

Nutritional status and its associated factors among children

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Abstract

This study aimed to analyze the nutritional status of children in these districts, taking into account factors such as age, gender, maternal education, family income, and children's eating patterns. The study used a cross-sectional design, with 279 children aged 1-10 years as subjects. Data were collected by distributing structured questionnaires to the participants' parents. The data were analyzed using the chi-square test to determine the significance of the relationship between the predictors and nutritional status of the children ($\alpha = 0.05$). The results showed that maternal education (0.012), parental income (0.001), and eating patterns (0.001) were significantly associated with the nutritional status of children who were stunted and normal. However, for overweight and obese children, maternal education (0.835), parental income (0.951), and eating patterns (0.309) were not predictors of nutritional status. Age and sex did not significantly influence the nutritional status of children in all categories. Family based interventions through health education are needed to improve nutritional literacy so that parents can plan and prepare nutritious meals for their children. The government must provide policies to support families, especially those with low incomes, to ensure the availability of adequate food and access to nutritious food.

Keywords: nutritional status, family income, maternal education, children's eating patterns

Introduction

Nutrition plays a crucial role in human growth and development as it affects the quality of human resources. Poor nutritional status in children can hinder mental and physical growth and cognitive ability, leading to decreased work productivity in adulthood.¹⁻³ The literature defines malnutrition as a medical condition that occurs due to a deficiency or imbalance in the intake of essential nutrients for growth, cognitive activity, and all aspects related to life. Nutrient deficiencies can vary from mild to severe.^{4,5} Malnutrition reflects a condition where food intake is insufficient to meet established nutritional standards.⁶

The World Health Organization (WHO) reports that malnutrition problems mostly occur in low-income and middle-income countries. Globally, approximately 1–2 million children die each year due to severe acute malnutrition, and 20 million children live with severe acute malnutrition.^{7,8} In Indonesia, there are four main nutrition issues in toddlers: stunting, wasting, underweight, and overweight. By 2022, the prevalence of stunting (21.6%) still exceeded the threshold set by the WHO, although the number was lower than that in 2019. However, the prevalence of wasting and underweight in toddlers increased compared to the previous year.⁹ On the other hand, the prevalence of overweight or obesity in toddlers was 3.5% in 2022, a decrease of 0.3 points from the previous year. Therefore, the Indonesian government accelerated the improvement of public nutrition as a national health policy priority. The strategy pursued is the prevention and management of double burden of malnutrition.¹⁰

Several previous studies have identified maternal education and knowledge as predictors of malnutrition in children.¹¹⁻¹³ Other studies have reported that family income and economic status also play an important role in children's nutritional status, especially in relation to ensuring adequate food

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availability.^{14,15} A high income allows families to increase their purchasing power for food. Meanwhile, low or poor economic conditions can cause the nutritional needs of toddlers from food intake to be insufficient.¹⁶ Poor eating patterns and limited nutritious food diversity are other risk factors for malnutrition.¹⁷⁻¹⁹ The lack of food diversity is a problem in poor and developing countries. Food types often only add a little or no animal products and few fresh fruits and vegetables.²⁰

Data from the National Growth Status Survey of Indonesia (Studi Status Gizi Indonesia) 2021 show that five districts in North Sumatra with the highest stunting prevalence are Mandailing Natal District (47.7%), Padang Lawas District (42.0%), Pakpak Barat District (40.8%), Nias Islands District (36.7%), and Nias Islands District (34.4%).⁹ Therefore, this study aimed to analyze the status of children's nutrition in these districts by considering several factors such as maternal education, family income, and children's feeding patterns.

Method

This study used a cross-sectional design to analyze the risk factors for nutritional status in children. A total of 279 children aged 1-10 years were included as research subjects, recruited using proportional random sampling techniques. The subjects were recruited from several urban and rural areas in North Sumatra, namely Pematang Cengkreg, Titipapan, Kota Bangun, Pangkalan Mahsyur, Kidupen Ke Juhor, Tualang, Pondok Baru, Deli Tua Barat, Sibuganding, Belawan Bahari, and Tanjung Rejo.

During data collection, structured questionnaires were distributed to the subjects' parents. If parents encountered difficulties filling out the questionnaires, the researchers provided guidance. The questionnaire was divided into three parts: the child's sociodemographic information, parents' sociodemographic information, and child's eating patterns. The child's sociodemographic information included data on age, sex, weight, and height, while the parents' information included data on the mother's highest education level and the family's monthly income. The children's nutritional status was determined based on measurements of weight/height, BMI/age, and height/age.²¹ The researchers used all three anthropometric measurements to determine whether the children had normal nutritional status or abnormal nutritional status (underweight or overweight). Further analysis was performed to ensure that the children had a body equal to their age (BMI/A). A subsequent analysis was conducted to determine whether the children fell within the criteria of being short or normal. The data were analyzed using the chi

square test to determine the significance of the relationship between the predictors and children's nutritional status ($\alpha=0.05$).

Table 1. Characteristics of respondents (n=279)

Variable	n	%	Median
Age (1-10 years)			4.00
Gender			
Male	129	46.2	
Female	150	53.8	
Mother's education			
Elementary school	4	1.4	
Junior high school	43	15.4	
Senior high school	217	77.8	
Diploma	3	1.1	
Bachelor	12	4.3	
Parental income (in rupiah)			
< 2 million	1	0.4	
2-5 million	243	87.1	
> 5 million	35	12.5	
Eating pattern			
Good	183	65.6	
Fair	51	18.3	
Poor	45	16.1	
Nutritional status			
Stunting	60	21.6	
Normal	199	71.4	
Overweight	19	6.6	
Obesity	1	0.4	

Results

Table 1 provides information on the distribution of respondents in various categories, such as gender, maternal education, parental income, eating patterns, and nutritional status. The median age of the respondents was 4.00 years, which means that half of the respondents were under four years old and the other half were over four years old. This study included 129 males (46.2%) and 150 females (53.8%). Regarding maternal education, the majority of respondents had mothers with high school education (217 children), followed by mothers with junior high school education (43 children), and university education (12 children). A total of 243 children came from families with incomes between 2-5 million rupiahs, while only one child came from a family with an income of less than 2 million rupiahs. The eating patterns of the children showed that 183 children had good eating patterns (65.6%), 51 children had fair eating patterns (18.3%), and 45 children had poor eating patterns (16.1%). In terms of nutritional status, 60 children experienced stunting (21.6%), 199 children had normal nutritional status (71.4%), 19 children were overweight (6.6%), and only one child was obese (0.4%).

experienced stunting (21.6%), 199 children had normal nutritional status (71.4%), 19 children were overweight (6.6%), and only one child was obese (0.4%).

Table 2 shows the results of the analysis of risk factors for nutritional status of children, comparing the group experiencing stunting and the group with normal nutritional status. The results indicate that maternal education is significantly related to the nutritional status of children. A higher level of maternal education tends to be associated with a higher proportion of normal nutritional status than stunting. Parental income was significantly associated with nutritional status. Children from families with incomes between 2-5 million rupiahs have a higher proportion of normal nutritional status than those from stunting. The eating patterns of the children showed a significant relationship with their nutritional status. Children with good eating patterns tended to have a higher proportion of normal nutritional status than those with fair or poor eating patterns. On the other hand, age and sex did not show significant differences in their relationship with the nutritional status of children.

Table 2. The relationship between risk factors and nutritional status

Predictor	Nutritional status (n (%))				
	Stunting	Normal	<i>p</i>	Overweight-Obesity	<i>p</i>
Age					
≤ Median	35 (12.5)	116 (41.6)	0.972	16 (5.7)	0.079
> Median	25 (9.0)	83 (29.7)		4 (1.4)	
Gender					
Male	29 (10.4)	92 (33.0)	0.747	8 (2.9)	0.432
Female	31 (11.1)	107 (38.4)		12 (4.3)	
Mother's education					
Elementary school	2 (0.7)	2 (0.7)	0.012	-	0.835
Junior high school	18 (6.5)	25 (9.0)		1 (0.4)	
Senior high school	38 (13.6)	159 (57.0)		18 (6.5)	
Diploma	-	3 (1.1)		-	
Bachelor	2 (0.7)	10 (3.6)		3 (1.1)	
Parental income (in rupiah)					
< 2 million	-	3 (1.1)	0.001	-	0.951
2-5 million	58 (20.8)	167 (59.9)		17 (6.1)	
> 5 million	2 (0.7)	29 (10.4)		3 (1.1)	
Eating pattern					
Good	1 (0.4)	165 (59.1)	0.001	17 (6.1)	0.309
Fair	24 (9.6)	18 (6.5)		3 (1.1)	
Poor	35 (12.5)	16 (5.7)		-	

The analysis results for children with overweight or obesity show that age, sex, and maternal education do not have a significant influence on overweight or obesity in children. However, the eating patterns of children showed a significant difference in their relationship with being overweight or obese. Children with good eating patterns tend to have a higher tendency to be overweight or obese than those with fair or poor eating patterns.

Discussion

In this study, we found that age and sex were not related to the nutritional status of children. Intrinsically, males have higher nutritional requirements than do females. This can be observed from the different growth curves of males and females. Females generally grow faster than males, and the growth spurt of males is slower than that of females.²² However, a study in Ethiopia found that boys are more likely to experience malnutrition than girls. Exclusive breastfeeding and adequate diversity of complementary foods are the main determinants of stunting in both boys and girls.²³ Another study showed that the prevalence of stunting or low body weight is highest at the age of 18-23 months.²⁴ Maternal education is a significant predictor of nutritional status in children with stunting and normal status. However, it does not significantly affect overweight or obese children. These findings suggest that the relationship between maternal education and nutritional status may vary depending on the child's nutritional status. Research has consistently shown that the educational level of the mother is a significant predictor of children's nutritional status, particularly in relation to stunting. A study in the slums of Nairobi found that maternal education is a strong predictor of child stunting, with close to 40% of children in the study being stunted.²⁵ Similarly, a study in Ethiopia found that maternal education was the strongest predictor of childhood stunting among the maternal factors studied, and that the prevalence of stunting sharply

declines as maternal education increases.²⁶ Another study in Ethiopia revealed that maternal education was a significant predictor of stunting among children, with children of unemployed mothers who had no exposure to nutrition education being more likely to be stunted.²⁷

In this study, parental income was one of the factors affecting children's nutritional status. Parental income influences a family's purchasing power, which determines access to quality and sufficient food for the child. Low incomes can lead to food insecurity and limited access to healthy foods. Additionally, higher income is also associated with better access to health services, including routine check-ups and medical care, which are important for children's health and nutritional status.²⁸⁻³⁰ Similarly, this study showed that children's diet was significantly associated with nutritional status. Another study conducted in a rural area of West Bengal found that dietary preferences and childhood eating behavior have a marked influence on the nutritional status of children. The study emphasized that childhood is the best time to determine nutritional status and take action accordingly, as the habits that children acquire about food and proper eating behavior can influence their dietary choices and preferences in later life.³¹ A study demonstrated that parental dietary patterns have a significant correlation with children's nutritional status. The study found that parental food patterns have a much stronger association with children's overnutrition in rural areas, and that parental consumption of fruit and dairy positively contributes to children's nutritional status.³² A study conducted in Poland evaluated the nutritional status and dietary habits of children aged 6-10 attending primary schools. The study revealed a positive correlation between BMI and the frequency of mineral water consumption, and emphasized the need for education on proper dietary habits for children.³³

Stunting remains a major nutritional problem in Indonesia, and addressing it requires continuous efforts and collaboration across sectors, not just from the Provincial/City Health Office, but also from the community. Families play a crucial role in preventing and addressing stunting, particularly in ensuring adequate nutrition for children during the first 1,000 days of life, from conception to the age of two years. Educating parents about healthy eating habits is important for maintaining good health. Parents play a crucial role in shaping their children's eating habits and promoting healthy behaviors.³⁴ They can set an example by maintaining a healthy lifestyle themselves, including eating a balanced diet and keeping their living environment clean.³⁵ Parents can also help their children develop healthy eating habits by providing them with nutritious meals and snacks, encouraging them to try new foods, and involving them in meal planning and preparation.³⁶ Additionally, parents can educate themselves about proper nutrition and seek guidance from healthcare professionals to ensure that their children are receiving adequate nutrition.

Conclusion

The results indicate that maternal education, parental income, and eating patterns of children show a significant relationship with their nutritional status. Children with good eating patterns tend to have a higher proportion of normal nutritional status compared to those with fair or poor eating patterns. On the other hand, age and gender do not show significant differences in their relationship with the nutritional status of children. The study also shows that children with good eating patterns tend to have a higher tendency for being overweight or obese than those with fair or poor eating patterns.

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