Food Security in Households of Stunting Toddlers in the Meratus Mountains Region HULU Sungai Tengah District, South Kalimantan Province, Indonesia

Ahmad Suhaimi [a*], Siswanto [a] and Heldawati [a]

[a] Agribusiness Study Program, Amuntai College of Agricultural Sciences, Jl. Bihman Villa No. 123 Amuntai, Hulu Sungai Utara, South Kalimantan (71419), Indonesia.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The occurrence of stunting in toddlers often arises due to vulnerable food security at the household level. Household food security includes food availability, food access, and food diversity related to ecosystem conditions. This research aims to determine family food security in stunted toddlers and its relationship with food availability, food access, and food diversity in the Meratus Mountains of Batang Alai Timur District, Hulu Sungai Tengah Regency, South Kalimantan Province, Indonesia. The methods used are observation, interviews, and recording methods. The research results show that the average energy consumed by toddlers in Hulu Sungai Tengah Regency is 1104.2 kcal/capita/day with an RDA score of 65.4. The food security status of most households is in the food insecure category with a moderate degree of hunger of 70.0%, a degree of severe hunger of

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*Corresponding author: Email: ahmad99ec@gmail.com;

30.0% and there are no households experiencing food security and food insecurity without hunger. Aspects of food availability, two respondents have high food availability, namely 10%, two respondents with moderate food availability, 10%, and the majority have low food availability, 80%. Aspects of food access, 6 respondents have a distance of < 25 minutes to the market, namely 30%, 14 respondents have access to a market with a distance of ≥ 25 minutes to obtain food, 70%. Aspects of food security, there are 20 respondents or all families of children under five who experience food insecurity, namely 100%, there are no respondents who have food safe and food alert status. The composite index shows that there are no respondents or families of children under five who have food secure status, there are only two respondents who have food alert status, namely 10% and the majority of families experience food insecurity, totaling 18 respondents, namely 90%. The correlation coefficient value with stunting is the availability of 0.349, access of 0.488, and diversity of 0.373. So it can be concluded that the relationship between availability, access diversity, and stunting is weak.

1. INTRODUCTION

Food is anything derived from biological and water resources, both processed and unprocessed, which is intended as food or drink for human consumers, including food additives and other ingredients used in the process of preparing, processing, and manufacturing food or drinks [1].

According to Law no. 18 of 2012, food security is a condition where food is met for the country and individuals, which is reflected in the availability of sufficient food, both in quantity and quality, safe, diverse, nutritious, equitable and affordable and does not conflict with the religion, beliefs, and culture of the community, to be able to live a healthy, active and productive life sustainably.

Households experiencing food insecurity can be caused by insufficient availability and access to food so food or nutritional intake is inadequate. If the family's food security is always in a condition of food security that is food insecure for a certain period, it can result in a lack of nutritional intake which has an impact on nutritional status [2].

The results of the 2020 Food Security Agency Survey of the Ministry of Agriculture show that in 2019 around 30% of Indonesian toddlers experienced stunting. This condition can be caused by many aspects, ranging from educational to economic aspects. Stunting is very important to prevent, this is because the impact of stunting is difficult to repair and can be detrimental to the child's future. Poor nutritional status in pregnant women and babies is the main factor causing children under five to experience stunting.

The research aims to determine food security in households with stunted toddlers and the relationship between household food security (food availability, food access, and food diversity) with the incidence of stunting in toddlers in the Meratus mountain area, Hulu Sungai Tengah Regency, South Kalimantan Province.

2. RESEARCH METHODS

2.1 Place and Time of Research

The research was carried out in Batang Alai Timur District, Hulu Sungai Tengah Regency, South Kalimantan Province, Indonesia from February 2022 to April 2022, starting from the preparation stage, data collection, data processing, to writing the report.

2.2 Sample

The sample consisted of 20 respondents from households with children under five. The sample was classified based on household food security and nutritional status.

2.3 Data Collection Method

This research uses observation and interview methods, secondary data collection from various related agencies), and 24-hour recall (obtaining data on toddlers' food consumption).

2.4 Data Analysis

To determine family food security in stunted toddlers, starting with the 24 Hour Food Recall method and continuing with the United States Household Food Security Survey Module (US-

HFSSM) analysis tool; and to determine the relationship between family food security (food availability, food access, and food diversity) with the incidence of stunting among children under five in Hulu Sungai Tengah Regency using Product Moment (Pearson) correlation. Previously, the following calculations were carried out:

2.5 Food Availability

Availability of household staple food is measured by taking an inventory of the staple food (rice) available in the family, whether obtained from input or production of one's own farming business, purchases and gifts minus household output, namely sales, social activities, and giving to other parties in the household. The unit of energy is kcal/capita/day. Systematically, the amount of staple food availability in farming households can be calculated using the following formula:

S = Farming Production Input + Purchases + Giving Output for sale + Social Activities + Giving to Other Parties / Number of People

Information:

S = Availability of staple food (rice) in farming households (grams/capita/day of rice converted into kcal/capita/day).

Input = Basic food input from farming production, purchasing, and distribution (grams/capita/day of rice converted into kcal/capita/day).

Output = Output of staple food sold, social activities, provided by other parties, etc. (grams/capita/day of rice converted into kcal/capita/day).

According to [3], the availability of staple foods in households can be categorized into three, including the following.

a. Low: Food availability < 1400 kcal/capita/day
b. Medium: 1400 kcal/capita/day ≤ Food Availability < 1600 kcal/capita/day

c. High: Food Availability ≥ 1600 kcal/capita/day

2.6 Food Access

Food access is data on access to traditional markets collected by asking subjects directly to estimate the time needed to get to the traditional market in minutes. Scoring for each household's access to market indicators uses a comparison of values with standards. The standard value is the maximum travel time limit which is considered the furthest time [4] states that based on the researchers' provisions, the travel time that has been determined is the upper limit for giving a score, namely 25 minutes which can be calculated using the following formula:

$$S_{Am} = \begin{cases} \text{If Am} \geq 25, \text{skor } 0 \\ \text{If Am} < 25, \text{score from formula } (100 - (4 \times Am)) \end{cases}$$

information:
Sam = Market access indicator score
Am = Travel time to market (minutes)

2.7 Food Diversity

The food utilization aspect calculates the percentage of protein-energy deficiency (KEP) obtained from the Batang Alai Timur District Community Health Center (2021) processing data on the number of toddlers experiencing malnutrition and malnutrition. The data needed to assess the use of food is to find the percentage of toddlers who experience a lack of protein energy. The formula used is :

$$r = \left(\frac{\sum BKEP}{\sum BD}\right) X \ 100$$

Information:

r = Percentage of children with PEM in the study area.
∑BKEP = Number of toddlers lacking protein energy in the study area.
∑BD = Number of toddlers weighed in the study area.

Table 1. Indicators of malnutrition in toddlers

Indicator	Percentage (%)	Weight	Category
Malnutrition and	r < 15	1	Safe
Malnutrition in Toddlers	15 ≥ r ≤ 20	2	Alert
	> 20	3	Prone

Source: Processed Primary Data, (2022)

Table 2. Index of Composite

Score	Category	Information
3-4	Safe	Only consists of scores 1 and or 2
5-6	Alert	There is no score of 3 from the assessment of each aspect
5-9	Insecurity	There are scores of 2 and/or 3 from the assessment of each aspect

Source: Processed Primary Data, (2022)

2.8 Index of Composite

The index of composite is an assessment of the combined scores from the aspects of food availability, access, and utilization of food ingredients. The following is the determination of the score according to a combined calculation of the three aspects of food security

2.9 Product Moment or Pearson Correlation Analysis

$$r_{xy} = \frac{n \sum XY - (\sum X)(\sum Y)}{\sqrt{n \{\sum X^2 - (\sum X)^2\}} \sqrt{n \{\sum Y^2 - (\sum Y)^2\}}}$$

Information:

r = Product Moment Correlation Coefficient
n = Number of observations
∑X = Number of observations of X values
∑Y = Number of observations of Y values

3. RESULTS AND DISCUSSION

3.1 General Description of East Batang Alai District

Batang Alai Timur is a sub-district in Hulu Sungai Tengah Regency, South Kalimantan Province, Indonesia. This sub-district is to the east of Hulu Sungai Tengah Regency. The landscape of the region is mostly hills, mountains, and Meratus forests which are still green and sustainable. The area of the Meratus protected forest area in East Batang Alai District is 43,782 ha. The topography of the East Batang Alai region is at an altitude of between 330 and 1894 meters above sea level, namely on Mount Halau-halau (a large mountain in the Meratus Mountains) with a land slope angle varying between 0-40°.

3.2 Household Food Security in Stunted Toddlers

3.2.1 Food consumption patterns

The results of research on household food consumption patterns using the expected food pattern approach are presented in Table 3.

Based on Table 3, it can be stated that the average energy consumed by toddlers is 1104.2 kcal/capita/day with a PPH score of 65.4. This condition shows that the energy consumption of toddlers is still below the energy consumption standard, namely 1400 kcal/capita/day, and the ideal PPH score, namely 100 [5]. The results of this research are in line with research reported by [6] that the PPH score of toddlers in Amuntai Tengah District reached 71.4 and their food consumption is still not diverse and the research results of [7] that the PPH score of children aged 0.5-12.9 years is only 49.9 and is still not diverse.

The lack of diversity in the food consumption of toddler families is because there are still many who do not consume food, especially the food group tubers, nuts, and oily fruit and seeds. This is by the results of research [8] that various studies on food consumption patterns carried out by researchers concluded that up to now the dependence of people's food consumption on food sources of carbohydrates, especially rice, is still very high (more than 60%). Meanwhile, on the other hand, the role of tubers, vegetables fruit, and nuts is still very low. Based on this situation, has implications for the low diversity score for food consumption patterns (PPH score) reaching 65.4, which is far below the ideal score of 100. This situation is due to the lack of land owned so agricultural production inputs, especially rice, are still low. In other words, the household food consumption patterns of stunted toddlers do not meet the criteria for balanced nutrition. This indicates that the food diversity program needs to be improved through joint efforts so that families under five have good food consumption patterns, especially in Hulu Sungai Tengah Regency.

3.2.2 Household Food Security Status or United States Household Food Security Survey Module (US-HFSSM)

The results of research regarding household food security status are presented in Table 4.

Based on Table 4, shows that the food security status of stunted toddler households is mostly in the food insecure category with a moderate

Table 3. Household food consumption patterns using the expected food pattern (PPH) approach

No	Group Food	Food Pattern (PPH) Score Calculation								
		Calories	%	% AKE	Weight	Actual Score	AKE Score	Maximal Score	AKE Score Gap and Max Score	PPH Score
1.	Grains	543,6	49,2	39,7	0,5	278,0	19,8	25	-5,1	19,7
2.	Tubers	0,0	0,0	0,0	0,5	0,0	0,0	2,5	-2,5	0,0
3.	Animal Food	257,4	23,3	18,4	2,0	517,1	38,2	24	12,7	23,7
4.	Oil and Fat	56,4	5,1	4,0	0,5	28,9	2,0	5	-2,9	2,0
5.	Oily Fruit/Seeds	0,0	0,0	0,0	0,5	0,0	0,0	1	-1	0,0
6.	Nuts	0,0	0,0	0,0	2,0	0,0	0,0	10	-10	0,0
7.	Sugar	26,9	2,4	1,9	0,5	13,4	0,9	2,5	-2,4	0,9
8.	Vegetable and fruit	74,6	6,8	5,3	5,0	373,0	26,6	30	-3,3	19,1
9.	Etc	145,3	13,2	100,8	0,0	0,0	0,0	0,0	0,0	0,0
Total		**1104.2**	**100,0**	**335,7**	**11,5**	**1210,4**	**87,5**	**100,0**	**-13,5**	**65,4**

Source: Primary data processing, 2022

Table 4. Household food security status

Category	Frequency	Percent (%)
Food Security	0	0,0
Food Insecurity without Hunger	0	0,0
Food Insecurity with Moderate Degree of Hunger	14	70,0
Food Insecurity with Severe Degrees of Hunger	6	30,0
Total	20	100,0

Source: Primary Data Processing, 2022

Table 5. Food Availability in households for stunting toddlers

Category	Indicator	n	Weight	Percent (%)
Height	≥ 1600 kcal/capita/day	2	1	10,0
Currently	1400 kcal/capita/day ≤ Food availability < 1600 kcal/capita/day	2	2	10,0
Low	< 1400 kcal/capita/day	16	3	80,0
Total		**20**		**100,0**

Source: Primary data processing, 2022

degree of hunger, namely 70.0%. and other households are in the food insecure category with a severe degree of hunger, namely 30.0% and there are no households experiencing food security and food insecurity without hunger. The lack of food security in under-five households is due to some areas being mountainous and rocky which are difficult to plant, especially rice, so some respondents have little rice yields and some buy it for their daily needs.

Household calorie consumption was less than 1400 kcal/capita/day, and food availability was less than 1600 kcal/capita/day for 2 respondents (10%), and more than 1600 kcal/capita/day for 2 respondents (10%). There were 18 respondents in the food insecurity category, namely (90%), and 2 respondents in the food alert category, namely (10%). This is in line with research [9] that respondents' calorie consumption was more than 2200 kcal/capita/day, 54 respondents (54%) and 46 respondents (46%) consumed energy ≤ 2200 kcal/capita/ day. Most of the research respondents were in the food insecure category, namely 36%, 39% in the food insecure category, 15% in the food insecure category, and 10% in the food insecure category. Research results [2] showed that 60% of respondents had food secure status, 34.5% of respondents experienced a severe level of energy deficit, while the protein adequacy level variable was (29.1%) with more and (25.5%) categories. %) in the normal category.

3.2.3 Food availability

The results of research on household food availability for Stunting Toddlers are presented in Table 5.

Based on Table 5, shows that 2 respondents who have food availability in stunted toddler households have high food availability, namely 10%; 2 respondents have moderate food availability, namely 10% and 16 respondents are in the low food availability category, namely 80%. From the food availability of families under five, some inputs and outputs can be calculated, the source of input comes from agricultural production, whether farming in the fields or using a dryland system, which depends on how many harvests farmers can harvest in one year.

The availability of staple household food in the Meratus mountainous region still depends on land ownership to be able to plant it, because some areas are also surrounded by rocky mountains where not all areas can be planted with rice. In addition, most of the families of toddlers work outside of farming to be able to meet their household needs. The availability of staple foods influences the nutritional consumption of families of toddlers. Therefore, the availability of sufficient staple food in the form of rice in the family is very important so that the calorie needs of the family or individual can be met.

Food insecurity over a long period can affect food consumption by reducing the quality and quantity of food, which can cause deficiencies in the nutrients needed by the body and hurt the growth of children under five, resulting in stunting.

3.2.4 Food access

The results of the research show that household access to food for toddlers is stunted as presented in Table 6.

Table 6. Household Access to Food for Stunting Toddlers

Indicator	n	Weight	Percent (%)
0< 25 minutes to traditional market	6	0	30,0
≥ 25 minutes to traditional market	14	1	70,0
Total	**20**		**100,**

Source: Primary data processing, 2022

Table 7. Food diversity in stunting toddler households

Category	Indicator	Yield	n	Weight	Percent (%)
Food Safe	r < 15	$r = \left(\frac{\Sigma 146}{\Sigma 331}\right)$ X 100	0	1	0,0
Food Alert	15 ≥ r ≤ 20	= 44.10	0	2	0,0
Food Insecurity	r > 20		20	3	100,0
Total			**20**		**100,0**

Source: Primary data processing, 2022

Based on Table 6, shows that access to food for families under five in the Meratus mountain area is 6 respondents who have a distance of < 25 minutes to the market, namely 30%, then the remaining 14 respondents have access to the market with a distance of ≥ 25 minutes to obtain food, namely 70 %. In this research, access to the market is far because the research area is in a mountainous area where infrastructure or roads have quite difficult terrain. Apart from that, the difficulty of transportation, especially in remote areas, is also very minimal, this has an impact on families being able to get food well and enough to meet energy requirements. It was stated by [4] that the problem of individual malnutrition can be overcome by ensuring food security. Currently, the realization of food security does not only focus on the micro level (national/regional) by ensuring sufficient food availability. Areas that fall into the food secure category cannot guarantee comprehensive food security conditions at the household level. This is because each household has different and unequal access to food.

3.2.5 Food diversity

The results of research regarding the diversity of household food for stunted toddlers are presented in Table 7.

Based on Table 7, shows that the food diversity of families of toddlers with stunting is that there are 20 respondents or all families of toddlers experiencing food insecurity, namely 100%. There were no respondents with food safe status and food alert status, namely 0%. This situation shows that the food diversity/consumption of toddlers is classified as food insecure (r-value> 20). The lack of diversity in the food consumption of toddler families is due to the family's habit of preparing their food using the existing menu in a monotonous manner and repeating the menu the next time. Apart from that, the child's diet is not appropriate due to the lack of knowledge of the parents. Another factor is that the Batang Alai Timur sub-district area cannot produce food groups as a whole because the area cannot produce these crops. Apart from that, not all houses in East Batang Alai District have access to electricity so they have difficulty lighting and also cannot store food in the refrigerator, the perishable nature of agricultural products means they cannot store them as food reserves for the family.

The results of this research are in line with research conducted in Deli Serdang Regency [8] which shows that there is a significant relationship between family food security, one of which is food diversity and the incidence of stunting. The main problem with food diversification is the imbalance between food consumption patterns and food production or availability in society. The production of various types of food cannot be produced in all regions and cannot be produced every time it is needed. The results of other research by [10] show that diversification or diversification of food consumption is the main pillar in efforts to reduce food and nutrition problems. From a physiological perspective, to be able to live an active and healthy life, humans need 40 types of nutrients found in various types of food. Of the various types of food available, not a single type of food is nutritionally complete except breast milk. This fact shows that diversifying food consumption for the population is an important aspect of the realization of quality human resources in Indonesia.

3.2.6 Index of composite

The results of the research regarding the index of composite for the combined score of food availability and food diversity are presented in Table 8.

Based on Table 8, it shows that there are no respondents or families of toddlers whose food security status is 0%; There were 2 respondents who had food insecurity status, namely 10% and 18 respondents (most families) experienced food insecurity, namely 90%.

Table 8. Index of composite for combined score assessment of food availability, food access, and food diversity

Score	Category	Information	n	Percent (%)
3-4	Food Safe	Only consists of scores 1 and or 2	0	0,0
5-6	Food Alert	There is no score of 3 from the assessment of each aspect	2	10,0
6-9	Food Insecurity	There are scores of 2 and/or 3 from the assessment of each aspect	18	90,0
Total			20	100,0

Source: Primary data processing, 2022

Table 9. Results of product moment correlation analysis

		Stunting	Availability	Access	Diversity
Stunting	Pearson Correlation	1	.349	.488*	.373
	Siq. (2-tailed)		.131	.029	.106
	N	20	20	20	20
Availability	Pearson Correlation	.349	1	.716**	.231
	Siq. (2-tailed)	.131		.000	.328
	N	20	20	20	20
Access	Pearson Correlation	.488*	.716**	1	.010
	Siq. (2-tailed)	.029	.000		.965
	N	20	20	20	20
Diversity	Pearson Correlation	.373	.231	.010	1
	Siq. (2-tailed)	.106	.328	.965	
	N	20	20	20	20

Source: Primary data processing, 2022

3.3 Relationship between Household Food Security (Food Availability, Food Access, and Food Diversity) with the Incidence of Stunting in Children under Five

The results of research on the relationship between household food security and the incidence of stunting among children under five in the Meratus mountain region using Product Moment (Pearson) Correlation analysis can be seen in Table 9.

Based on the results of the correlation analysis in Table 9, it can be stated that the magnitude of the correlation and level of significance between the Availability and Access variables, the Availability and Diversity variables, and the Access and Diversity variables are as follows.

(1) The correlation coefficient value between availability and the incidence of stunting is 0.349, so it can be interpreted as having a weak relationship;

(2) The correlation coefficient value between food access and the incidence of stunting is 0.488, so it can be interpreted as a weak relationship;

(3) The correlation coefficient value between diversity and the incidence of stunting is 0.373, so it can be interpreted as having a weak relationship.

The relationship between food availability and the incidence of stunting among children under five in East Batang Alai District has a correlation coefficient of 0.349, which means that household food availability is weakly correlated with the incidence of stunting.

Food security refers to the availability of sufficient food that is available in quantity and quality, safe, varied, and nutritious, which can meet the consumption needs of the family so that it can meet the adequacy of individual nutritional consumption. Energy intake that is less than required over a long period will inhibit growth, and even reduce energy reserves in the body

resulting in a state of malnutrition or poor nutrition. This will have an impact on physical growth, having a shorter body will experience impaired mental development and hampered intelligence.

This is in line with the opinion of [11] that family food insecurity over a long period can affect food consumption by reducing the quality and quantity of food, which can cause deficiencies in the nutrients needed by the body and hurt the growth of toddlers.

The relationship between food access and the incidence of stunting among children under five in East Batang Alai District is with a correlation coefficient of 0.488, this means that food access is weakly correlated with the incidence of stunting. The results of this research are in line with research conducted by [12] that there is a relationship between food access and food security, that the better the food access, the better the level of food security, and vice versa.
According to [13], household food access is said to be good if the household can access food that is available physically, socially, and economically. Lack of access to family food will result in difficulties in meeting nutritional requirements for toddlers, so indirectly family food access can affect the nutritional status of toddlers through the level of nutritional adequacy in toddlers.

The relationship between food diversity and the incidence of stunting among children under five in East Batang Alai District is with a correlation coefficient of 0.373, this means that food diversity is weakly correlated with the incidence of stunting. The food diversity of a community is usually influenced by the conditions of the region or region where they live, and how much the community can obtain and utilize existing natural resources, in addition to being influenced by other external factors such as social, economic, cultural customs and also community knowledge. Therefore, recognition of the importance of diversity in food consumption in East Batang Alai District is very necessary to improve the nutrition of the community and also as an effort to reduce the stunting rate.

According to [14] family food diversity is influenced by the social, economic, and cultural status of the community. The lack of diversity in food consumption is one of the causes of various problems in communities with low economic status in various developing countries.

Based on the relationship between the various aspects above, changes need to be made to reduce the stunting rate, we need to collaborate to help reduce the prevalence of stunting, not only mutual awareness but we as citizens must also support government programs so that all elements work together to work together. bring change for the better.

4. CONCLUSIONS AND RECOMMENDA-TIONS

4.1 Conclusion

1. Food security in households with stunted children:

  a. Based on the 24hour Food Recall, the average energy consumed by toddlers in Batang Alai Timur District is 1104.2 kcal/cap/day with a PPH score of 65.4. This condition shows that the energy consumption of toddlers is still below the energy consumption standard, namely 1400 kcal/cap/day and the ideal PPH score, namely 100.
  b. Based on the United States Household Food Security Survey Module (US-HFSSM), the household food security status of most households is in the food insecure category with a moderate degree of hunger, namely 70%. Some other households are in the food insecure category with a degree of severe hunger of 30% and there are no households that experience food security and food insecurity without hunger.

2. The relationship between family food security (food availability, food access and food diversity) with the incidence of stunting in toddlers using product moment (Pearson) correlation analysis is weak.

4.2 Suggestion

Family food security programs to reduce the prevalence of stunting must be based on consuming a variety of local resources in forest and mountain areas, providing education to parents about increasing food availability and diversity as well as improving market access that can be better and more easily accessible to the community. Housewives increase their knowledge about food intake and nutrition provided according to the needs of toddlers' bodies.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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