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The Role of Fathers in the Incidence of Stunting among Toddlers in Rural Areas

Peran Ayah terhadap Kejadian Stunting pada Balita di Pedesaan

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ABSTRACT

Background: Stunting is an unresolved health problem in the world. There were 21.6% of stunted toddlers in Indonesia in 2022, with a higher proportion in rural areas than in urban areas. The mother's role mainly caused stunting. On the other hand, the role of fathers had not been reviewed much in previous research.
Objectives: This study aims to analyze the role of fathers towards stunting among toddlers in rural areas.
Methods: The study had a case-control design conducted from April to October 2019. This research involved two populations, namely the control population and the cases. The control population was all non-stunted toddlers aged 24-59 months who lived in Jombang Regency, while the case population was all stunted toddlers aged 24-59 months who lived in Jombang Regency. The authors applied a multistage random sampling. The sample consisted of 79 controls and 79 cases calculated based on the two-population proportion formula. Data were analyzed using the chi-square test, fisher exact test, and logistic regression with α = 5%.
Results: Fathers with low education increased the risk of toddlers becoming stunted 2.407 times higher than fathers with high education (p = 0.010; OR = 2.407; 95% CI = 1.231-4.705). Fathers from large families were 1.971 times more likely to have stunted toddlers than fathers from small families (p = 0.042; OR = 1.971; 95% CI = 1.026-3.785).
Conclusions: Stunting in toddlers was significantly influenced by father's education. The size of the family also affected a toddler's risk of stunting. Increasing school age should be a priority program for preventing stunting in rural areas. In addition, health campaigns regarding pregnancy planning and birth control need to be carried out on an ongoing basis to reduce the incidence of stunting.

INTRODUCTION

Stunting is still a global health problem. Stunting is prone to occur in children under five and is often associated with negative impacts on the quality of human resources and health risks in later life[1,2]. Stunting was experienced by 148.1 million children under five in the world in 2022[3]. The burden of stunting was higher among children under five in Asia (52%)[3], including Indonesia. In Indonesia, the prevalence of stunting showed a decline from 30.8% in 2018[4] to 21.6% in 2022[5]. However, efforts to reduce stunting must continue to reach 14% in 2024[5].

In general, stunting was higher in rural areas. Several studies have found a high risk of stunting in rural areas[6-14]. According to a national survey, there was a gap between the prevalence of stunting in rural areas (34.9%) and in urban areas (27.3%)[4], as in East Java. The national survey in 2018, found that the prevalence of stunting in East Java was higher in rural areas (36.51%) compared to urban areas (29.57%)[15]. This condition was possible because people in rural areas have a lower socio-economic level and limited access to food, education, clean water and sanitation, and health services[7,9,10]. In addition, the majority of mothers in rural areas did not work[16-19], so they were less involved in food provision[20] and family decision-making[21,22].

Jombang Regency is an area in East Java with a relatively high prevalence of stunting. In 2018, the prevalence of stunting in Jombang Regency was found to be 29.77%[15] and decreased to 22.1% in 2022[5]. This condition was likely because the majority of the population in Jombang Regency lives in rural areas, so they have limited access to food, health information, and health facilities. In the villages of the study area, the most significant proportion of fathers work as farmers, fishermen, or laborers[23]. In line with this, a survey in East Java also found that most fathers of toddlers worked as farmers, fishermen, or laborers[15]. In rural areas, a father's occupation was the primary source of income. Therefore,

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fathers had an essential role as providers of food access and guarantors of family health facilities. In contrast, the majority of mothers in the villages in the study area did not work[23]. This condition leads mothers to a situation where they can not contribute to providing adequate food and health services.

The high prevalence of stunting in rural areas requires various interventions from policymakers. The interventions for stunting prevention will be more effective if they are based on risk factors. Several studies in various countries around the world and in Indonesia have found various risk factors for stunting in recent years. However, the majority of research focuses more on maternal factors, such as education[24-26], employment status[27,28], nutritional status[25,29,30], height[31-33], breastfeeding behavior[6,22,24,34], feeding patterns[35-37], and health care behavior[7,34,38,39]. Most studies ignore the contribution of paternal factors to stunting. Limited evidence suggests that fathers also play a role in preventing stunting. Fathers with higher education protect toddlers from stunting[27,34,40] . Several characteristics of fathers, namely age[41], type of work[42], height[34,43-45], and smoking status[46-48] also influenced the incidence of stunting in toddlers.

Heretofore, the involvement of fathers in child health programs has not been the focus of government intervention. Fathers should also be seen as potential agents to prevent malnutrition and promote positive feeding practices in the family[49,50]. Research on the role of fathers in influencing stunting in rural areas is essential as a basis for risk factor-based stunting prevention interventions. However, scientific evidence regarding the role of fathers in the incidence of stunting in rural areas is still limited. Based on this condition, the research aims to analyze the role of fathers in the incidence of stunting in rural areas.

METHODS

This type of research was quantitative with a case-control design. This research used three randomly selected villages in Jombang Regency from April to October 2019. The three selected villages were the research locations, namely Wonosalam Village, Kesamben Ngoro Village, and Mayangan Village. This research was part of a large study entitled "Analysis of Socio-Economic, Nutritional, and Health Factors on the Incident of Stunting in Rural and Urban Areas." Ethical approval gave by the Ethics Commission of the Faculty of Nursing, Airlangga University, with a number of 1760-KEPK. There were two populations involved in this research, namely control population and case population. The control population was all toddlers aged 24-59 months who had normal nutritional status and lived in Jombang Regency, while the case population was all toddlers aged 24-59 months who had stunted nutritional status and lived in Jombang Regency. Sampling was taken using a multistage random sampling technique, namely taking village areas first and obtaining three randomly selected villages, then continuing with a random sampling of respondents. The sample size calculation used the sample size formula for the two-population proportion and obtained 158 samples, which were divided into two groups, namely 79 samples from the control group and 79 samples from the case group. The research inclusion criteria were that toddlers were in good health, had no abnormalities, and had lived in the research area for the last six months. This research had been completed with a sampling frame obtained from integrated service post data in selected villages.

This research consisted of two stages, namely anthropometric measurements and structured interviews using questionnaires. The aim of carrying out anthropometric measurements was to ensure that the selected respondents were included in the control group or case group. Height measurements were carried out to group toddlers into the case group if the TB/U z-score (height for age) was < -2 SD and the control group if the TB/U z-score (height for age) was ≥ -2 SD. The characteristics of fathers, such as age, education, occupation, height, smoking status, family size, and household expenses, were obtained by interviewing respondents by trained D3 nutrition graduate enumerators.

The dependent variable of this research was the nutritional status of toddlers, which were grouped into stunted and not-stunted groups. The independent variables were several data of fathers, including age, education, occupation, height, smoking status, family size, and per capita expenditure. The age was grouped into five categories, namely < 25 years, 25–29 years, 30-34 years, 35–39 years, and ≥ 40 years. The education was divided into two categories: low if the father's education was up to junior high school level, and high if the father's education was at least high school level. Fathers' occupations were grouped into farmer/laborer/fisherman, entrepreneur/trader/tailor, and civil servant/private employee. Based on previous research conducted by Sari and Sartika[44], the father's height was classified into two categories, namely < 162 cm and ≥ 162 cm. Father's smoking status was divided into smokers and non-smokers. Family size was grouped into small (≤ 4 people) and large (> 4 people). Per capita expenditure was categorized into three categories: low (quintiles 1 and 2), medium (quintile 3), and high (quintiles 4 and 5). This research data was analyzed univariately using a crosstab to see the frequency distribution. Bivariate analysis used chi-square and fisher exact tests to determine the father's factors associated with stunting. Logistic regression was used to analyze the magnitude of the influence of father's factors on the incidence of stunting, with a significance level of $p < 0.05$.

RESULTS AND DISCUSSION

Table 1 shows the characteristics of toddler fathers analyzed in this study. The majority of fathers were of mature age (94.3%). Most of the fathers had low education (62.0%). Fathers primarily worked as farmers, laborers, or fishermen (42.4%). Most fathers had a height < 162 cm (66.5%) and had a smoking habit (68.4%). Around 56.3% of fathers had few family members. The proportion of fathers who come from households with per capita household expenditure in the low category is the same as in the high category (40.1%).

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Table 1. Characteristics of Toddler Fathers and Their Relationship with Stunting Incidents among Toddlers in Rural Areas

Variables	Stunting		Non-Stunting		Total		p-value
	n	%	n	%	n	%	
Father's age (in year)							
<25	5	6.3	4	5.1	9	5.7	
25-29	16	20.3	14	17.7	30	19.0	
30-34	16	20.3	24	30.4	40	25.3	0.540[b]
35-39	18	22.8	20	25.3	38	24.1	
≥40	24	30.4	17	21.5	41	25.9	
Father's education							
Low	57	72.2	41	51.9	98	62.0	0.014[a]*
High	22	27.8	38	48.1	60	38.0	
Father's occupation							
Farmer/laborer/fisherman	35	44.3	32	40.5	67	42.4	
Entrepreneur/trader/tailor	21	26.6	15	19.0	36	22.8	0.271[a]
Civil servant/private employee	23	29.1	32	40.5	55	34.8	
Father's height							
<162 cm	56	70.9	49	62.0	105	66.5	0.312[a]
≥162 cm	23	29.1	30	38.0	53	33.5	
Father's smoking status							
Smoker	53	67.1	55	69.6	108	68.4	0.864[a]
Non smoker	26	32.9	24	30.4	50	31.6	
Family size							
Less than and equal to 4	38	48.1	51	64.6	89	56.3	0.054[a]
5 and above	41	51.9	28	35.4	69	43.7	
Family expenditure							
Low (quintile 1 and 2),	65	44.5	52	35.6	117	40.1	
Medium (quintile 3)	28	19.2	30	20.5	58	19.9	0.276[a]
High (quintile 4 and 5)	53	36.3	64	43.8	117	40.1	

[a]Chi-square Test; [b]Fisher exact Test; *Significance in p < 0.05

Most stunting cases were found in fathers aged > 25 years (Table 1). Research that conducted in Bangladesh[21] also found the same findings. In fourteen low and middle-income countries, stunting was found to be higher in fathers over 20 years of age[51]. This condition is related to food access. As fathers age, there is a possibility that food security will decrease due to increasing needs, especially in households with a low economic level[52,53]. This decrease in food security can increase the risk of children under five becoming stunted[13,54-56]. However, as in research conducted in Indonesia[57,58] and Bangladesh[21], stunting was not related to the father's age in this study (p = 0.429). There are several explanations regarding the results of this research. On the one hand, younger fathers (< 25 years) did not have sufficient experience in working, so access to food is not yet stable[59]. On the other hand, more mature fathers (> 25 years) had a higher burden to meet the needs for foods. Therefore, this kind of family is more vulnerable to food insecurity if their resources are limited[52,53].

Most fathers with low education have stunted toddlers (Table 1). Research in Banyumas[60] and Aceh[40], as well as other countries in Ethiopia[24,61], also found similar things. Several other studies also found higher stunting in fathers with low education[27,32,62-65] and no education[21,22,26]. Father's education was related to stunting in this study (Table 1). These findings were similar to studies in various countries[6,21,25,27,34,61,65,66] and regions of Indonesia[29,32,40,67]. The results of this study implied that although mothers are the primary caregivers of toddlers, fathers also significantly influence children's nutritional status. Fathers who are highly educated are likely to earn a higher income, so they have adequate food access[59,61,68,69]. Higher education was also associated with higher knowledge, attitudes, behavior, and awareness regarding children's nutritional adequacy, growth and development, hygiene behavior, and use of health facilities[29,32,40,42,61,66]. According to Alderman et al.[70], healthcare information and behavior change were complex enough that a father should possess not only basic literacy but also capable of numeracy skill. Therefore, the father's limited education is insufficient to generate awareness to provide adequate food access and access to health care.

An occupation is an activity that generates income. Households with fathers who work independently can protect children under five from stunting[6,66]. This was because a field that produces an adequate source of income can guarantee family financial security, sufficient food, and easy access to health services[71]. However, professions such as laborers, farmers, and other low-wage jobs may contribute to malnutrition in children under five, as the income earned is insufficient to meet food and healthcare needs[42]. In this study, the proportion of stunting was more significant in fathers with menial jobs such as farmers, laborers, or fishermen (Table 1). In line with previous findings, stunting appeared to be more prevalent among fathers who work as farmers[24,61,72-74]. In rural contexts, fathers were generally the backbone of the family, so the father's work was the primary source of income[61]. According to Geberselassie et al.[66], income from single-parent households tends to be smaller compared to two-parent

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households. In this study, a father's job with a lower income would likely lead to limited food access and a higher prevalence of stunting. However, stunting was not associated with the father's employment in this study (p = 0.271). A similar relationship was seen in several previous studies in five South Asian countries[33], Ethiopia[24,61,73], and Indonesia[75,76]. Parent's positive behavior to prevent malnutrition in toddlers, such as providing adequate quantity and quality food and good health behavior, was thought to be the cause of the absence of a relationship between stunting and father's employment in this study[77].

Most of the stunted toddlers were found in fathers with a height < 162 cm (Table 1). Previous research showed fathers with heights < 160 cm[62] and < 165 cm[60] were more likely to have stunted toddlers. Research in the Philippines found that fathers under 5 feet tall were 4.7 times more likely to have stunted children than their counterparts over 5 feet tall[34]. According to Gupta et al.[78], parents have an intergenerational influence on stunting among toddlers. In addition to adequate feeding patterns and exposure to infections during growth, a child's height is also determined by the height of his parents[34]. However, stunting is not related to the father's height (p = 0.312) as in research in Banyumas[60] and Bantul[75]. The influence of the father's height on the child is likely weaker than that of the mother's height. This condition is likely due to the intergenerational influence of the mother on the child, which is driven by intrauterine conditions and related gender norms and roles[51].

The highest proportion of stunting was found in smoking fathers (Table 1). This study aligns with research in rural Surakarta, Indonesia[18] and Srilanka[48]. A cross-sectional study in low-income families in rural areas found that smoking fathers increased the risk of stunting 1.8 times higher than non-smoking fathers[46]. Meanwhile, research results in Nepal show that smoking fathers can increase the likelihood of stunting in toddlers by 3.47 points[47]. According to Bella et al.[47], the high incidence of stunting in smoking fathers is influenced by the effects of passive smoking and financial effects. The effects of smoking on toddler growth are long-term and do not occur after initial exposure at birth[79]. Quelhas et al.[80] stated that exposure to cigarettes during pregnancy harms pregnancy outcomes, potentially causing stunting, inhibiting brain development, and other impacts later in life. The research results in Table 1 show that there is no relationship between the father's smoking status and the incidence of stunting in rural areas (p = 0.864). Several previous studies also showed the same findings[18,81]. In Nepal, exposure to cigarette smoke from the environment was also found not to be associated with stunting[82]. The reason why smoking status is not related to stunting is thought to be because this study only asked about the father's smoking status but did not ask about the duration and frequency of smoking, the number of cigarettes consumed by the father, and the duration and frequency of the toddler's exposure to cigarettes. Therefore, the research results cannot describe the actual smoking conditions of fathers.

Stunting was slightly higher in fathers from large families (Table 1) as well as previous findings[6,24,40,61,73,83-85]. Family size has been reported to be related to stunting in several previous studies[7,16,20,34,55,66,73,76] In this study, family size was also associated with the incidence of stunting (p = 0.054), but with a weak significance level as in research in Ethiopia[85]. The reasons for the relationship between family size and the incidence of stunting were low economic levels, limited access to food, competition for food, and limited access to health services in families with large numbers of members[34,66,76]. However, these findings differed from research in several regions in Indonesia[40,60,86,] and several countries[61,82,87], which found no relationship between stunting and family size.

Family expenditure is a proxy for household economic status. The highest proportion of stunting occurred in fathers with low household expenditure per capita (Table 1). Research in various regions of the world, such as Ethiopia[22,24,64,85,88], Madagascar and the Central African Republic[89], Pakistan[65,90], Bangladesh[27], India[28], and Zambia[91] also found higher stunting in families with low socio-economic status. Limited access to food, access to health services, as well as limited access to adequate water, and sanitation in low-economic families, were thought to be the causes of the high number of stunted toddlers in these families[22,61,76,88]. Per capita household expenditure was unrelated to rural stunting (p = 0.276). Several previous studies found that socio-economic level was not related to the incidence of stunting[16,57,92,93]. There may be other causes related to stunting in this study. According to Santosa et al.[93], socio-economics did not directly influence stunting. Socio-economics indirectly influenced stunting through maternal factors such as nutritional status, pregnancy conditions, pregnancy output, and feeding patterns for toddlers.

The results of the multivariate analysis in Table 2 show that the father's education (p = 0.010; OR = 2.407; 95% CI: 1.231-4.705) and family size (p = 0.042; OR = 1.971; 95% CI: 1.026-3.785) were risk factors stunting among toddlers in rural areas. The fathers with low education were at risk of increasing the incidence of stunting 2,407 times greater than those with higher education (Table 2). The risk of stunting in low-educated fathers was comparable to a cross-sectional study in Gianyar Regency[32]. Research in Ethiopia[61] and Filipina[34] found a higher risk of stunting than the results of this study, with odds values of 5.3 times and 3.43 times, respectively. This reason was likely due to differences in the number of samples in this study compared to previous studies and the age range of the toddlers studied. This research reaffirmed that the length of schooling needs to be increased and must be one of the priority programs for stunting prevention. The school education curriculum must also add subject matter to increase students' knowledge of nutrition and health as prospective parents in the future[70].

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Table 2. The results of the multivariate analysis

Variable	OR	p-value	95% CI
Father's education			
Low	2.407	0.010*	1.231-4.705
High	1		
Family size			
Less than and equal to 4	1	0.042*	1.026-3.785
5 and above	1.971		

*Significance in $p < 0.05$

Fathers originating from large families faced an elevated risk of stunting, 1.971 times greater than their counterparts with smaller families (Table 2). This risk opportunity aligns with research conducted in Ethiopia, where the risk of stunting is 1.77 times higher in families with six or more members[66]. Fikadu et al.[73] and Fufa et al.[55] found much higher risk odds from this study. This difference was likely due to differences in geographic conditions, sample size, and selection of variable categories used. These findings emphasize the importance of health campaigns related to pregnancy planning and birth control at both the community and individual levels to reduce the incidence of stunting.

CONCLUSIONS

Fathers had an essential role in the incidence of stunting in rural areas. Fathers with a low level of education increased the risk of toddlers becoming stunted by 2.407 times higher than fathers with a high level of education. Another factor that also influences stunting is family size. Fathers from large families were 1.971 times more likely to have stunted toddlers than fathers from small families. Policymakers need to strengthen education programs by increasing school age and making it a priority program to prevent stunting in toddlers. Integrating nutrition and health material into the school curriculum should be carried out to increase students' knowledge of nutrition and health from an early age. Apart from that, health campaigns regarding pregnancy planning and birth control should be carried out continuously to prevent toddlers from stunting.

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Author Contributions

ES: conceptualization, supervision, writing–original draft, writing–review and editing; BDP: methodology, data analysis, writing–original draft; AB: writing–original draft, writing–review and editing.

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