Parental Characteristics and Their Association with Stunting among Toddlers in Sungai Rengit Village, South Sumatra

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Abstract. Stunting, a chronic form of undernutrition marked by impaired linear growth, remains a significant public health concern in Indonesia. This study aimed to examine the association between parental characteristics and the incidence of stunting among toddlers in Sungai Rengit Village, South Sumatra. A cross-sectional study was conducted from December 2024 to March 2025, involving 100 children aged 12–59 months selected through purposive sampling. The variables examined included parental education, parental occupation, and maternal age at the time of marriage. Anthropometric data were collected using WHO standards, and statistical analysis was performed using SPSS version 24, including Chi-square tests and the Mann–Whitney U test. The results showed that although the Chi-square test revealed no statistically significant association between individual parental characteristics and stunting ($p > 0.05$), the Mann–Whitney U test indicated a significant difference in height-for-age Z-scores between stunted and non-stunted children ($p = 0.000$). These findings suggest that parental characteristics may play an indirect yet important role in shaping children's nutritional outcomes through lifestyle, food access, and caregiving practices. Strengthening family-level interventions may therefore be essential in addressing stunting in rural Indonesian communities.

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1 Introduction

Stunting – a linear growth disorder due to chronic malnutrition and infection within the first 1000 days of life, remains a global health problem [1–6] – has been a global problem. The stunted children ratio as much as 55 % was found in Asia, while 39 % in Africa [7]. In further detail, out of 83.6 million Asian children with stunting cases, the highest rates were mostly discovered in South Asia (58.7 %) and the lowest rates were found in Central Asia (0.9 %) [8]. The case proportion in South Sumatra, Indonesia, was already 19.3% in 2016, when it further increased to 22.8% in 2017-2018. Considering the long-term consequences of impeded growth in children [9] that might bring a higher risk of chronic illnesses when they become adults [10] and how stunting contributes to the loss of 2 % to 3 % child demographic rate annually [11], attempts to cut back on stunting are therefore imperative.

Ending famine and all forms of malnutrition, as well as attaining food sustenance by 2030, has become a target in the Sustainable Development Goals (SDGs) [12–14]and has been referred to in order to diminish the stunting rate by up to 40 % in 2025 [15]. Aiming for healthy, intelligent generations to come [16] and a minimum mortality rate due to stunting, the Indonesian government has issued the Presidential Regulation No. 72 of 2021 and the National Population and Family Planning Board Regulation No. 12 of 2021 to accelerate the decrease of stunting prevalence up to 14%. SDG programs on community nutrition, family planning, sanitation, and clean water have become parts of a specific, sensitive intervention to be conducted in a holistic, integral, quality fashion. Lahat Regency, with a 48.1% stunting rate [17], was able to cut it down to 22.4% in 2021 [18] by implementing the integrated programs.

Family plays an essential role in preventing stunting cases [19]. Adults in a family, particularly parents, shape a child's eating habits [20] and, naturally, parenting affects his/her nutrition status [21,22]. If parents are less informed about health, family nutrition will likely become an issue for them, their children, and the environment [16,19]. Parenting methods vary with age, educational background, occupation, society, and other characteristics. Specifically on age, young parents with an immature mindset are prone to stunting cases [2, 23–25] as their unawareness often causes low birth weight in infants. While mother holds the responsibility of parenting [22], father's leading role is no less important [16] as maintaining healthy norms and habits will be strenuous [26].

2 Material and Methods

This study employed a quantitative cross-sectional design and was conducted in Sungai Rengit Village, Banyuasin Regency, South Sumatra, Indonesia, between December 2024 and February 2025 (S 2°47'41.42", E 104°34'37.85").

The study population included all toddlers aged 12–59 months in the village. Using purposive sampling, a total of 100 children were selected based on the following inclusion criteria: (1) not currently under medical treatment, (2) free from infectious disease within the past month, and (3) categorized as stunted (height-for-age Z-score <-2 SD) based on WHO standards.

Primary data were collected through structured interviews with parents using a validated questionnaire, while secondary data were obtained from the 2010 Indonesian National Basic Health Research. Child height was measured using standardized equipment at local health posts ("Posyandu"), and nutritional status was determined using the WHO Anthro Software (2005).

Data were analyzed using SPSS version 24. Univariate analysis was used to describe the distribution of parental characteristics and stunting status. Chi-square tests were applied to

assess the association between categorical variables. Since the Z-score data were not normally distributed, the Mann–Whitney U test was used to compare mean Z-scores between stunted and non-stunted children. Additionally, Multiple Logistic Regression with the backward elimination method was used to evaluate the effect of parental characteristics on stunting while controlling for potential multicollinearity.

Fig. 1. Length measuring in a local integrated healthcare center

3 Result and Discussion

3.1 Univariate analysis

The children's height at measurement by age – very short, short, normal, and tall – has become the nutrition status [27] and was compared with family characteristics in Table 1.

Table 1. Family characteristics and children's nutritional status (height-for-age categories)

		Very Short		Short		Normal		Tall		Sum
		n	%	n	%	N	%	n	%	
Father's Educational Background	Elementary	10	17.9	21	37.5	24	42.9	1	1.8	56
	Junior High	4	17.4	7	30.4	11	47.8	1	4.3	23
	Senior High	4	19.0	6	28.6	9	42.9	2	9.5	21
Mother's Educational Background	Elementary	9	17.6	18	35.3	23	45.1	1	2.0	51
	Junior High	7	24.1	10	34.5	12	41.4	0	0.0	29
	Senior High	2	10.5	6	31.6	8	42.1	3	15.8	19
	College	0	0.0	0	0.0	1	100.0	0	0.0	1
Mother's Occupation	Laborer	1	8.3	4	33.3	7	58.3	0	0.0	12
	Merchant/ Farmer	3	18.8	5	31.3	6	37.5	2	12.5	16
	Housewife	14	19.7	24	33.8	31	43.7	2	2.8	71
	Entrepreneur	0	0.0	1	100.0	0	0.0	0	0.0	1
Father's Occupation	Laborer	12	16.7	27	37.5	31	43.1	2	2.8	72
	Merchant/ Farmer	5	26.3	5	26.3	7	36.8	2	10.5	19
	Entrepreneur	1	16.7	2	33.3	3	50.0	0	0.0	6
	Employee	0	0.0	0	0.0	3	100.0	0	0.0	3
Mother's Age of Marriage	< 20 years	9	16.7	19	35.2	24	44.4	2	3.7	54
	20-30 years	9	19.6	15	32.6	20	43.5	2	4.3	46

As shown in Table 1, children of parents with lower education levels and manual occupations tended to have a higher proportion of very short and short stature. However, these patterns were not markedly different across groups. Maternal age at marriage (<20 years vs. 20–30 years) also showed minimal variation in child growth outcomes.

3.2 Bivariate analysis

Employing the Chi-square, the significance of demographic factors towards stunting was observed (Table 2).

Table 2. Association between family characteristics and stunting occurrence

		Stunted		Not Stunted		Total	P Value
		n	%	n	%		
Father's Educational Background	Elementary	31	55.4	25	44.6	56	0.750
	Junior High	11	47.8	12	52.2	23	
	Senior High	10	47.6	11	52.4	21	
Mother's Educational Background	Elementary	27	52.9	24	47.1	51	0.502
	Junior High	17	58.6	12	41.4	29	
	Senior High	8	42.1	11	57.9	19	
	College	0	0.0	1	100.0	1	
Mother's Occupation	Laborer	5	41.7	7	58.3	12	0.676
	Merchant/ Farmer	8	50.0	8	50.0	16	
	Housewife	38	53.5	33	46.5	71	
	Entrepreneur	1	100.0	0	0.0	1	
Father's Occupation	Laborer	39	54.2	33	45.8	72	0.334
	Merchant/ Farmer	10	52.6	9	47.4	19	
	Entrepreneur	3	50.0	3	50.0	6	
	Employee	0	0.0	3	100.0	3	
Mother's Age of Marriage	< 20 years	28	51.9	26	48.1	54	0.974
	20-30 years	24	52.2	22	47.8	46	

Chi-square tests (Table 2) showed no significant association between parental education, occupation, or maternal age at marriage and stunting (all $p > 0.05$). This suggests that individual parental characteristics alone may not adequately explain stunting in this population. Prior studies have also noted that higher education does not always translate into improved nutritional practices [28,29], and maternal employment status alone is not a consistent predictor of child growth [30,31].

3.3 Mann–Whitney test results

The Mann–Whitney test confirmed a significant difference in HAZ scores between stunted and non-stunted children (p = 0.000), indicating severe linear growth deficits in the stunted group (Table 3).

Table 3. Mann–Whitney test of height-for-age Z-scores by stunting status.

	Z score PB/U
Mann-Whitney U	6.000
Wilcoxon W	1384.000
Z	-8.569
Asymp. Sig. (2-tailed)	.000

3.4 Comparison of Growth Patterns between Stunted and Non-Stunted Children

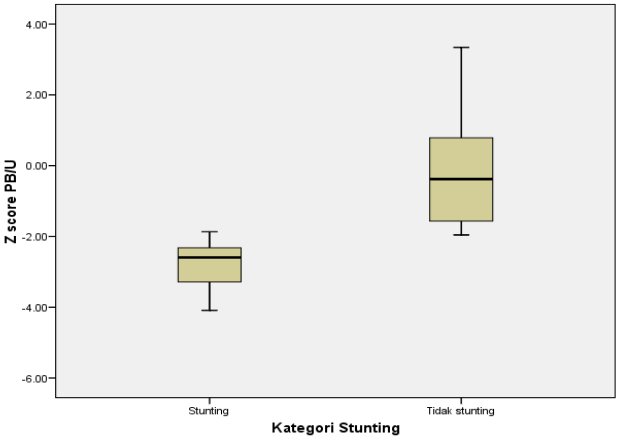

Fig. 2. Stunting category table

As shown in Figure 2, stunted children had a median HAZ below -3 SD with a narrow interquartile range, reflecting uniform growth retardation. In contrast, the non-stunted group had a median near zero but with greater variability. This indicates that stunting reflects chronic disadvantages in nutrition and environment, rather than random variation.

3.5 Discussion

In summary, our study found no direct association between parental education, occupation, or maternal age at marriage and stunting, although stunted children had significantly lower height-for-age Z-scores (HAZ). This indicates that while stunting is clearly manifested in anthropometric measures, its determinants may not lie solely in basic parental demographic characteristics. Instead, more complex and structural factors appear to shape child growth outcomes. The finding is consistent with previous research in Indonesia, Ethiopia, and other low- and middle-income countries, which have highlighted the limited predictive value of

parental education or employment status when considered in isolation [28–32]. For instance, a mother's formal schooling may not automatically translate into improved nutritional practices if she lacks access to food resources, health services, or culturally appropriate knowledge on child feeding. Similarly, employment status may not be protective if income is unstable or if work limits the time available for child care.

A systematic review across Indonesia covering the period 2010–2021 reported a pooled stunting prevalence of 30.9% [33], underscoring the magnitude of this public health challenge. More recent national surveys, such as the SSGI 2024, indicate some improvement, with prevalence decreasing to around 19.8%. However, these averages obscure persistent disparities across provinces, rural–urban settings, and socioeconomic groups. Our findings from Sungai Rengit add nuance to this picture by showing that even within a small community, stunting prevalence remains high, and simple indicators such as parental education or occupation may not be sufficient to predict risk. This highlights the importance of recognizing contextual determinants. Household food security, maternal health during pregnancy, frequency of illness in early childhood, and caregiving practices are likely to play a greater role than parental demographic background alone [33,34].

The lack of significant associations in our data should not be interpreted as evidence that parental characteristics are irrelevant. Rather, it suggests that stunting is the outcome of multiple interrelated factors. Previous studies have documented that the quality of dietary intake, access to clean water and sanitation, and maternal nutritional status are among the strongest predictors of child growth. For example, even well-educated parents may face barriers if healthy foods are unaffordable or unavailable in local markets. Conversely, parents with limited schooling may succeed in supporting healthy child growth if they have access to community health workers and practical nutrition education. Thus, interventions should not be restricted to educational attainment but should instead integrate broader strategies that empower families to apply knowledge in practice.

The implications of this study are important for policy and program development. National programs to reduce stunting in Indonesia have made progress, but local-level interventions remain critical. Our results suggest that family-level strategies—such as nutrition education tailored to local contexts, household-level socioeconomic support, and programs addressing food security—may complement broader government efforts. For example, conditional cash transfer programs, nutrition counseling, and maternal support groups have been effective in improving dietary diversity and child health outcomes in other regions. Applying similar approaches in Sungai Rengit and comparable communities may enhance the impact of existing initiatives.

At the same time, our study has notable limitations. The cross-sectional design prevents causal inferences, as we cannot establish whether parental factors precede and directly influence stunting. The relatively small sample size and the focus on a single village may limit the generalizability of the findings to other contexts. Measurement limitations, such as reliance on self-reported parental characteristics, may also introduce bias. Nonetheless, these limitations highlight the importance of further research rather than diminishing the value of our findings.

Future research should therefore adopt longitudinal designs that follow children from birth to early childhood, enabling researchers to track the cumulative influence of parental, household, and environmental factors. Moreover, including variables such as household income, maternal nutritional status, dietary diversity, access to health care, and sanitation conditions would provide a more comprehensive understanding of the determinants of stunting. By integrating both individual- and community-level factors, future studies can better inform targeted interventions that address the root causes of stunting.

4 Conclusion

In conclusion, this study shows that parental education, occupation, and maternal age at marriage were not directly associated with stunting in statistical terms; however, stunted children had significantly lower HAZ scores ($p < 0.001$). This suggests that while basic parental demographic characteristics alone may not predict stunting, they remain important in shaping food access, caregiving practices, and household lifestyle, which in turn influence child growth. The findings highlight the need for practical interventions that strengthen nutrition education, improve household food security, and support maternal and child health at the community level. As a cross-sectional study with a relatively small sample size limited to one village, our results should be interpreted with caution. Future research using longitudinal designs and broader socioeconomic indicators is needed to confirm and expand upon these findings.

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