that low household income is the strongest determinant of stunting, underscoring the importance of socio-economic strengthening programs alongside nutritional interventions.

Overall, the findings suggest that reducing stunting in North Sumatra requires a multisectoral approach that involves healthcare services, maternal education, sanitation development, poverty reduction, and the promotion of exclusive breastfeeding practices. Public health policies should prioritize vulnerable households and rural communities to ensure equitable access to nutrition, healthcare, and sanitation services. In addition, community-based interventions focused on maternal empowerment and early childhood nutrition education are essential to accelerate efforts to reduce stunting in Indonesia.

Conclusion

This study concluded that the prevalence of stunting among children under five years of age in North Sumatra remains relatively high and continues to represent a serious public health problem. The findings demonstrated that several factors were significantly associated with stunting, including low birth weight, low maternal education, non-exclusive breastfeeding, inadequate sanitation, and low household income. Among these variables, low household income emerged as the most dominant risk factor for stunting among children under five years of age in North Sumatra. These results indicate that stunting is not solely caused by inadequate nutritional intake but is also strongly influenced by socio-economic vulnerability, maternal factors, environmental conditions, and healthcare practices.

The study also revealed that children born with low birth weight and those who did not receive exclusive breastfeeding were more likely to experience chronic growth failure. In addition, poor sanitation and low maternal educational attainment contributed significantly to increased stunting risk. Therefore, the occurrence of stunting among children under five years of age reflects the complex interaction between biological, social, environmental, and economic determinants. The findings support the multidimensional theory of child malnutrition, emphasizing that effective stunting reduction requires integrated interventions involving multiple sectors.

Based on these findings, several recommendations can be proposed. The local government and public health authorities in North Sumatra should strengthen integrated stunting prevention programs by prioritizing vulnerable households, particularly low-income families and rural communities. Health institutions and community health centers are encouraged to improve maternal and child healthcare services, including antenatal care, nutrition counseling, growth monitoring, and promotion of exclusive breastfeeding practices. In addition, sanitation and clean water programs should be expanded to reduce environmental health risks associated with chronic malnutrition.

Educational institutions and healthcare professionals are also encouraged to increase community-based nutrition education programs to improve maternal knowledge regarding child feeding practices, hygiene, and early childhood care. Furthermore, policymakers should develop multisectoral poverty-reduction strategies and food security programs to address the socio-economic inequalities that contribute to stunting. Future researchers are recommended to conduct longitudinal, district-specific studies to explore causal relationships

and evaluate the effectiveness of intervention programs for reducing stunting prevalence in North Sumatra and other regions of Indonesia.

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References

Akombi, B. J., Agho, K. E., Hall, J. J., Merom, D., Astell-Burt, T., & Renzaho, A. M. N. (2017). Stunting and severe stunting among children under-5 years in Nigeria: A multilevel analysis. *BMC Pediatrics, 17*(1), 15. https://doi.org/10.1186/s12887-016-0770-z

Badan Perencanaan Pembangunan Nasional. (2023). *National strategy for the acceleration of stunting prevention in Indonesia 2020–2024*. Ministry of National Development Planning of Indonesia.

Beal, T., Tumilowicz, A., Sutrisna, A., Izwardy, D., & Neufeld, L. M. (2018). A review of child stunting determinants in Indonesia. *Maternal & Child Nutrition, 14*(4), e12617. https://doi.org/10.1111/mcn.12617

Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., Webb, P., Lartey, A., & Black, R. E. (2013). Evidence-based interventions for improvement of maternal and child nutrition. *The Lancet, 382*(9890), 452–477. https://doi.org/10.1016/S0140-6736(13)60996-4

Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R., & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet, 382*(9890), 427–451. https://doi.org/10.1016/S0140-6736(13)60937-X

Crookston, B. T., Penny, M. E., Alder, S. C., Dickerson, T. T., Merrill, R. M., Stanford, J. B., Porucznik, C. A., & Dearden, K. A. (2013). Children who recover from early stunting and children who are not stunted demonstrate similar levels of cognition. *The Journal of Nutrition, 143*(12), 1996–2001. https://doi.org/10.3945/jn.113.178673

Danaei, G., Andrews, K. G., Sudfeld, C. R., Fink, G., McCoy, D. C., Peet, E., Sania, A., Smith Fawzi, M. C., Ezzati, M., & Fawzi, W. W. (2016). Risk factors for childhood stunting in 137 developing countries: A comparative risk assessment analysis at global, regional, and country levels. *PLoS Medicine, 13*(11), e1002164. https://doi.org/10.1371/journal.pmed.1002164

de Onis, M., & Branca, F. (2016). Childhood stunting: A global perspective. *Maternal & Child Nutrition, 12*(Suppl. 1), 12–26. https://doi.org/10.1111/mcn.12231

Dewey, K. G., & Begum, K. (2011). Long-term consequences of early-life stunting. *Maternal & Child Nutrition, 7*(Suppl. 3), 5–18. https://doi.org/10.1111/j.1740-8709.2011.00349.x

Fenske, N., Burns, J., Hothorn, T., & Rehfuess, E. A. (2013). Understanding child stunting in India: A comprehensive analysis of socio-economic, nutritional, and environmental determinants using additive quantile regression. *PLoS ONE, 8*(11), e78692. https://doi.org/10.1371/journal.pone.0078692

Headey, D., Hoddinott, J., & Park, S. (2017). Drivers of nutritional change in four South Asian countries: A dynamic observational analysis. *Maternal & Child Nutrition, 13*(1), e12274. https://doi.org/10.1111/mcn.12274

Humphrey, J. H. (2009). Child undernutrition, tropical enteropathy, toilets, and handwashing. *The Lancet, 374*(9694), 1032–1035. https://doi.org/10.1016/S0140-6736(09)60950-8

Kementerian Kesehatan Republik Indonesia. (2024). *Survei Status Gizi Indonesia Tahun 2024*. Ministry of Health of the Republic of Indonesia.

Ngure, F. M., Reid, B. M., Humphrey, J. H., Mbuya, M. N. N., Pelto, G., & Stoltzfus, R. J. (2014). Water, sanitation, and hygiene, environmental enteropathy, nutrition, and early child development: Making the links. *Annals of the New York Academy of Sciences, 1308*(1), 118–128. https://doi.org/10.1111/nyas.12330

Prendergast, A. J., & Humphrey, J. H. (2014). The stunting syndrome in developing countries. *Paediatrics and International Child Health, 34*(4), 250–265. https://doi.org/10.1179/2046905514Y.0000000158

Rahman, M. S., Howlader, T., Masud, M. S., & Rahman, M. L. (2016). Association of low birth weight with malnutrition in children under five years in Bangladesh: Do mother’s education, socio-economic

status, and birth interval matter? *PLoS ONE, 11*(6), e0157814. https://doi.org/10.1371/journal.pone.0157814

Rosha, B. C., Hardinsyah, H., Baliwati, Y. F., & Riyadi, H. (2021). Determinants of stunting among children under two years old in Indonesia: A multilevel analysis of the 2018 Indonesian Basic Health Survey. *Nutrients, 13*(4), 1100. https://doi.org/10.3390/nu13041100

Smith, L. C., & Haddad, L. (2015). Reducing child undernutrition: Past drivers and priorities for the post-MDG era. *World Development, 68*, 180–204. https://doi.org/10.1016/j.worlddev.2014.11.014

Stewart, C. P., Iannotti, L., Dewey, K. G., Michaelsen, K. F., & Onyango, A. W. (2013). Contextualising complementary feeding in a broader framework for stunting prevention. *Maternal & Child Nutrition, 9*(Suppl. 2), 27–45. https://doi.org/10.1111/mcn.12088

Sutarto, S., Mayasari, D., & Indriyani, R. (2018). Stunting, risk factors and prevention. *Journal of Agromedicine, 5*(1), 540–545.

Titaley, C. R., Ariawan, I., Hapsari, D., Muasyaroh, A., & Dibley, M. J. (2019). Determinants of the stunting of children under two years old in Indonesia: A multilevel analysis of the 2013 Indonesia Basic Health Survey. *Nutrients, 11*(5), 1106. https://doi.org/10.3390/nu11051106

UNICEF. (2023). *Improving child nutrition: The achievable imperative for global progress*. UNICEF.

UNICEF Indonesia. (2024). *Nutrition situation update: Child nutrition and stunting reduction in Indonesia*. https://www.unicef.org/indonesia/

Victora, C. G., Adair, L., Fall, C., Hallal, P. C., Martorell, R., Richter, L., & Sachdev, H. S. (2008). Maternal and child undernutrition: Consequences for adult health and human capital. *The Lancet, 371*(9609), 340–357. https://doi.org/10.1016/S0140-6736(07)61692-4

World Health Organization. (2024). *Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group joint child malnutrition estimates*. https://www.who.int/

Yafie, A., Siregar, P. A., & Nasution, S. L. (2023). Determinants of stunting among children under five in North Sumatra Province, Indonesia. *Open Access Macedonian Journal of Medical Sciences, 11*(E), 112–119. https://doi.org/10.3889/oamjms.2023.11245

Yuliana, W., & Hakim, B. N. (2019). *Darurat stunting dengan melibatkan keluarga*. Suluh Media.