



# Household Food Insecurity, Level of Nutritional Adequacy, and Nutritional Status of Toddlers in the Coastal Area of Central Tapanuli Regency

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## Abstract

**BACKGROUND:** The food security and livestock service office of North Sumatra Province (2020) noted that almost a third of the area or 35% of the subdistricts in Central Tapanuli Regency are food-insecure areas.

**AIM:** This study aims to determine the level of family food insecurity, the level of nutritional adequacy, and the nutritional status of children under 5 in the coastal area of Central Tapanuli Regency.

**METHODS:** This research is part of a dissertation study entitled Positive Deviance in Household Food Insecure in Improving the Nutritional Status of Toddlers in the Coastal Area of Central Tapanuli Regency. The steps in this research are to identify the level of household food insecurity, level of nutritional adequacy, and nutritional status of children under 5. The research was conducted by interviewing respondents (mothers of toddlers) and taking anthropometric measurements of 59 children under 5 purposively in the coastal area of Central Tapanuli Regency.

**RESULTS:** Most of the occupations of the head of the family are fishers (78.0%) and the household food insecurity status as much as 81.4% is food insecure. The nutritional status of children under 5 in the less category is 50.8%, the nutritional status of stunting is 35.6%, and wasting is 10.2%. There is a significant relationship between family food insecurity and the level of adequacy of nutrients: Energy ( $p = 0.000$ ; odds ratio [OR] = 38.000) and protein ( $p = 0.002$ ; OR = 10.929). There is a significant relationship between household food insecurity and nutritional status of weight for age ( $p = 0.0039$ ; OR = 6.300).

**CONCLUSION:** Household food insecurity is related to the level of nutritional adequacy (energy and protein) and nutritional status of weight for age.

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## Introduction

Food security is one of the important aspects to achieve the Sustainable Development Goals. Food security at the family level will be realized if (1) the household can provide sufficient food, (2) nutritious and safe food can be easily accessed, and (3) its use is appropriate of the day so that it can meet the nutritional needs of the body to avoid from malnutrition. If these conditions are not achieved, a family will be said to be food insecure. In other words, food insecurity is the opposite of food security [1].

Food insecurity can affect the quality of health, starting from pregnancy until the child enters toddlerhood. Food insecurity that results in lack of food in children under 5 does not only affect their current health but also physical, mental, and social development [2]. The meta-analysis study conducted by Moradi *et al.* (2019) showed that food insecurity increased the risk of stunting (Odds ratio [OR] = 1.17 95% confidence interval [CI]: 1.09–1.25)

and underweight (OR = 1.17 95% CI: 1.01–1.36). The results of the analysis also showed that food insecurity increased the risk of stunted growth (OR = 1.20 95% CI: 1.02–1.39) for children over 5 years. This association was significant only for the risk of stunting (OR = 1.14 95% CI: 1.05–1.23) in children under 5 years [2]. Previously, the same thing was also conveyed by Larry, food insecurity that occurs in childhood affects cognitive, socioemotional levels, and ultimately interferes with academic achievement even if food insecurity is not resolved 3 years earlier [3]. Nutrition and food insecurity are interdependent components of public health and everyone's concern. Poor nutrition can lead to reduced immunity, stunted physical and mental development, and reduced productivity [4], [5].

Data from the North Sumatra Provincial Health Office in 2018, Central Tapanuli Regency, had stunting, malnutrition, and wasting nutritional status of 43.69%, 30.07%, and 19.58%, respectively. Almost half of the children under 5 in Central Tapanuli Regency experience stunting problems, while the

problem of malnutrition shows that there is one-third of children under 5 in Central Tapanuli Regency currently experiencing malnutrition. The high nutritional problems in Central Tapanuli Regency are caused by inadequate food intake, sanitation, and hygiene as well as infectious diseases in children under 5 [6], [7].

The situation of food insecurity that occurs in several areas in Central Tapanuli Regency can be seen from household consumption and expenditure, the average amount of energy and protein consumption per capita per day is 2038.20 kcal and 53.99 g of protein. This figure is still less than the nutritional adequacy rate recommended by the Ministry of Health of 2100 kcal and 57 g of protein. Likewise, spending on food at the family or household level is more than 65% of the total expenditure, which is 66.56%, meaning that most of the household expenditure is spent on food needs [8]. According to the Food Security Agency, if the expenditure on food is above 65%, it is declared as a household that is not food insecure; the higher the income of the community, the smaller the percentage of expenditure on food [9].

Coastal areas are regions that are remote from urban areas, making it more probable that health problems may develop owing to inadequate access and infrastructure, especially for coastal areas in the form of small islands that requires specific transportation [10]. The coastal communities of West Sorkam, Central Tapanuli Regency, are mostly (85%) of the coastal Batak tribe, and their primary source of income is fishing, with hardly any variation in economic status between families. The purpose of this study was to determine the level of household food insecurity, nutritional adequacy, and nutritional status of children under 5 in the Central Tapanuli Regency's coastal area.

## Methods

This research is part of research from a dissertation with the title positive deviance in food Insecure Families in Improving the Nutritional Status of Toddlers in the Coastal Area of Central Tapanuli Regency, with the design of this research being Participatory Action Research. The research was conducted by interviewing respondents (mothers of toddlers) and taking anthropometric measurements of 59 children under 5 purposively in the coastal area of Central Tapanuli Regency. The sample in this study was purposive. This research stage was an action diagnosis stage, which is a stage that analyzes family food insecurity and the factors that influence it. This stage also assessed the nutritional status of children under 5 (good/poor nutrition, stunting/not stunting, and wasting/not wasting). Data collection was carried out in Pasar Sorkam Village, West Sorkam District, in Central Tapanuli Regency. This research has

been declared ethically qualified with the number 403/KEP/USU/2021 from the ethics committee of the Faculty of Medicine, University of Sumatera Utara. Primary data were obtained from interviews using a questionnaire while secondary data were obtained from the Health Office of Central Tapanuli Regency. Determination of household food security status using the Food insecurity level method: Using the Household Food Insecurity Access Scale (HFIAS). All questionnaires were translated into Indonesian and surveys were delivered in one-on-one interviews in the Indonesian language. HFIAS scores range from absolute food security (score = 0) to very severe food insecurity (maximum score = 27). There are four categories of food insecurity status, according to the HFIAS guidelines: "Food insecure (0–1)," "mild food insecurity (2–7)," "moderate food insecurity (8–14)," and "severe food insecurity (15–27)." Reliability analysis was conducted to test the internal consistency for the nine HFIAS questions. To facilitate data processing, the criteria for food insecurity were divided into two, namely, food security and food insecurity.

The nutritional status of children under 5 was measured using the index BB/U (weight for age) and PB/U, TB/U (body length or height for age). Data were collected by: Children under 5 were weighed and their height measured to determine nutritional status. The child's age in months was assessed using two sources, first from the mother's answer when interviewed, and second based on the date of birth listed on the health monitoring card/record at the neighborhood health centers or posyandu. If the months did not match, the posyandu registration was used as the main source.

The data were processed and analyzed using the Statistical Package for the Social Sciences program in the form of univariate and bivariate analysis. The presentation of data was in the form of a distribution table of respondent characteristics and cross-tabulation between household food insecurity status with the adequacy of nutritional intake of children under 5 and nutritional status of children under 5. Household food security status, nutritional adequacy, and nutritional status of children under 5 are presented as categorical data. The analysis used the Chi-square statistical test to determine the significance of the relationship between the two variables with a value of  $\alpha = 0.05$ .

## Results

The description of family characteristics includes the mother's last education, mother's occupation, family income, food expenditure, and household food security status in Pasar Sorkam village. Most of the household heads (78%) are fishermen. The highest level of knowledge of mothers under 5 is in the less category (61%) even though the level of

education of mothers is at most included in the category of secondary education level (59.3%). Most of the family income (66.1%) is below the regional minimum wage in Central Tapanuli Regency. The distribution of family characteristics of children under 5 in this study is presented in Table 1.

**Table 1: Characteristics of toddler families**

Variables	n	%
Family head job		
1. Labor	6	10.2
2. Trader/entrepreneur	7	11.9
3. Fisherman	46	78.0
Mother toddler's educational history		
1. Graduated from elementary school	7	11.9
2. Graduated from middle school	11	18.6
3. Graduated from high school	35	59.3
4. Graduated from college	6	10.2
Mother toddler knowledge		
1. Adequate	23	39.0
2. Less adequate	36	61.0
Family income		
1. Meet the regional minimum wage	20	33.9
2. Does not meet the regional minimum wage	39	66.1
Expenditures on food		
1. Low	49	83.1
2. High	10	16.9
Family food insecurity status		
1. Secure	11	18.6
2. Insecure	48	81.4
Toddler nutritional status		
Tb/u or pb/u		
1. Not stunting	38	64.4
2. Stunting	21	35.6
BB/u		
1. Good	29	49.2
2. Less	30	50.8
BB/Tb or BB/PB		
1. No wasting	53	89.8
2. Wasting	6	10.2
Nutritional problems		
1. No	26	44.1
2. Yes	33	55.9
Nutritional adequacy level of toddlers		
Energy		
1. Enough	20	33.9
2. Less	39	66.1
Protein		
1. Enough	23	39
2. Less	36	61

Table 2 shows that in families experiencing food insecurity, children under 5 tend to experience less energy intake (79.1%) compared to families who are food insecure, most (90.9%) have adequate intake. The relationship between family food insecurity status is related to the level of adequacy of energy intake of children under 5 ( $p = 0.000$ ).

**Table 2: Cross-tabulation of food insecurity status with energy adequacy level of toddler**

Food insecurity status	Energy adequacy level				Total	p-value	OR	
	Adequate		Inadequate					
	n	%	n	%				
Food secure	10	90.9	1	9.1	11	100	0.000	38.0
Food insecure	10	20.8	38	79.1	48	100		

OR: Odds ratio.

Table 3 shows that household experience food insecurity, children under 5 tend to experience less protein intake (70.8%) compared to families who are food insecure, most of them (81.8) have adequate intake. The relationship between family food insecurity statuses is related to the level of protein intake of children under 5 years old ( $p = 0.002$ ).

According to the cross-tabulation in Table 4, it is known that from families that are food secure, most of the children under 5 are well-nourished (81.8%)

**Table 3: Cross-tabulation of food insecurity status with protein adequacy level of toddlers**

Food insecurity status	Protein adequacy level				Total	p-value	OR	
	Enough		Not enough					
	n	%	n	%				
Food secure	9	81.8	2	18.2	11	100	0.002	10.929
Food insecure	14	29.2	34	70.8	48	100		

OR: Oral radio.

and families who are not food insecure most of the children under 5 are undernourished (58.3%). This shows that there is a tendency that children under 5 who are in a family condition that is not food insecure will experience anemia compared to those who are food insecure (OR = 6.3), statistics shows that the relationship between food security status and nutritional status of children under 5 based on the BW/U index is significantly related ( $p = 0.039$ ).

**Table 4: Cross-tabulation of food insecurity status with nutritional status of toddlers based on BB/U**

Food insecurity status	Nutritional status BB/U				Total	p-value	OR	
	Good		Less					
	n	%	n	%				
Food security	9	81.8	2	18.2	11	100	0.039	6.300
Food insecurity	20	41.7	28	58.3	48	100		

OR: Oral radio.

The results showed that food-insecure families had the nutritional status of children under 5 years old based on TB/U or PB/U who were stunting as much as 18.2%, while in food-insecure families, the nutritional status of children under 5 who were not stunted was 39.6% (Table 5)

**Table 5: Cross-tabulation of food insecurity status with nutritional status of toddlers based on TB/U or PB/U**

Food insecurity status	Nutritional status tb/u or pb/u				Total	p-value	OR	
	Good		Less					
	n	%	n	%				
Food security	9	81.8	2	18.2	11	100	0.297	2.95
Food insecurity	29	60.4	19	39.6	48	100		

Or: Oral radio.

The results showed that the nutritional status of toddlers who were wasting was not found in resistant families, while in food-insecure families, the nutritional status of children under 5 who were wasting was 12.5% (Table 6).

**Table 6: Cross-tabulation of food insecurity status with nutritional status of toddlers based on BB/TB or BB/PB**

Food insecurity status	Nutritional status BB/TB or BB/PB				Total	p-value	OR	
	No wasting		Wasting					
	n	%	n	%				
Food security	11	100	0	0	11	100	0.581	1.143
Food insecure	42	87.5	6	12.5	48	100		

OR: Oral radio.

## Discussion

The factors that influence childhood malnutrition are very diverse. UNICEF's conceptual framework on malnutrition identifies [11] inappropriate

feeding practices as a direct cause of malnutrition in children under 5. In the practice of feeding children under 5, it was found that the intake of energy nutrients for children under 5 was 66.1% in the less category and 61% in the less category in protein intake. Lack of nutrient intake from the recommended adequacy for a long period can lead to growth disorders and even reduce energy reserves in the body so that there is a state of malnutrition or poor nutrition. This will impact physical growth, having a shorter body, experiencing mental development disorders, and stunted intelligence. Lack of protein is often found along with a lack of energy, which can lead to marasmus [12]. In addition to food from a physical point of view, children also need other things to achieve optimal growth and development, knowledge about nutrition and food, and parental attitudes (upbringing) in feeding. Mistakes in choosing food will have a terrible impact on children both now and in the future. When viewed from the results of the study, most (61.0%) mothers of children under 5 had knowledge of nutrition and food in the poor category. Most of the questions that were asked of the respondents that were not known by the mother were about the provision of complementary foods to breast milk and the nutritional status of stunting in children.

At the household level, household food insecurity status, socioeconomic conditions, and knowledge of nutritious food are some of the main factors that influence children's nutritional status [11]. The results of the study got that the income of the interviewed families was below the UMR in Central Tapanuli Regency as much as 66.1%. Children from middle-income families have increased dietary diversity and reduced rates of malnutrition. More affluent households often use additional income to purchase non-staple foods, increasing household food diversity. A recent analysis found income to be a significant determinant of household dietary diversity in Bangladesh [13].

Malnutrition is the leading cause of death during childhood, accounting for more than 33% of child deaths worldwide [14]. The insufficient quality of food given to children observed in this study can be explained by various descriptions of the nutritional status of children under 5. The results showed that the nutritional status of children under 5 who were undernourished was 50.58%, stunting was 35.6%, and wasting was 10.2%. The rate of malnutrition and stunting is very far from the national figure where malnutrition is 17.7% and stunting is 30.8%, also, this figure is still above the target set by the World Health Organization which is 20% [15].

Based on the category of food insecurity level, households in the coastal area of Central Tapanuli Regency with food insecurity status were 81.4%. The influence of food security on children's nutritional status can be influenced by other determinants such as maternal knowledge about nutrition and child health-care practices, maternal nutritional status, food

allocation, and utilization practices in the household as well as access to health services and healthy environmental conditions [16].

Family food insecurity affects the energy and protein intake of children under 5. Food-insecure families tend to have adequate levels of energy and protein intake at 90.9–81.8%, respectively, while in food-insecure families, the energy and protein adequacy levels are only 20.8–29.2%. Family food insecurity in the long term can affect food consumption by reducing the quality and quantity of food so that it can cause a lack of nutrients needed by the body and harm the growth of toddlers [17].

The results of the analysis using the Chi-square test show that household food security has a significant relationship with the incidence of malnutrition in children under 5 ( $p = 0.0039$ ), this indicates that household food security is a significant risk factor for the incidence of malnutrition in children under 5 in the coastal area of Central Tapanuli with an OR value of 6.38, meaning that households in food-insecure conditions are at 6.38 times greater risk of having children under 5 with malnutrition than households in food-insecure conditions. Households with food security classified as food insecure can have an impact on nutrition and health problems for household members, especially vulnerable groups including toddlers. Toddlers who are in food-insecure household conditions will have good access to food, both in quality and quantity, and this will have an impact on the fulfillment of the nutritional needs of toddlers so that optimal nutritional status is achieved. In contrast to under-fives who are malnourished who are not food safe have less access to food so that the portion of food is reduced to share with other family members. The higher prevalence of nutritional disorders in children living in food-insecure households may be due to inadequate food intake, limited consumption of various food groups with low nutritional content, and coping mechanisms during food shortages [18]. Similar findings are also found in the results of a study conducted by Engidaye *et al.* (2019) that household food insecurity was also identified as a factor associated with childhood anemia, which means that children from food-insecure households are at 2.34 times greater risk of developing anemia [19].

The status of household food insecurity is not related to the nutritional status of stunting (TB/U or PB/U) and wasting (BB/TB or BB/PB) of children under 5. This is indicated by Chi-square statistical analysis ( $p > 0.005$ ), but cross-tabulation shows that in food-insecure families, more children experience stunting (39.6%) than in food-insecure families (18.2%). The results of research conducted by Shinsugi *et al.* (2015). The level of food insecurity was not significantly related to child stunting in the study, but households with severe food insecurity had children who were more likely to experience stunting because they had been given tea/porridge with milk within 24 h. As a result,

some children do not eat 3 times a day, making them more susceptible to stunting compared to children who are not given tea or porridge as food [20].

## Conclusion

Food-insecure households in the coastal area of Pasar Sorkam Village, Central Tapanuli Regency are as much as 81.4% and food secure as much as 18.6%. The prevalence of undernourished children is 50.8%, stunting is 35.6%, and wasting is 10.2%. There is a significant relationship between household food security and the incidence of malnutrition in children under 5 with food-insecure household conditions having a 6.3 times greater risk of suffering from malnutrition compared to under 5 with food-insecure household conditions.

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