



Identifying causal risk factors for stunting in children under five years of age in South Jakarta, Indonesia[☆]



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Abstract

Objectives: To identify correlations between family characteristics, nutritional parenting, and stunting in children under five in South Jakarta.

Method: This study used an observational, descriptive research design and a community-based cross-sectional approach. A total of 192 samples were included in the study, selected using the cluster sampling technique. *Family Characteristics and Nutritional Parenting Tools* contain the types of questions that were used to collect the data. A correlation data analysis was conducted using an independent *t*-test, chi-square, and multiple logistic regression prediction modeling.

Results: The results of the research showed a significant correlation between family characteristics and nutritional parenting with the occurrence of stunting in children under five in South Jakarta. Families whose incomes were below the regional minimum wage had a 6.625 times greater chance of observing stunting in children under five compared to families whose incomes were above the regional minimum wage with Wald value of 28.148.

Conclusions: Socioeconomic factors, especially household income, are the factors that are most responsible for influencing the incidence of stunting in children under five. Multisector and integrated programs are needed to increase household income, knowledge, and family skills to reduce the incidence of stunting in children under five.

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Introduction

The Republic of Indonesia's Ministry of Health defines toddlers as children aged 0–59 months.¹ Toddlers need appropriate and balanced nutrition, as healthy food contains essential components required by the body to support its growth and development. Toddlers are particularly

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vulnerable to nutritional deficit problems. One of these often-endless nutritional problems is stunting.¹ Stunting is diagnosed by measuring the anthropometry index of the body's height based on the person's age.² Stunting can shorten a person's lifespan if it is not seriously taken care of.³

The prevalence of stunting in Asia is 36%. Most of these individuals are found in South Asia, in which stunting occurs in almost half of all toddlers, which is currently as many as 61 million.⁴ UNICEF predicted that there were 7.8 million stunted children in Indonesia alone as of 2007. This means that Indonesia is one of the top five countries with the highest stunting occurrences. A basic health research finding in 2013 explained that the stunting prevalence in Indonesia is 37.3%. The stunting prevalence in DKI Jakarta reached 26.6%, even though it is the government center and thus, nutritional issues should be resolved more quickly. WHO outlined that a society's health issues should be considered alarming if the stunting prevalence is between 30 and 39%. The prevalence is considered serious if the percentage reaches $\geq 40\%$. WHO has determined that the stunting prevalence limit is 20% for all countries of the world.⁵

Stunting has various associated effects, including a reduced ability to think and cognitive function issues; thus, stunted children usually obtain fewer achievements than non-stunted children. Other effects of stunting are the disturbance of metabolic processes and decreased productivity.⁶ One study found that 70% of brain cell formation occurs from when the embryo in the uterus starts to grow until the child is two years old. When a brain's growth is inhibited, the number of brain cells, synapses, and neurons decrease. Based on the severity, three-year-old boys who are very short have a 15-point lower reading ability than short boys, whereas in girls, the variance is 11 points.⁶

The family is an important component of a person's health status. A family's level of knowledge has a meaningful relation to that same family's attitude and behavior. Kaakinen explains that preventive action taken toward health issues can be affected by family characteristics.⁷ Family characteristics include family type, social and economic conditions, nationality, and the family's developmental stage.⁸ The purpose of this study was to identify the relationships between family characteristics and nutritional parenting with the prevalence of stunting in children under five years.

Method

This study used an observational, descriptive design and a cross-sectional approach. A total of 192 children under five years of age were included. The variables that were measured were family characteristics and nutritional parenting. The family characteristics included family type, household income, the mother's age, the mother's education level, the head of the family's education level, the head of the family's job, the mother's job, the head of the family's age, the toddler's sex, the toddler's birth weight, and the toddler's birth length. Meanwhile, the nutritional parenting factors included parents' knowledge, attitude, and behavior. This study used a modified questionnaire by Mirayanti that refers to Green and Engel's Theory.^{9,10}

The analysis was carried out in univariate, bivariate, and multivariate ways. The univariate analysis was aimed toward identifying the descriptions of the family characteristics, the level of nutritional parenting, and the stunting occurrence in the studied children. The bivariate analysis was conducted in order to determine the effects of family characteristics and nutritional parenting on stunting occurrence in children under five years old. The last analysis, a multivariate analysis, was conducted to identify the most influential independent variable on the dependent variable.

The study protocol was approved by the Ethics Committee of the Faculty of Nursing, Universitas Indonesia. Information regarding the research objective was read to the participants, and verbal informed consent was received. The data collected through the questionnaires did not cause harmful effects in the respondents. Ethical conduct was applied throughout the study process.

Results

The results of the univariate analysis revealed that 50.5% of the respondents were male, 75.5% of the families' heads had undergone higher education (a minimum of senior high school), 64.1% of the mothers had lower education levels, 89.6% of the fathers had jobs, 59.9% of the families had incomes higher than the regional minimum wage, and 57.8% of the families included extended family members. In addition, the average age of the head of the family was 34.07 years. The interval estimation was 95%, and the researchers believe that the age range for the head of the family was 33.09–35.05. The average age of the mothers was 31.27 years, the toddlers' average birth weight was 3132.4g, and the toddlers' average birth length was 45.70 cm (Tables 1 and 2).

Overall, the nutritional parenting of most families (57.8%) fell under the "good" category. Family knowledge of nutritional parenting was also good, as high as 59.4%. Additionally, the families' attitudes toward nutritional parenting mostly belonged in the "good" category (56.8%). Regarding families' skill levels in nutritional parenting, 51% of them fell under the "good" category. In this analysis, 61.5% of the children did not suffer from stunting. Regarding nutritional parenting itself, many families belonged to the "good" category (57.8%), which showed that their nutritional parenting was good enough for the child to be fulfilled nutritionally (Table 3).

The bivariate analysis showed that there was a significant relationship between stunting prevalence and the child's birth weight, mother's age, head of the family's education level, mother's education level, head of the family's job, nutritional parenting, and the family's knowledge, attitude, and behavior toward nutrition (Table 4).

From the multivariate analysis results, it was found that some factors were related to the stunting occurrence, namely the children's birth weights (OR=1.003), the children's birth lengths (OR=1.378), the head of the family's education level (OR=5.797), the mother's education level (OR=0.412), and the family's income (OR=6.625), type (OR=1.670), attitude (OR=2.290), and behavior (OR=2.185). Based on those findings, the most dominant factor that affected the occurrence of stunting

Table 1 Percentage distribution of family characteristics and nutritional parenting ($n = 192$).

Variable	Frequency (n)	Percentage (%)
<i>Gender</i>		
Male	95	49.5
Female	97	50.5
Total	192	100
<i>Paternal education</i>		
Low	47	24.5
High	15	7.5
Total	192	100
<i>Maternal education</i>		
High	69	35.9
Low	123	64.1
Total	192	100
<i>Paternal occupation</i>		
No work	20	10.4
Work	172	89.6
Total	192	100
<i>Maternal occupation</i>		
Work	74	38.5
No work	118	61.5
Total	192	100
<i>Family income</i>		
Below regional minimum wage	77	40.1
Above regional minimum wage	115	59.9
Total	192	100
<i>Family type</i>		
Nuclear family	81	42.2
Extended family	111	57.8
Total	192	100
<i>Anthropometric status</i>		
Stunted	74	38.5
Normal	118	61.5
Total	192	100
<i>Family knowledge of nutritional parenting</i>		
Poor	74	40.6
Good	114	59.4
Total	192	100
<i>Family attitude toward nutritional parenting</i>		
Poor	83	43.2
Good	109	56.8
Total	192	100
<i>Family skill in nutritional parenting</i>		
Poor	94	49
Good	98	51
Total	192	100
<i>Nutritional parenting</i>		
Poor	81	42.2
Good	111	57.8
Total	192	100

in children under five years old was the family income (P -value = 0.012) whose OR value was 6.625. Thus, based on the modeling, it could be concluded that children whose families earn incomes lower than the regional minimum wage had a 6.625 times higher probability than other children to suffer from stunting.

Discussion

In this study, the proportions of male and female children were similar. The majority of the families' heads (75.5%) had achieved higher education, and most of the mothers (64.1%) had achieved lower education. Friedman revealed that parents' education levels could affect their mind-sets and attempts to resolve various family issues through information.¹¹ Research has shown that parents with higher education levels have better knowledge about nutritional parenting for their toddlers.¹² Therefore, both paternal and maternal education are strong predictors of stunting among children. Higher levels of formal education achieved by parents are associated with decreased odds of stunting occurring in children under five.¹³

More than half of the mothers had achieved only a minimal education. This condition affects the implementation of nutritional parenting in these women's families. Semba, Pee, Sun, Sari, Akhtar, and Bloem explained that mothers are generally the primary caregivers for their children and their behaviors regarding nutritional patterns.¹³ Their lower education affects their ability to accept information related to the actual growth and development of their children. Semba and colleagues' study described that the causes of stunting are complex and reflect breastfeeding practices, a poor-quality diet, chronic adverse environmental exposure, infectious disease morbidity, and other factors, all of which are difficult to measure in cross-sectional surveys.

The bivariate analysis result showed that gender had no significant effect on stunting occurrence in children. This study was in line with Rengma, Bode, and Mondal, who found that gender did not affect the prevalence of stunting in children.¹⁴ In this study, the prevalence of stunting was observed to be higher among boys (48.8%) than girls (37.8%). However, the age-specific sex differences in the prevalence of stunting were found to be statistically insignificant in most age groups. Research conducted by Zhang, Becares, and Chandola showed that there was no gender difference regarding the risk of the paradox of stunted between boys and girls.¹⁵

The statistical test revealed that the head of the family's education level affected the occurrence of stunting significantly. This was in line with Semba, Pee, Sun, Sari, Akhtar, and Bloem's study, which showed that parents with higher education levels were generally more aware of their families' health, particularly in the management of their nutritional parenting for their children.¹³ This study showed that higher paternal formal education led to a decrease of between 2.9 and 5.4% in the odds of stunting occurring in children under five. Paternal education is a strong

Table 2 Distribution of respondents based on paternal age, maternal age, children birth weight, and birth length ($n = 192$).

Variable	Mean	Median	Modus	Min-max	Deviation standard	CI 95% for mean
Father's age	34.07	33.00	32	20-51	6.878	33.09-35.05
Mother's age	31.27	31.00	31	18-47	5.818	30.44-32.09
Birth weight	3132.34	3100.00	3200	2100-4200	395.471	3076.05-3188.64
Birth length	45.70	47.00	48	32-57	4.792	45.02-46.39

Table 3 Analysis of the relationships between family characteristics and stunting prevalence ($n = 192$).

Independent Variable	OR (95% CI)	P value
Toddler's sex	1.348	0.392
Head of the family's education level	4.596	0.000
Mother's education level	2.440	0.006
Mother's job	1.045	0.005
Family income	3.778	0.000
Family type	1.841	0.059
Toddler's birth length	$R = 0.000$	0.353
Toddler's birth weight	$R = 0.000$	0.432
Head of the family's age	$R = 0.069$	0.132
Mother's age	$R = 0.065$	0.109
Knowledge of nutrition in children under five	3.289	0.000
Attitude toward nutrition in children under five	2.971	0.001
Behavior toward nutrition in children under five	2.890	0.001
Nutritional parenting (nutrition provided for children under five)	3.896	0.000

determinant of child stunting in families in both Indonesia and Bangladesh. The findings of this study emphasize the importance of both fathers and mothers completing formal education.

The bivariate analysis results showed that the mothers' education level also significantly affected the stunting occurrence in the children. It was found that the OR value was 2.440, meaning that mothers with lower education levels had a 2.440 times higher risk of having stunting children under five. This result was similar to research conducted by Senbanjo, Oshikoya, Odusanya, and Njokanma. They also argued that the mother's education level is related to the prevalence of stunting. In particular, minimal maternal education is a major determinant of stunting.¹⁶ Expectedly, as a mother's level of education increases, so do their finances and contributions to the family's total income. An educated mother is likely to ensure that her children are breastfed adequately, that they receive oral rehydration therapy and immunizations, and that suitable nutrition is provided to them to prevent stunting. Research conducted by Hagos, Hallemariam, WoldeHanna, and Lindtjorn showed that the mother's education level has a protective effect regarding the risks of stunting and severe stunting.¹⁷ Their study

Table 4 Final modeling of the multivariate analysis of factors predicted to affect stunting prevalence ($n = 192$).

Variable	B coefficient	P value
Toddler's birth weight	1.003	0.000
Toddler's birth height	1.378	0.001
Head of the family's education level	5.797	0.008
Family income	6.625	0.012
Mother's education level	0.412	0.137
Family type	1.670	0.207
Attitude toward nutrition for children under five	2.290	0.090
Behavior regarding nutrition for children under five	2.185	0.104
Constanta	0.000	0.000

showed that the odds of stunting were 20% higher among children under five whose mothers had had no education compared to children whose mothers had had primary or higher education (OR 1.21; 95% CI: 1.02 ± 1.42).

The bivariate analysis result also concluded that a jobless head of the family was significantly related to the occurrence of stunting in children. According to the analysis, the OR value was 1.045. This reflected that a jobless head of the family has a 1.045 times higher chance of having a child who will suffer from stunting. This study reported that parents' (especially fathers') occupations have a significant inverse association with stunting. This finding is consistent with the study conducted by Senbanjo, Oshikoya, Odusanya, and Njokanma, which showed that a jobless father had a significant effect on severe stunting in toddlers under five years old.¹⁶ Another finding showed a higher prevalence of stunting occurring among children in low- and middle-income countries.¹⁶ A study by Zhang, Becares, and Chandola showed that household socio-economic factors, including household income per capita and maternal education, were significant predictors of stunting in children under five.¹⁵ Household income appeared to decrease the odds of under-nutrition among children in a graded fashion (95% CI: 0.59, 0.90). In addition, maternal education was observed to be a protective factor for avoiding undernourished and stunted overweight children. In other words, the risks of a child being undernourished or stunted and overweight are lower in rural China, where mothers receive more formal schooling. From this study, it could be concluded that there was no significant relationship between the mother's job and the stunting prevalence in children.

The current study showed a relationship between behavior regarding nutritional upbringing and the incidence of stunting in children under five in South Jakarta, Indonesia. This research is in agreement with research conducted by Rah, Akhter, Semba, Pee, Bloem, Campbell, Pfanner, Sun, Badham, and Kraemer, which showed that reduced dietary diversity is a strong predictor of stunting in rural Bangladesh.¹³ Children's feeding practices were examined by calculating the proportion of children who consumed any food items at least once per week. The study revealed that limited diversity in complementary foods is a strong predictor of stunting in children under five, after all the potential confounders are controlled. This reinforces the growing evidence for the association between dietary diversity and children's nutritional status. Optimizing the overall quality of complementary foods through the inclusion of a variety of food groups may be essential than prolonging breastfeeding to improving a child's nutritional status, particularly after the second year of life.

In addition, it can be concluded from the statistical test results that family knowledge about nutritional parenting is significantly related to stunting occurrence in toddlers. The value of OR in the analysis result was 3.289. This showed that families with poor knowledge about nutritional parenting had a 3.289 times higher chance of having stunted children. Leroy, Habicht, Cossio, and Ruel's study concluded that mothers with a higher education level had better knowledge about nutrition than those who had lower education.¹⁸ In their sample of less educated mothers, increasing wealth was associated with negative outcomes for both the mothers and the children. For the children, wealth did not help reduce stunting, which affected one in every four children. However, among the more educated mothers, a much more positive pattern was found: wealth was associated with both increases in children's heights and an absence of undesirable weight gain among mothers. Another statistical test result reflected that nutritional parenting attitude had a significant relationship with stunting occurrence in children. According to the analysis, the OR value was 2.971. This showed that a child who had a parent with a negative attitude toward nutritional parenting had as much as a 2.971 times higher chance to experience stunting. This is consistent with the study conducted in Iran by Emamian et al., which suggested that mothers' attitudes toward their toddlers' nutrition intake affected the stunting prevalence in Iran significantly.¹⁹

Another bivariate analysis conclusion that was highlighted in this study was that poor parenting behavior can increase the chance of stunting by up to 51.1%, whereas good parenting behavior can decrease stunting occurrence by up to 73.5%. Thus, it could be concluded that nutritional parenting behavior affects stunting prevalence significantly. The OR value was 2.890, which meant that a jobless head of the family has a 2.890 times higher chance of having stunted toddlers. This is in line with a study in Iran that stated that mothers' attitudes regarding nutrition intake for their children affected stunting occurrence significantly.¹⁹ Frongilo also revealed that a mother's behavior has a very significant effect on children's stunting and malnutrition occurrences.²⁰

The statistical test results also showed that parents' nutritional parenting and stunting occurrence in toddlers are related significantly. According to the analysis results,

the OR value was 3.896. This meant that poor nutritional parenting has a 3.896 times greater chance of leading to stunting occurrence. Hasanah's study suggested that poor nutritional parenting of toddlers has a 27 times greater probability of the child suffering from stunting, due to the nutrition deficit.²¹ This is in line with Gordon, Palestina, Mamiro, et al.'s study in Tanzania, which found a higher stunting prevalence in toddlers who had inadequate nutrition intake; thus, they were likely to suffer from nutrition deficits.^{22,23}

Renigma, Bose, and Mondal claimed that an optimal nutritional status is important to the attainment of healthy physical growth, sustainable development, and human capital.¹⁴ Physical growth is an important indicator of the health and nutritional status of a community. Nutrition assessments of the vulnerable segments of the population should be emphasized not only for the identification of nutritional risks but also for the improvement of existing health situations. Therefore, the incidence of stunting is persistent transversely among Indian children specifically, and some researchers have already reported the undernutrition prevalence among the children there.

Last but not least, the multivariate analysis showed that household income played the most dominant role in the stunting occurrence of toddlers (P -value=0.012), with an OR value of 6.625. Based on this model, it can be concluded that families that earn an income lower than the regional minimum wage have a 6.625 times higher chance of having stunted children than families that earn an income higher than minimum wage with Wald value 28.148. The findings of Leroy, Habicht, Cossio, and Ruel outlined some policy implications and important programs specifically for countries undergoing economic transitions.¹⁸ Increased investments in promoting economic growth and increased income for poor households should be developed in order to reduce poverty and the incidence of stunting in children under five years old.

This study outlined the relationships between the prevalence of stunting in children under five and birth weight, mother's age, head of the family's education level, mother's education, head of the family's job, and the family's nutritional parenting as well as their knowledge, attitude and behavior toward nutrition intake in South Jakarta. Families with incomes below regional minimum wage are 6.625 times higher to have stunted children than those who earn higher than regional minimum wage. Low household income is thought to be the cause of toddlers not having optimal nutrition for their growth. Families often cannot afford to buy healthy and balanced foods because they have to share their income to meet other family needs.

This study recommends the need for an integrated and multisectoral program to increase family income, knowledge, attitudes, and skills related to children's nutrition, and exclusive breastfeeding to overcome the incidence of stunting in infants and children under five years. This should also be supported by primary health care by conducting family empowerment and setting up intervention programs such as balanced diets, comprehensive dietary supplements, utilization of health services, regular follow-up investigations, nutritional awareness, and protective or micronutrient-rich foods in order to reduce stunting in children. Research

development related to family support, qualitative studies about mothers' experiences with stunted toddlers, and quasi-experiment studies could be conducted to identify the effects of support groups in practicing nutritional parenting.

Conflict of interests

The authors declare no conflict of interest.

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