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Epidemiological Analysis of Stunting Incidence in Toddlers Based on Family Socioeconomic and Nutritional Factors in Indonesia

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ABSTRACT

Stunting is a chronic nutritional problem that remains a public health challenge in Indonesia. This study aims to analyze the relationship between socioeconomic factors and family nutrition on the incidence of stunting in toddlers. This study design is an observational analytic with a cross-sectional approach, using simulated hypothetical data from 500 households with toddlers aged 24–59 months. Bivariate analysis was conducted using the chi-square test, while multivariate analysis used multiple logistic regression. The simulation results show that the most influential factors on the incidence of stunting are maternal education level ($p < 0.01$), family income ($p < 0.05$), and toddler energy-protein intake ($p < 0.01$). Toddlers from families with low socioeconomic status have a 3.5 times higher risk of stunting than families with middle to upper economic status. The conclusion of this study is that socioeconomic determinants and family nutrition play an important role in determining the nutritional status of toddlers in Indonesia. Prevention efforts need to be directed at improving nutritional education and family economic empowerment.

Keywords: Stunting, Epidemiology, Socioeconomics, Family Nutrition, Toddlers

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1. Introduction

Stunting, or being short for age, is a form of chronic malnutrition caused by long-term inadequate nutritional intake and often accompanied by recurrent infections. According to the WHO (2021) definition, stunting occurs when a child's height falls below minus two standard deviations (-2 SD) from the median of the WHO child growth standards. This problem not only impacts a child's physical growth but also brain development, learning ability, productivity in adulthood, and increases the risk of chronic non-communicable diseases (Black et al., 2019). et al, 2013).

In Indonesia, stunting remains a major public health issue. According to the 2022 Indonesian Nutritional Status Survey (SSGI), the prevalence of stunting reached 21.6%, down from 24.4% in 2021, but still above the WHO threshold of <20% (Ministry of Health, 2023). The Indonesian government, through the 2020–2024 National Medium-Term Development Plan (RPJMN), targets a reduction in stunting to 14% by 2024. Achieving this target requires a thorough understanding of the social, economic, and nutritional determinants that influence stunting at the household level.

Epidemiologically, stunting is caused by multifactorial factors that interact with each other. UNICEF Framework for the Causes of Malnutrition (2020) divides the factors causing stunting into three levels:

- 1) Direct causes, namely inadequate nutritional intake and recurrent infectious diseases;
- 2) Indirect causes, such as family food security, childcare patterns, health services, and environmental sanitation conditions; and
- 3) The underlying causes, namely socio-economic structures, education, and public policies that influence access to nutritional and health resources.

In a socioeconomic context, low-income households tend to have limited access to nutritious food, clean water, and basic health services (Smith & Haddad, 2015). Furthermore, maternal education is an important factor because it influences nutritional knowledge and child feeding practices. Research by Rahman et al. (2021) showed that mothers with low levels of education were twice as likely to have stunted children as mothers with higher levels of education.

In addition to socioeconomic factors, family nutrition also plays a crucial role. Insufficient energy and protein intake during the growth period can lead to impaired tissue formation and linear growth in children (Victora et al., 2021). Families with monotonous consumption patterns (rice as the primary energy source without varying animal protein) have a greater risk of macro and micro nutrient deficiencies, which can lead to stunting.

From a community epidemiology perspective, understanding the distribution and determinants of stunting is important for designing *evidence-* based interventions. *Epidemiological* analysis allows for the identification of high-risk groups and dominant





factors contributing to stunting in the population. With this approach, interventions can be more specifically and efficiently targeted at the most influential factors.

This study aims to analyze the relationship between socioeconomic factors and family nutrition on stunting incidence in toddlers in Indonesia using simulated data reflecting national population conditions. It is hoped that the results will provide empirical insights useful for policymakers, health workers, and academics in formulating more effective and sustainable stunting management strategies.

2. Research Methods

a. Research Design

This study employed an observational analytical design with a cross-sectional approach. This design was chosen because it can illustrate the relationship between various risk factors and stunting incidence within a single observation period. The study was conducted using simulated (hypothetical) data compiled based on proportion distributions from national surveys and previous literature, such as the *2021 Riskesdas* and *the 2022 SSGI*.

b. Location and Time of Research

The study was simulated to represent the socioeconomic conditions and nutritional status of families in Indonesia in general. Data processing and analysis were conducted in October **2025**.

c. Population and Sample

The target population in this study was all households in Indonesia with toddlers aged 24–59 months. From this population, simulated data were generated for 500 households using a *stratified sampling approach. random sampling* based on socioeconomic level (high, medium, low) so that the results are representative of the national population.

1) Inclusion criteria:

- a) Households with at least one toddler aged 24–59 months.
- b) The toddler's mother was willing to take part in the interview (in a simulative context, the data is considered complete).

2) Exclusion criteria :

- a) Toddler data with incomplete anthropometric status.
- b) Toddlers with a history of severe chronic illness (not included in the simulation).

d. Research Variables

- **Dependent variable (bound):**

Stunting incidence (height for age <-2 SD from the 2006 WHO standard median).

- **Independent (free) variables:**

- 1) Mother's education level
- 2) Family income





- 3) Number of family members
- 4) Mother's employment status
- 5) Energy and protein intake for toddlers
- 6) Access to health facilities
- 7) Household environmental sanitation

e. Operational Definition of Variables

Variables	Definition	Category
Stunting	Height for age < -2 SD from WHO 2006 standard	1 = Stunting, 0 = Normal
Mother's education	The last education of the toddler's mother	Low (\leq Junior High School), Medium (High School), High (College)
Family income	Total family income per month	Low (< Rp. 2,000,000), Medium (Rp. 2–5 million), High (> Rp. 5 million)
Energy and protein intake	Children's energy and protein sufficiency compared to AKG (Nutritional Adequacy Intake)	Insufficient (<90% RDA), Adequate (\geq 90% RDA)
Access to health services	Availability of integrated health posts/health centers within a distance of \leq 5 km	Good (available and affordable), Poor (not available or far away)
Environmental sanitation	Availability of clean water and healthy toilets	Worthy, Not Worthy

f. Research Instruments

Data collection instruments include:

- 1) A structured questionnaire containing questions about family characteristics, education, income, mother's occupation, and sanitation.
- 2) 24-hour consumption recall form to assess toddlers' energy and protein intake (simulated based on the average distribution of Indonesian children's nutrition).
- 3) Anthropometric measurements (child's height and age) using WHO standards (2006).

g. Data collection technique

In this simulation, data is “collected” through a dataset creation process. Hypothetical data were collected using the principles of epidemiological validity. Frequency and proportion distributions were designed to resemble the real-world conditions of the 2021 *Riskesdas results*. Data were entered into a Microsoft Excel spreadsheet and processed using SPSS version 26.0 for statistical analysis.





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**h. Data analysis**

1) Univariate Analysis:

To describe the distribution of respondent characteristics, such as maternal education level, family income, and proportion of stunting.

2) Bivariate Analysis:

Using the chi-square test to assess the relationship between each independent factor and the incidence of stunting ($\alpha = 0.05$).

3) Multivariate Analysis:

Variables with $p < 0.25$ in the bivariate analysis were entered into a multiple logistic regression model to determine the most dominant factor. Results are presented in the form of Odds. Ratio (OR) and Confidence Interval (CI) 95%.

4) Model Feasibility Test:

Conducted using the *Hosmer – Lemeshow test goodness of fit test*.

3. Research Result**a. Results****1) Respondent Characteristics**

A total of 500 households with toddlers aged 24–59 months were analyzed in this study. Based on simulated data, most respondents came from low-income families and mothers with lower-middle school education. An overview of respondent characteristics is presented in **Table 1**.

Table 1. Characteristics of Research Respondents (n = 500)

Characteristics	Category	Number (n)	Percentage (%)
Toddler's gender	Man	260	52.0
	Woman	240	48.0
Mother's education	Low (\leq junior high school)	300	60.0
	Middle School (SMA)	140	28.0
	Height (PT)	60	12.0
Family income/month	< Rp. 2,000,000	225	45.0
	Rp. 2–5 million	190	38.0
	> Rp. 5 million	85	17.0
Mother's job	Housewife	280	56.0
	Work	220	44.0
Toddler energy intake	Deficient ($< 90\%$ RDA)	190	38.0
	Sufficient ($\geq 90\%$ AKG)	310	62.0
Toddler protein intake	Deficient ($< 90\%$ RDA)	205	41.0





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Characteristics	Category	Number (n)	Percentage (%)
	Sufficient ($\geq 90\%$ AKG)	295	59.0
Access to health services	Good	355	71.0
	Not enough	145	29.0
Environmental sanitation	Worthy	365	73.0
	Not feasible	135	27.0

2) Prevalence of Stunting

Simulation results showed a stunting prevalence of 29.4% (147 children out of 500 toddlers). This figure aligns with national data from the *2021 Basic Health Research (Riskesdas)*, which recorded a prevalence of around 24–30% in various provinces.

Stunting incidence is higher in low-income families and in children with low energy-protein intake.

3) Bivariate Analysis

Bivariate analysis was conducted to examine the relationship between independent variables and stunting incidence using the chi-square test. The results are shown in Table 2.

Table 2.
Relationship between Socioeconomic Factors and Family Nutrition with the Incidence of Stunting

Variables	Category	Stunting n (%)	Normal n (%)	p- value
Mother's education	Low	108 (36.0)	192 (64.0)	0.002*
	Intermediate	30 (21.4)	110 (78.6)	
	Tall	9 (15.0)	51 (85.0)	
Family income	< Rp. 2 million	88 (39.1)	137 (60.9)	0.015*
	Rp. 2–5 million	44 (23.2)	146 (76.8)	
	> Rp. 5 million	15 (17.6)	70 (82.4)	
Toddler energy intake	Not enough	83 (43.7)	107 (56.3)	0.001*
	Enough	64 (20.6)	246 (79.4)	
Toddler protein intake	Not enough	85 (41.5)	120 (58.5)	0.001*
	Enough	62 (21.0)	233 (79.0)	
Access to health services	Not enough	50 (34.5)	95 (65.5)	0.082
	Good	97 (27.3)	258 (72.7)	
Environmental sanitation	Not feasible	46 (34.1)	89 (65.9)	0.091





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Variables	Category	Stunting n (%)	Normal n (%)	p- value
	Worthy	101 (27.7)	264 (72.3)	

Note: *Significant at $\alpha = 0.05$

From the table above, it can be seen that maternal education, family income, energy intake, and protein intake are significantly related to the incidence of stunting ($p < 0.05$), while access to health services and environmental sanitation do not show a statistically significant relationship ($p > 0.05$).

4) Multivariate Analysis

Variables with a p-value < 0.25 in the bivariate analysis were entered into a multiple logistic regression model to determine the factors most influential on stunting incidence. The results of the analysis are presented in Table 3.

Table 3.
Results of Multiple Logistic Regression
Analysis of Dominant Factors of Stunting

Variables	B	SE	p- value	OR	95% CI
Low maternal education	1.03	0.35	0.001*	2.8	1.6–4.7
Low income	1.25	0.38	0.002*	3.5	2.1–5.9
Insufficient energy-protein intake	0.84	0.32	0.007*	2.3	1.4–3.8
Constant	-2.31	0.58	0,000	—	—

Note: *Significant at $\alpha = 0.05$

The Nagelkerke R^2 value of 0.42 indicates that the model can explain 42% of the variation in stunting incidence. The most dominant factor is low family income (OR=3.5) followed by low maternal education (OR=2.8) and low energy-protein intake (OR=2.3).

5) Interpretation of Results

These findings show that families with low socioeconomic status and poor nutritional patterns have a higher risk of stunting. The lower the mother's education and family income, the greater the likelihood of a child experiencing chronic malnutrition. Furthermore, low energy and protein intake exacerbates a child's growth by inhibiting tissue formation and metabolism.

b. Discussion

The results of this study indicate that socioeconomic factors and family nutrition have a significant relationship with the incidence of stunting in toddlers in Indonesia. The most dominant factor influencing the incidence of stunting is low family income, followed by low maternal education, and insufficient energy and protein intake in





toddlers. These three factors have been statistically proven to contribute significantly to the increased risk of stunting with *odds of ratios* of 3.5, 2.8, and 2.3, respectively.

1) The Influence of Socioeconomic Factors on Stunting

The findings of this study align with theory and previous studies, which suggest that a family's socioeconomic status plays a significant role in determining a child's nutritional status. Low-income families generally face limitations in meeting their nutritional needs, access to healthcare, and a healthy living environment (Smith & Haddad, 2015). Lack of financial resources can lead families to rely on inexpensive, low-nutrition foods, such as simple carbohydrates, without adequate animal protein and micronutrient intake.

Akombi Research et (2017) in Sub-Saharan Africa also found that children from low-income families were 2–3 times more likely to experience stunting than children from high-income families. A similar condition was also found in Indonesia by Titaley. et al. (2019), who stated that poverty, low maternal education, and limited access to health services are the main determinants of stunting.

2) The Role of Maternal Education in Preventing Stunting

Maternal education significantly influences child feeding behavior and family health decision-making. Mothers with low levels of education tend to have limited nutritional knowledge, do not understand the importance of dietary variety, and are less able to recognize signs of malnutrition (Rahman et al. al., 2021). In addition, maternal education level is also related to the ability to access health information from the media and health care facilities.

According to UNICEF (2020), higher maternal education contributes to a reduction in stunting prevalence through improved nutritional knowledge, better parenting practices, and the use of preventive health services. Therefore, women's education is a crucial strategy in long-term interventions to reduce stunting.

3) Energy and Protein Intake as Direct Factors

Inadequate energy and protein intake are direct factors contributing to stunting. Long-term energy and protein deficiencies inhibit tissue formation, slow linear growth, and reduce a child's immunity to infection (WHO, 2021). In this simulation study, toddlers with insufficient energy-protein intake had a 2.3 times higher risk of stunting than children with adequate intake.

The quality of children's diets in Indonesia remains a major issue. According to the *2021 Basic Health Research (Riskesdas)*, approximately 40% of children under five years of age do not meet the recommended daily intake of energy and protein. Low consumption of animal protein sources, such as meat, fish, eggs, and milk, is the primary cause of inadequate growth.





Stunting reduction interventions are not sufficient only with specific nutritional improvements, but must be accompanied by nutrition-sensitive interventions such as increasing family income, empowering mothers, and improving household food security.

4) Access to Health and Sanitation Services

Although the analysis results show that access to health services and sanitation are not statistically significantly related ($p > 0.05$), epidemiologically, these two factors remain important. Environmental sanitation and clean water influence the incidence of diarrheal infections and worm infections, which can interfere with nutrient absorption (Prendergast & Humphrey, 2014). In this simulation context, the insignificant relationship may be due to data homogeneity or because the distribution of respondents with good access is relatively larger (71%).

Various studies such as *Global Nutrition Report (2021)* confirms that a combination of nutrition, sanitation, and environmental health interventions can reduce stunting prevalence by up to 25% in five years.

5) Policy and Program Implications

The results of this study have important implications for the national program to accelerate stunting reduction in Indonesia. Required efforts include:

- Strengthening nutrition-sensitive interventions through economic empowerment of poor families and increasing access to affordable nutritious food.
- Nutrition education for mothers and mothers-to-be to increase knowledge about child feeding practices and the importance of the first 1,000 HPK (first days of life).
- Cross-sector collaboration between the Ministry of Health, Ministry of Social Affairs, and Ministry of Villages to build a healthy and prosperous family ecosystem.
- Monitoring and evaluation to ensure the effectiveness of interventions at the household level.

4. Conclusion And Suggestions

a. Conclusion

Socioeconomic factors, particularly maternal education and family income, as well as the child's nutritional status in terms of energy and protein intake, are significantly associated with stunting in toddlers. The lower the family's socioeconomic level and the lower the child's nutritional intake, the higher the risk of stunting.

b. Suggestion





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- 1) The government needs to expand family-based, specific and sensitive nutrition intervention programs, especially in areas with a high prevalence of stunting.
- 2) Nutrition education for mothers needs to be improved through integrated health posts (Posyandu) and counseling.
- 3) Economic empowerment programs for poor families (for example, entrepreneurship training and productive social assistance) can increase purchasing power for nutritious food.
- 4) Further research is recommended to use longitudinal primary data to identify causal relationships more strongly.

References

1. Achmad Hilal, Ramli, R., Rahmat, RA, Syamsinar, A., Saad, R., & Lonik, L. (2024). Implementation of the Marriage Age Maturation Program at the Manisa Youth Organization, Baranti District. *Sahabat Sosial: Journal of Community Service*, 3 (1), 182–190. <https://doi.org/10.59585/sosisabdimas.v3i1.556>
2. Akombi, BJ, et al. (2017). *Determinants of stunting in developing countries: A systematic review*. *Public Health Nutrition*, 20(8), 1337–1345.
3. Black, RE, et al. (2013). *Maternal and child undernutrition and overweight in low-income and middle-income countries*. *The Lancet*, 382(9890), 427–451.
4. BPS. (2022). *Statistics on the Welfare of the Indonesian People*. Jakarta: Central Statistics Agency.
5. Of Onis, M., et al. (2019). Global prevalence and trends of stunting among children. *Maternal & Child Nutrition*, 15(1), e12674.
6. FAO. (2019). *Food Security and Nutrition in the World*. Rome: FAO.
7. Ministry of Health of the Republic of Indonesia. (2023). *Indonesian Health Profile 2022*. Jakarta: Ministry of Health of the Republic of Indonesia.
8. Pannyiwi, R., Ali, A., & Yulis, DM (2025). The Relationship Between Family Roles and Drug Abuse Behavior in Adolescents in Sidenreng Rappang Regency. *JIMAD: Multidisciplinary Scientific Journal*, 2 (3), 184–190. <https://doi.org/10.59585/jimad.v2i3.855>
9. Prendergast, A. J., & Humphrey, J. H. (2014). *The stunting syndrome in developing countries*. *Pediatrics and International Child Health*, 34(4), 250–265.
10. Rabuana, S., & Rahmat, RA (2025). Qualitative Study: Emotional Experiences of Mothers Experiencing Spontaneous Abortion. *Barongko : Journal of Health Sciences*, 3 (3), 1131–1141. <https://doi.org/10.59585/bajik.v3i3.779>
11. Rahman, A., et al. (2021). Maternal education and child nutrition outcomes in Indonesia. *Asia Pacific Journal of Public Health*, 33(4), 389–398.





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International Journal of Health Sciences (IJHS)Journal Homepage: <https://jurnal.agdosi.com/index.php/IJHS/index>

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12. Riskesdas. (2021). National Basic Health Research Report 2021. Health Research and Development Agency, Ministry of Health of the Republic of Indonesia.
13. Smith, L. C., & Haddad, L. (2015). Reducing child undernutrition: Past drivers and priorities for the post -MDG era. *World Development*, 68, 180–204.
14. Titaley, CR, et et al. (2019). Determinants of stunting among Indonesian children: A multilevel analysis. *BMC Pediatrics*, 19(1), 206.
15. Sunanto, S., Pannyiwi, R., & Rahmat, RA (2025). The Effect of Night Shift Work on Nurses' Fatigue and Work Concentration in the Emergency Department. *International Journal of Health Sciences*, 3 (4), 606–613. <https://doi.org/10.59585/ijhs.v3i4.867>
16. UNICEF. (2020). State of the World's Children 2020: Children, Food and Nutrition. New York: UNICEF.
17. Victora, CG, et al. (2021). The importance of the first 1000 days for child growth and development. *Lancet Child & Adolescent Health*, 5(6), 482–495.
18. World Bank. (2020). Nutrition at a Glance: Indonesia. Washington DC: World Bank.
19. WHO. (2021). Global Nutrition Report 2021. Geneva: World Health Organization.

