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Relationship between Sociodemographic Characteristics and the Incidence of Stunting in Toddlers Based on Family Income Stratification

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ABSTRACT

Introduction: The nutritional problem of stunting in Indonesia is known to occur in poor and non-poor families (those above 40% of social and economic welfare levels).

Objective: This research was conducted to see the relationship between sociodemographic characteristics and the incidence of stunting in children under five based on family income stratification in Palembang City.

Method: This research was a quantitative study with research data from 2020. The population in this study were toddlers 24-59 months in Palembang City with a sample of 97 toddlers. The sample in this research was taken by purposive sampling. The analytical method used to see the relationship was using the chi-square test.

Result: The results of the study showed that the proportion of stunting was 20.6% with the incidence of stunting in the family income stratification group < IDR 10,000,000 was 26.4% and in the family income stratification group ≥ IDR 10,000,000 is 13.6%. The results of the analysis show that each independent variable has a p value > α (0.05), except for the parenting method variable in the income stratification group < IDR 10,000,000 which has a p value < 0.05.

Conclusion: Further research needs to be carried out to investigate other factors that were thought to be risk factors for stunting, one of which is environmental factors, infectious diseases and nutritional patterns in children under five.

Keywords: Stunting; Sociodemographics; Family income stratification.

INTRODUCTION

Growth in children is internationally recognized as a crucial indicator of nutritional status and public health [1]. One of the current nutritional issues affecting toddlers worldwide is the occurrence of stunting. Stunting is a process that can affect a child's growth and development from early conception to the third or fourth year of life, where maternal and child nutrition plays a significant role. Stunting is defined as the percentage of children with height-for-age (HAZ) below -2 standard deviations from the median of the WHO Child Growth Standards in 2006 [2]. Stunting is a consequence of chronic or recurrent malnutrition. The consequences of stunting in children are both immediate and long-term, including increased morbidity and mortality rates, heightened risks of infectious and non-communicable diseases [3]. Additionally, children affected by stunting are unable to reach their maximum height potential and may experience suboptimal cognitive development. Such conditions can detrimentally impact the lives of stunted children, with consequences persisting into adulthood [4].

Based on data from the Joint Child Malnutrition Estimates 2023, globally in 2022, there were approximately 148.1 million or 22.3% of children under five who experienced stunting, with nearly half of the stunted children residing in Asia, accounting for 52% [4]. Meanwhile, in Indonesia, according to the Indonesian Nutrition Status Survey (SSGI), in 2022, approximately 21.6% of children under five experienced stunting, a decrease from 24.4% in 2021 and 27.7% in 2019 [5]. According to BPS (2018), in Indonesia, the prevalence of stunting is experienced by both economically disadvantaged and advantaged communities, with rates exceeding 40% across all levels of social and economic well-being [6]. According to RISKESDAS 2018 data, 20% of Indonesian children from middle to upper socioeconomic groups also experience stunting. Based on this information, it is evident that the occurrence of stunting affects nearly all groups across Indonesia [7].

The province of South Sumatera has a high economic growth rate for the Sumatera region, and even ranks high in Indonesia in 2019 [8]. Additionally, based on the assessment of Gross Regional Domestic Product, the prosperity of Palembang City is at the 20th level out of 514 cities/regencies in Indonesia. Therefore, it can be understood that Palembang City is one of the cities with a high level of economic development and good prosperity or well-being [8].

Determinants of stunting are multidimensional and have clear regional characteristics. Understanding the role of risk factors for stunting in childhood is considered crucial so that stakeholders can propose strategies for prevention and control to address the issue of stunting. Previous studies have mainly been conducted in disadvantaged areas, where risk factors for stunting include poor economic conditions, inadequate sanitation practices, and insufficient utilization of health services such as contaminated water, lack of proper sanitation facilities, inadequate food intake, and lack of exclusive breastfeeding [3]. However, in urban areas in South Sumatera, particularly in Palembang City, which has a stable economy and significantly improved environmental conditions compared to disadvantaged areas, the sanitation situation and community infrastructure have improved significantly. Most families are able to provide sufficient food for pregnant women and children, and pregnant women are required to follow standard healthcare procedures. However, Palembang City continues to experience stunting issues, and in 2020, it was designated as a stunting locus [9].

Based on this, researchers want to investigate whether the occurrence of stunting in Palembang City is partly caused by sociodemographic variables. Therefore, the researchers are interested in conducting a study titled "The Relationship Between Sociodemographic Characteristics and the Incidence of Stunting in Toddlers Based on Family Income Stratification in Palembang City."

METHOD

This study is a quantitative analysis using data from the year 2020. In this study, researchers aim to determine the relationship between sociodemographic characteristics and the incidence of stunting in toddlers based on family income stratification. The population in this study consists of all toddlers (24-59 months old) in Palembang City. The sample in this study was purposively selected and calculated using the Lemeshow formula using Sample Size software, resulting in 97 samples.

The variables in this study consist of dependent and independent variables. The dependent variable is the occurrence of stunting, defined as toddler height-for-age (HAZ) < -2 SD based on the WHO curve. In this study, stunting and severe stunting are combined into the stunting category. Independent variables include father's education level, mother's education level, mother's knowledge, family dependents, and parenting methods. Additionally, family income stratification is grouped based on SPSS calculation results using the median, resulting in two categories: family income group of Rp 3,000,000 - Rp 10,000,000 and family income group \geq Rp 10,000,000 (Rp 10,000,000 - Rp 35,000,000).

The data in this study were analyzed using SPSS software. Statistical analysis used in this study involves two stages: univariate analysis and bivariate analysis. In bivariate analysis, the collected data are processed using the chi-square test if the data distribution is normal, and Fisher's exact test if the data distribution is not normal.

RESULTS

Based on Table 1, there is no difference in gender and nutritional status (stunting and non-stunting) between the group with an income < Rp 10,000,000 and ≥ Rp 10,000,000. Meanwhile, according to Table 2, there are differences in the percentage of father's education, mother's education, and parenting methods between the group with an income < Rp 10,000,000 and ≥ Rp 10,000,000. However, there is no difference in the distribution based on mother's knowledge and the number of family dependents between the two income groups.

Table 1. Characteristics of Toddlers

Characteristics	Income < Rp 10.000.000		Income ≥ Rp 10.000.000		Total		P Value
	n	%	n	%	n	%	
Gender							
Male	25	47	21	47.7	46	47.4	0.956
Female	28	53	23	52.3	51	52.6	
Nutritional status							
Stunting	14	26.4	6	13.6	20	20.6	0.121
Non-Stunting	39	73.6	38	86.4	77	79.4	

Table 2. Sociodemographic Characteristics

Characteristics	Income < Rp 10.000.000		Income ≥ Rp 10.000.000		Total		P Value
	n	%	n	%	n	%	
Father's Education							
Low	11	85.0	2	15.0	13	13.0	0.020
High	42	50.0	42	50.0	84	87.0	
Mother's Education							
Low	9	90.0	1	10.0	10	10.0	0.020
High	44	50.6	43	49.6	87	90.0	
Mother's Knowledge							
Low	38	56.0	30	44.0	68	70.0	0.706
High	15	52.0	14	48.0	29	30.0	
Number of dependents in the family							
Large >2	21	43.7	27	56.3	48	49.5	0.071
Small <2	32	65.3	17	34.7	49	50.5	
Parenting Methode							
By Others	24	46.0	28	54.0	52	53.6	0.033
By Mother	29	64.0	16	36.0	45	46.4	

The bivariate analysis results indicate that in the income group < Rp 10,000,000, there is a difference in the proportion of stunting incidents based on parenting methods. However, in the income group ≥ Rp 10,000,000, there is no difference in the proportion of stunting incidents based on all independent variables. To understand the relationship between sociodemographic factors and the occurrence of stunting, refer to Tables 3 and 4.

Table 3. Tabulation of Parental Education and Mother's Knowledge Variables with the Incidence of Stunting Based on Family Income Stratification

Family Income Stratification	Characteristics	The occurrence of stunting				Total	P Value	OR (95% CI)
		Stunting		Non-Stunting				
		n	%	n	%	n		
< Rp 10.000.000	Father's Education							
	Low	3	27.3	8	72.7	11	100	1.057 (0.237 – 4.711)
High	11	26.2	31	73.8	42	100		

≥ Rp 10.000.000	Mother's Education								
	Low	1	11.0	8	89.0	9	100	0.416	0.298 (0.034 – 2.630)
	High	13	29.5	31	70.5	44	100		
	Mother's Knowledge							0.706	0.789 (0.231 – 2.703)
	Rendah	6	24.0	19	76.0	25	100		
	Tinggi	8	28.6	20	71.4	28	100		
	Father's Education							1.000	1.167 (1.031 – 1.320)
	Low	0	0.0	2	100.0	2	100		
	High	6	14.3	36	85.7	42	100		
	Mother's Education							0.136	8.600 (3.773 - 19.604)
Low	1	100.0	0	0.0	1	100			
High	5	11.6	38	88.4	43	100			
Mother's Knowledge							0.568	0.838 (0.727 – 0.965)	
Low	6	16.2	31	83.8	37	100			
High	0	0.0	7	100.0	7	100			

Table 4. Tabulation of Parenting Methods and Family Dependents Variables with the Incidence of Stunting Based on Family Income Stratification

Family Income Stratification	Characteristics	The occurrence of stunting				Total		P Value	OR (95% CI)
		Stunting		Non-Stunting		n	%		
		n	%	n	%				
< Rp 10.000.000	Parenting Methode							4.464 (1.179 – 16.903)	
	By Others	10	41.7	14	58.3	24	100		
	By Mother	4	13.8	25	86.2	29	100		
	Number of dependents in the family							0.727 (0.225 – 2.832)	
Large >2	5	23.8	16	76.2	21	100			
Small <2	9	28.0	23	72.0	32	100			
≥ Rp 10.000.000	Parenting Methode							3.261 (0.346 – 30.735)	
	By Others	5	17.9	23	82.1	28	100		
	By Mother	1	6.3	15	93.7	16	100		
	Number of dependents in the family							1.304 (0.212 – 8.032)	
Large >2	4	14.8	23	85.2	27	100			
Small <2	2	11.8	15	88.2	17	100			

DISCUSSION

Income Stratification < Rp 10,000,000

The Relationship Between Parental Education and Stunting Incidence in Toddlers Based on Family Income Stratification < Rp 10,000,000 in Palembang City

Based on Table 3, the Fisher exact test results for parental education yielded a p-value of 1.000, indicating p-value > 0.05, thus showing no significant relationship between paternal education and stunting incidence based on family income group < Rp 10,000,000. Similarly, based on the Fisher exact test results for maternal education, a p-value of 0.416 was obtained, meaning p-value > 0.05, indicating no significant relationship between maternal education and stunting incidence based on family income group < Rp 10,000,000. These research findings align with Mustajab et al.'s study (2022), where their analysis did not indicate a significant relationship between parental

education, both paternal and maternal, and stunting incidence in toddlers. Mustajab also explained that stunting incidence could be caused by other factors such as maternal knowledge, economic status, and sanitation [10].

In the analysis results of Table 3, it is also observed that the tendency for stunting in toddlers is more prevalent among mothers with higher education (29.5%). This could be related to the low family income < Rp 10,000,000. The low family income in this study may affect the fulfillment of family consumption needs, including influencing the quality and quantity of food consumed, which in turn relates to nutritional status. Therefore, in the family income stratification < Rp 10,000,000, even if the mother of the toddler has higher education, there is still a risk of having a stunted toddler. Research in Pakistan (2019) concluded based on previous studies in Bangladesh and India that while increasing female education is necessary, it may not be sufficient to reduce stunting problems. In developing countries, even if women are highly educated but not properly empowered, it can affect child health. The research results depict that women's education and wealth are closely related to child health issues. If the mother is also a breadwinner, it will help increase the total household income, which in turn can increase the chances of obtaining high-quality food in sufficient quantities [11].

According to the Indonesian Ministry of Health (2000), the quality and quantity of food consumed are closely related to income levels. The amount of income determines the extent to which a family can meet its nutritional needs within the body. If income is high, the quantity and variety of food tend to be good. But if income is low, the opposite will happen. Therefore, in this case, income level also influences what type of food will be purchased. The higher the income, the greater the percentage of purchasing fruits, vegetables, and various other types of food to meet the nutritional needs of the family, including toddlers [12].

The Relationship Between Mother's Knowledge and Stunting Incidence in Toddlers Based on Family Income Stratification < Rp 10,000,000 in Palembang City

Based on Table 3, the chi-square test results for mother's knowledge yielded a p-value of 0.706, meaning p-value > 0.05, indicating no significant relationship between mother's knowledge and stunting incidence based on family income group < Rp 10,000,000. These research findings align with Sahroni et al.'s study (2020), which explains that there is no significant relationship between mother's knowledge about nutrition and the degree of stunting incidence in toddlers with a p-value of 0.075. Sahroni also explains that in his research, stunting incidence can be caused by factors other than knowledge [13].

In the analysis results of Table 3, it is also noted that the occurrence of stunting in mothers with high knowledge has a higher percentage (28.6%). This could be because in this study, although some mothers have a high level of knowledge, they do not apply their knowledge in daily life. This could also be related to economic status, where mothers with high knowledge are in the income stratification group < Rp 10,000,000. This may be related to the mother's ability to provide quality and diverse food for the family. Thus, this analysis result can explain that even though mothers have a high level of knowledge, they still have the risk of having stunted toddlers.

According to Yuliantini (2023), one of the factors affecting the nutrition of 2-5-year-old children is mother's knowledge. Knowledge about good nutrition will enable someone to provide good food menus for consumption [14]. However, when related to the study conducted by Phyto (2021), which explains that food menu provision is also related to monthly food budget conditions and maternal caregiving practices, especially in preparing food. Maternal caregiving practices, especially in food preparation, are considered crucial in maintaining children's nutritional status from birth through childhood to adolescence [15]. This is also explained in Mutingah's research (2021) that good knowledge cannot determine good attitudes or behaviors. Good knowledge, when accompanied by poor practices and unsupported economic conditions, will have negative impacts [16].

The Relationship Between Parenting Methods and Stunting Incidence in Toddlers Based on Family Income Stratification < Rp 10,000,000 in Palembang City

Based on Table 4, the chi-square test results for parenting methods yielded a p-value of 0.022, meaning p-value < 0.05, indicating a significant relationship between parenting methods and stunting incidence based on family income stratification < Rp 10,000,000 in Palembang City. Additionally, an odds ratio (OR) of 4.464 (95% CI) was obtained, indicating that toddlers cared for by others have a 4.464 times greater risk of experiencing stunting compared to toddlers cared for by their biological mothers.

In the analysis results of Table 4, it is also observed that there is a higher tendency for stunting in toddlers cared for by others (41.7%). In this study, toddlers cared for by others specifically refer to those cared for by grandmothers rather than other relatives or caregivers. This aligns with Heriawan's research (2021), which explains that grandmother's caregiving prioritizes the child's comfort over concerns about the child's nutritional status. This behavioral pattern occurs spontaneously based on the grandmother's experience in caring for her own children in the past. Consequently, grandmothers continue traditional caregiving practices, believing they will not have adverse

effects on the child's growth and development. However, when viewed from the perspective and standards of the health world, grandmothers' caregiving practices can be one of the risk factors for stunting [17].

These research findings also align with Saputri's study (2019), which identifies parenting methods as a factor influencing stunting incidence in toddlers. The phenomenon of working mothers and children being cared for by others (family members or caregivers) leads to suboptimal parenting, ultimately affecting the child's nutritional status or growth and development [18]. Moreover, in this variable, stunting incidence may also be related to low family income (< Rp. 10,000,000), resulting in limited food provision compared to families with income \geq Rp 10,000,000. This corresponds with Asrianti's research (2019), which indicates that, besides childcare by others, lower-middle-income families are known to have a higher risk of stunting due to their inability to provide varied and quality household food supplies [19].

The Relationship Between Family Dependents and Stunting Incidence in Toddlers Based on Family Income Stratification < Rp 10,000,000 in Palembang City

Based on Table 4, the chi-square test results for the number of family dependents yielded a p-value of 0.727, indicating p-value > 0.05, hence no significant relationship between the number of family dependents and stunting incidence based on family income stratification < Rp 10,000,000.

However, Table 4 shows that toddlers from families with fewer dependents experience more stunting (28%). This aligns with Lemaking et al.'s explanation (2022) in their research, where employment is linked to income and household needs. Despite almost all fathers being employed and some mothers as well, the family's ability to meet living needs still depends on the amount of income generated from their parents' work. Thus, even with a smaller family size, if the family income cannot meet the needs of the children, they remain at risk of experiencing stunting [20].

Income Stratification \geq Rp 10,000,000

The Relationship Between Parental Education and Stunting Incidence in Toddlers Based on Family Income Stratification \geq Rp 10,000,000 in Palembang City

Based on Table 3, the analysis results show no significant relationship between parental education and stunting incidence in toddlers based on the family income group \geq Rp 10,000,000 (p-value > 0.05). However, the analysis indicates a tendency for more stunting incidence in toddlers with mothers having low education (100%) compared to those with mothers having high education (11.6%).

Sulaeman (2022) explains that mothers with low education are assumed to have less capability in understanding information about healthy lifestyles, clean living behaviors, and nutritious food. Meanwhile, individuals with higher education levels are assumed to easily comprehend information about healthy lifestyles and clean living behaviors [21]. However, this analysis result contradicts with the < Rp 10,000,000 income group, where the tendency for stunting occurs in the opposite manner, experienced by mothers with high education. In this regard, it's known that even if mothers have high knowledge, if not supported by sufficient income to meet nutritional needs, the risk of stunting can still occur. Similarly, with high income, if not accompanied by good information comprehension due to low education, the risk of stunting can also occur.

Relevant explanations are provided by research conducted by Putri (2023), stating that besides education, economic status is considered significantly impacting the likelihood of a child experiencing stunting. Families with good financial quality will receive better public services such as education and health services as well as having high purchasing power for various types of nutritious food. Conversely, low family income reduces the family's ability to obtain nutritious food, leading to malnutrition or deficiencies in macro or micronutrients [22].

Relationship Between Mother's Knowledge and Stunting Incidence in Toddlers Based on Family Income Stratification \geq Rp 10,000,000 in Palembang City

The analysis in Table 3 indicates that there is no significant relationship between mother's knowledge and stunting incidence in toddlers based on the family income stratification group \geq Rp 10,000,000. However, according to Table 3, it is known that in the family income group \geq Rp 10,000,000, the tendency for stunting occurs in toddlers whose mothers have low levels of knowledge (20%). According to Ahli et al (2023), mother's knowledge about nutrition is related to decision-making regarding the nutritional needs of children and healthcare, and one of the factors that can influence knowledge is education [23].

However, based on the data in this study, the majority of mothers have a high level of education, but this does not guarantee that maternal knowledge about nutrition will also be good. This is in line with research conducted by Rahmah (2023) that there is no significant relationship between education level and knowledge about stunting [24]. Nursaidah (2022) also explains in her study that a high level of knowledge sometimes does not align with knowledge about nutrition due to different educational backgrounds. Additionally, the researcher also suggests that knowledge

is not only obtained from formal education but can also come from informal education and other sources, experiences, or living environments. Therefore, if a mother has a high level of education but is not exposed to or seeks relevant information from other sources, it will undoubtedly lead to low mother's knowledge about nutrition despite the mother's high level of formal education [25].

Relationship Between Parenting Methods and Stunting Incidence in Toddlers Based on Family Income Stratification \geq Rp 10,000,000 in Palembang City

The analysis in Table 4 indicates that there is no significant relationship between parenting methods and stunting incidence in toddlers based on the family income stratification group \geq Rp 10,000,000, with a tendency for stunting to occur in toddlers who are cared for by others. When comparing this analysis with the family income group $<$ Rp 10,000,000, it is observed that although the family income group \geq Rp 10,000,000 tends to experience stunting in toddlers, the percentage of stunting incidence is lower in the family income group \geq Rp 10,000,000. This could be because even though children are cared for by others, their feeding patterns and the quality of their food are well-maintained. Additionally, efforts to seek treatment when children are ill and access to healthcare services are assumed to be better within the family income group \geq Rp 10,000,000. These research findings are consistent with those of Asriati et al (2019), who explain that nutrition issues are caused by multiple factors. Some nutrition issues can be influenced by a family's ability to provide sufficient and varied food, which is related to the economic situation of a household [19].

Relationship Between Family Dependents and Stunting Incidence in Toddlers Based on Family Income Stratification \geq Rp 10,000,000 in Palembang City

The analysis in Table 4 indicates that there is no significant relationship between family dependents and stunting incidence in toddlers based on family income stratification \geq Rp 10,000,000. However, the analysis reveals that in the family income group \geq Rp 10,000,000, toddlers from families with a large number of dependents have a higher percentage of stunting incidence. When comparing this analysis with toddlers from families with a large number of dependents in the family income group $<$ Rp 10,000,000, it is found that the percentage of stunting incidence is higher (23.8%) compared to the family income group \geq Rp 10,000,000 (14.8%).

Based on this, Lemaking et al (2022) explain a relevant aspect of these research findings, stating that a large number of family members can influence the incidence of stunting. However, the results may vary if toddlers from families with a large number of dependents are economically capable of meeting the needs of all family members, thus avoiding some risk factors for stunting in such family situations [20].

CONCLUSION

The research results indicate that there is a difference in the proportion of stunting incidents based on parenting methods in the income group $<$ Rp 10,000,000, but in the income group \geq Rp 10,000,000, there is no difference in the proportion of stunting incidents based on all independent variables. Stunting incidents in this study are more common in the $<$ Rp 10,000,000 income group (26.4%) compared to the \geq Rp 10,000,000 income group (13.6%). Thus, in this regard, the socio-demographic factors studied in both the $<$ Rp 10,000,000 and \geq Rp 10,000,000 income stratification groups in Palembang are risk factors for stunting but not the main issue.

SUGESTION

Stunting incidents in both low and high-income groups can also be influenced by other factors. Therefore, further research is needed by adding variables such as environmental factors, infectious diseases, and nutritional care patterns in toddlers to the incidence of stunting.

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