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THE CORRELATION BETWEEN THE HOUSEHOLD FOOD SECURITY AND THE INCIDENCE OF STUNTING IN TODDLERS 6-59 MONTHS IN SEBERANG ULU I PALEMBANG

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ABSTRACT

Toddlers are one of the vulnerable groups experiencing stunting nutritional problems. Households with good food security can prevent toddlers from nutritional problems such as stunting. The purpose of this study was to analyze the relationship between food security and the incidence of stunting in toddlers in Palembang City, especially in the Seberang Ulu 1 area. The cross-sectional study designs with a sample of 200 toddlers aged 6-59 months in Seberang Ulu I District who were taken by purposive sampling. Data were analyzed of bivariate used the Chi-Square Test (crude) and multiple logistic regression analysis was used as a multivariate analysis (adjusted). The incidence of stunting under five occurs more in households with food insecure conditions, high food expenditure, low income and low maternal education. There was a relationship between household food security and the incidence of stunting (p <0.05) and there was no relationship between food expenditure, family income and mother's education with the incidence of stunting in toddlers in Seberang Ulu I District (p >0.05). Multivariate analysis showed that toddlers in households in food insecure conditions had a 1.7 times higher risk of experiencing stunting than toddlers in households in food secure conditions after controlling for family income. Food insecurity is a risk factor for stunting in toddlers. Based on the results of this study, it is suggested that the government provide guidance to increase family income through improving entrepreneurship skills for families in Seberang Ulu 1 to prevent stunting.

Keywords: food security, nutrition, stunting, toddler.

Introduction

Children under five years (toddlers) are one of the vulnerable groups that experiencing health problems, especially nutritional problems, stunting. Stunting is a chronic nutritional problem in toddlers which is characterized by shorter height compared to children of the same age which has an impact on disrupting physical and cognitive development, increasing the risk of death and non-communicable diseases in adulthood. The prevalence of stunting in children under five years has decreased globally in the last 20 years from 33.1% (201.6 million) in 2000 to 22.0% (149.2 million) in 2020.[1] Stunting can be caused directly by low nutritional intake and health status. Thus, reducing stunting focuses on handling one of the factors; food security and nutrition. Low intake of energy, protein, iron and zinc is associated with the incidence of stunting in toddlers in Indonesia.[2] Low nutrient intake in toddlers is caused by low food consumption, food quantity, eating habits, and the frequency of feeding in under-five children, which is influenced by the mother's knowledge regarding nutrition and family-level food security.[2] Food and nutrition security is a condition of fulfilling food and nutrition needs not only for the state but also for individuals.[3] This is reflected in the availability of food that is sufficient in quantity and quality, safe, diverse, fulfilling nutritional adequacy, evenly distributed and affordable to achieve good nutritional status. Food security is also included in one of the indicators of the Sustainable Development Goals goal 2.1.2, "*the prevalence of moderate or severe food insecurity in the population based on the Food Insecurity Experience Scale (FIES)*". By 2021, it is estimated that 29.3% of the global population (2.3 billion people) will be in a state of moderate or severe food insecurity, and 11.7% (923.7 million people) will face severe food insecurity.[1]

Indonesia is one of the developing countries experiencing stunting problems. The prevalence of stunting in Indonesia is the second highest in Southeast Asia after Cambodia.[4] Based on the results of the 2019 Indonesian Toddler Nutrition Status Survey (referred to *Survei Status Gizi Balita Indonesia* or SSGBI) and the 2021 Indonesian Nutrition Status Survey (referred to *Survei Status Gizi Indonesia* or SSGI), it was shown that there has been a decrease in the prevalence of stunting from 27.7% to 24.4%.[5] Even the prevalence of stunting has decreased, stunting is still one of the main priorities of the Indonesian government in the health sector as stated in the National Strategy for Stunting Prevention for the 2018-2024 period. One of the goals of the national stunting strategy is to increase access to nutritious food and promote food security.[6] According to the Global Food Security Index (GFSI), Indonesia's food security index in 2022 was at the level of 60.2 which ranked 63 out of 113 countries in the world. However, this index is still lower than the global index, which is 62.2, and below the Asia Pacific index average, which is 63.4.[7]

Households that have good food security can prevent toddlers from experiencing nutritional problems including stunting. Households in a food secure condition have a smaller proportion of stunted children under five compared to households in a food insecure condition. The results

showed that 74% of stunted toddlers came from families with food insecurity and 26% of stunted toddlers came from families with food security,[8] In addition, toddlers who come from food insecure households are more at risk of experiencing stunting than toddlers who come from food secure households. Several studies have shown the same result, that was, toddlers from food insecure households were 2-10 times at risk of experiencing stunting.[9–17]

Palembang City is the capital of South Sumatra Province which has a stunting toddler prevalence of 16.1% with a food security index in 2021 of 73.83.[5,15] Even Palembang City has the highest food security index compared to 3 other cities in South Sumatra Province, as many as 16 out of 100 toddlers are still at risk of experiencing stunting. Based on the results of Nutrition Status Monitoring (referred to *Pemantauan Status Gizi* or PSG) there was an increasing trend of stunting prevalence in Palembang City, from 9.0% in 2016 to 14.5% in 2017.[8] Seberang Ulu I District is one of the sub-districts in Palembang City which has become a priority locus for stunting. Health Profile of Palembang City in 2017 showed that the Seberang Ulu 1 area had a high incidence of 1,341 cases diarrhea, and low ownership of healthy homes (76.11%), low coverage of latrines (66.07%). This was the cause of the high incidence of infection (diarrhea in the Seberang Ulu 1 environment).[18] The results of the study in Seberang Ulu 1 also showed that the prevalence of stunting in children aged 6-59 months in Seberang Ulu I District was 39.4%. Apart from birth weight (p=0.012), other variables such as infectious diseases in the last 1 month (p=0.009), mother's height (p=0.016) and family income per month (p=0.024) were associated with stunting.[19] It was necessary to carry out further research on food security in both stunted and non-stunted toddler families. This study aimed to analyze the correlation between food security and the incidence of stunting in toddlers in Palembang City, especially in the Seberang Ulu 1.

Methods

A quantitative analytical study using a cross-sectional approach was used. This study was conducted in Seberang Ulu I District, Palembang City in August-October 2021. The target population in this study were all toddlers in South Sumatra Province, the source population was toddlers in the City of Palembang and the study population were toddlers in Seberang Ulu I District. Respondents in this study were mothers with toddlers aged 6-59 months who met the inclusion criteria, toddlers with single births and mothers who were willing to be respondents. While the exclusion criteria included toddlers suffering from infectious diseases such as diarrhea and Acute Respiratory Infections (ARI) in the last 1 month. The calculation of sample size using the hypothesis test formula is different for the proportion of the population with the proportion of stunting under five in food insecure households of 39% (P_1), the proportion of stunted under five in food secure households is 20% (P_2), with a 95% confidence interval and the strength of the test

80%. A total of 200 toddlers were involved in this study (10% non-response rate).[20] The sampling technique used was non-random sampling, purposive sampling.

The dependent variable in this study was nutritional status based on toddler's height/length according to age. Meanwhile, the main independent variables were food security and the confounding variables were food expenditure, family income and mother's education which were obtained through an interview process using a questionnaire. Nutritional status variables were measured using anthropometric measuring instruments; infantometers and stadiometers. The measurement results were then analyzed using z-scores with the categorization of stunting (z-score < -2SD) and not stunting (-2SD ≤ z-score ≤ 3SD) which referred to the Minister of Health Regulation (In Indonesia: *Peraturan Menteri Kesehatan* or PERMENKES) No. 2 of 2020.[21] Food security variables were collected using the United States Household Food Security Survey Module (US-HFSSM) questionnaire to provide an overview of the condition of fulfilling food for all household members within the last 12 months. Furthermore, the level of household food security was grouped into food security with a score of 0 and food insecurity with a score of 1-18. The food expenditure variable was data that shows the amount of food and non-food expenditure used by the family. Grouping the comparison of the proportion of food and non-food expenditures into high when food expenditure was ≥ 60% and low when food expenditure was < 60% of total household expenditure.[22] Meanwhile, the variable family income was categorized based on the Palembang City Minimum Wage in 2020, low (< Rp. 3,165,519.-) and high (≥ Rp. 3,165,519,-) and the mother's education variable was categorized as low, if the maximum education was junior high school and high school if having at least high school education.

Data analysis used univariate analysis techniques to explain the description of each of the variables studied. Meanwhile, to determine the relationship between the independent and dependent variables using the Chi-Square Test (crude) and to analyze the relationship between the main independent variables and the dependent and confounding variables, multiple logistic regression analysis was used as a multivariate analysis (adjusted). The alpha value = 0.05 was used as a limit for rejecting the null hypothesis (H_0) provided that the p value <0.05 was concluded as statistically significant. Data analysis results in this study were presented in the form of tables and narratives. This research had also obtained ethical approval from the Health Research Ethics Commission (In Indonesia: *Komisi Etik Penelitian Kesehatan* or KEPK) Faculty of Public Health, Sriwijaya University with No. 194/UN9.FKM/TU. KKE/2021.

Results

The number of samples in this study were 200 mothers with under five years children. Based on Table 1, it was shown that the prevalence of stunting in toddlers is 40.0%. Households in Seberang Ulu I District had a higher proportion of experiencing food insecurity (63.0%) with high

food expenditure (73.0%). In terms of family income, 81.5% of households have low income (< Rp. 3,165,519.-) and only 43.0% of households have mothers with low education (maximum junior high school).

Table 1. The Household Characteristics

Variable	Frequency	Percent (%)
Children's Nutritional Status		
Stunting	80	40,0
Not stunting	120	60,0
Household Food Security		
Food insecure	126	63,0
Food secure	74	37,0
Food Expenditure		
High (≥ 60%)	146	73,0
Low (< 60%)	54	27,0
Family Income		
Low (< Rp. 3.165.519,-)	163	81,5
High (≥ Rp. 3.165.519,-)	37	18,5
Mother's Education		
Low (maxJunior High School)	86	43,0
High (min Senior High School)	114	57,0
Total	**200**	**100,0**

Based on the results of the research in Table 2, it was explained that the proportion of stunted children under five was more from households with food insecure conditions (46.0%) than food secure (29.7%). Toddlers in households in food insecure conditions have a 1.5 times higher risk of experiencing stunting compared to toddlers in households in food insecure conditions (95% CI: 1.04 – 2.30; p=0.034).

Table 2. The correlation between Food Security and Other Variables with Stunting

Variables	Nutritional status				PR_{crude} (95% CI)	*p value*
	Stunting		Not stunting			
	n	%	n	%		
Household Food Security						
Food insecure	58	46,0	68	54,0	1,55 (1,04 - 2,30)*	0,034
Food secure	22	29,7	52	70,3	Ref	
Food Expenditure						
High (≥ 60%)	59	40,4	87	59,6	1,04 (0,70 - 1,53)	0,974
Low (< 60%)	21	38,9	33	32,4	Ref	
Family Income						
Low (< Rp. 3.165.519,-)	71	43,6	92	56,4	1,79 (0,99 - 3,25)	0,05
High (≥ Rp. 3.165.519,-)	9	24,3	28	75,7	Ref	
Mother's Education						
Low (max Junior High School)	35	40,7	51	59,3	1,03 (0,73 - 1,23)	0,977
High (min Senior High School)	45	39,5	69	60,5	Ref	

*= statistically significant by using the Chi Square test

Based on Table 2, in households with high food expenditure (≥ 60%), the proportion of stunted children under five (40.4%) was higher than in households with low food expenditure (< 60%). It was viewed from family income, the proportion of stunted children under five also came from households with low family income compared to households with high family income. The proportion of stunted children under five was also more common in households with mothers with low education (maximum junior high school) than those with higher education (minimum senior high school). The results showed that food expenditure, family income and mother's education were not significantly related to the incidence of stunting in toddlers in Seberang Ulu I District (p > 0.05).

Table 3. The Correlation between Food Security and Stunting Incidents with Family Income Confounding Variables

Variables	Initial Modeling		Final Modeling	
	PR_{crude} (95% CI)	***p-value***	**$PR_{adjusted}$ (95% CI)**	***p-value***
Household Food Security				
Food insecure	1,77 (0,93 - 3,34)	0,080	1,74 (0,92 - 3,28)	0,087
Food secure	Ref		Ref	
Food Expenditure				
High (≥ 60%)	2,07 (0,87 - 4,94)	0,100	1,97 (0,85 - 4,59)	0,115
Low (< 60%)	Ref		Ref	
Family Income				
Low (< Rp. 3.165.519,-)	0,86 (0,47 - 1,57)	0,622	-	-
High (≥ Rp. 3.165.519,-)	Ref			
Mother's Education				
Low (max Junior High School)	0,96 (0,49 - 1,86)	0,905	-	-
High (min Senior High School)	Ref			

Multivariate analysis using multiple logistic regression analysis of the risk factor model showed that toddlers in households in food insecure conditions have a 1.7 times higher risk of stunting than toddlers in households in food secure conditions after controlling for family income (95% CI: 0, 92 – 3.28; p=0.087). Although these results were not statistically significant, based on PR values, it has shown that food insecurity was a risk factor for stunting in toddlers. This was explained in Table 2 which showed that the proportion of stunted toddlers occurring in low-income families is 43.6%, while the proportion of stunted toddlers in families with high incomes was 24.3%, and the proportion of stunted toddlers in families with food insecurity was 46%, while the proportion of stunted toddlers in families with food security was 29.7%. For households with food insecure conditions, the proportion of stunted children under five was found more in low-income households. In households with food security, the proportion of stunted children under five was found in high-income households.

Discussion

The relatively high incidence of stunting in Seberang Ulu 1 District indicated the causal factors of the stunting problem. In addition to nutritional intake problems, there were other main factors that cause stunting; poverty, social and culture, increased exposure to infectious diseases, food insecurity and people's access to health services.[21] Food security (household food insecurity) and low parents' economic status were risk factors for stunting.[8,9] This is in line with the results of this study which showed that food insecure households were associated with stunting. Households with food insecure conditions had a 1.5 times higher risk of having stunted children than toddlers with households in food secure conditions. Food security referred to the availability of food that was sufficient in quantity and quality, safe, diverse, nutritious, equitable, affordable and does not conflict with religion, belief and culture, was able to live actively and productively in a sustainable manner.[23] In terms of nutrition, food security was identified from the ability of households to access food and the diversity of household food consumption.[8] The availability of food in a household affected the level of household consumption. If household food availability was met, household food consumption was fulfilled and achieved good nutritional status, and conversely if household food availability was not fulfilled then household food consumption was also not fulfilled and had an impact on poor nutritional status. The problem of household food unavailability or known as food insecurity was the low intake of nutrients such as energy, protein, vitamins and minerals which had an impact on the nutritional status of household members, especially toddlers who were an age group vulnerable to nutritional problems such as stunting.[24]

Household food security was seen from the aspect of spending on food every month, the number of family members and access to food. This was because the increasing number of family members and the indirect access to food (not having their own fields) causes the cost of spending on food to be high and had an impact on food insecurity in households. Family income related to a household's ability to meet primary, secondary and tertiary needs. Limited family income affected the quality and quantity of food that were consumed by family members, very low income was also a risk factor for frequent food shortages and no money to buy food, meaning that low family income costed more food, and lead to family-level food insecurity. Food insecurity in the family for a long period of time affected food consumption, by reducing the quantity and quality of food for family members, if this happened continuously, especially in toddlers, it caused insufficient nutrients needed by the body and had a negative impact on growth of toddlers and were at risk of stunting.[9] In this study, the proportion of stunted children under five was higher in households with high food expenditure than in households with low food expenditure.

Apart from food security, socio-economic factors (education and income) were also related to the incidence of stunting.[7] Low socio-economic factors, including low income and education lead to socio-economic stratification in society which ultimately resulted in differences in ability to

access health facilities and infrastructure, in which differences in access ability lead to differences in opportunities for disease and death, including the incidence of stunting in toddlers.[25] Socio-economic factors were also closely related to access to environmental sanitation and clean water sources, if not obtained properly, it would trigger infectious diseases in toddlers, which increased the risk of stunting in toddler.[24] More stunted toddlers also came from households with low family income and high food expenditure. Household income in this study was not significantly related to the incidence of stunting even most of the family incomes were classified as low below the City Minimum Wage. However, research in Bangkalan showed that there was a relationship between income and stunting, the families with low income had a 6 times higher risk of having a stunted child. And the next research in the following year showed that most of the non-stunting toddlers were from families with the above income.[26–28] Households that had an income below the City Minimum Wage chose energy-dense, filling foods even though they were low in nutrients and they often feel worried when they did not have money to buy family food.[15] Whereas families with high family economic status bought enough food in quantity, variety, and quality of food for their families.[18] Low levels of income indirectly caused stunting because low-income families had low purchasing power in terms of quality and quantity of food to meet adequate nutrition for their children.

The proportion of stunted children under five was also more common in households with mothers with low education. Another study in Palembang showed that food security, parenting styles, environmental sanitation and utilization of health facilities as indirect factors causing stunting.[28] Parenting style affected how a mother cared for her child, including feeding and parenting styles related to the mother's education level. In addition, knowledge was also related to education, the level of mother's knowledge was the key in household management, this could affect the mother's attitude in choosing food ingredients that were consumed by the family. Mothers with good knowledge of nutrition understood the importance of good nutritional status for the health and welfare of their families.[29] Research in Banjar Baru showed that parents with low education have a 5.1 times greater risk of having a stunted child.[30]

Conclusion

The results showed that there was a significant correlation between household food security and the incidence of stunting in children aged 6-59 months. Based on the results of multivariate analysis, food insecurity was a risk factor for stunting in toddlers after being controlled by family income variables. Incidence of stunting under five occurred more in households with food insecure conditions, high food expenditure, low income and low maternal education. Based on the results of this study, it was suggested that the government provide guidance to increase family income through increasing entrepreneurship skills for families in Seberang Ulu 1 to prevent stunting.

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