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Analysis of Diversity of Food Consumption in Families of Stunting Toddlers

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Abstract: The nutritional status of toddlers is an indicator of the diversity of family food consumption. This research aims to determine the diversity of food consumption in families of stunted toddlers and its relationship to the incidence of stunting in toddlers in Batang Alai Selatan District, Hulu Sungai Tengah Regency, South Kalimantan. This type of associative research uses primary and secondary data sourced from respondents and BPS data from Hulu Sungai Tengah Regency. This research uses analysis of food consumption patterns with the help of 24-hour food recall. The relationship between diversity in family food consumption and the incidence of stunting in children under five using Chi-square analysis. The research results show that the DDP score for food diversity for toddlers in Batang Alai Selatan District reached 77.3. The criteria for food consumption for families of children under five in the research area it still needs to be more diverse because it is still dominated by the grain food group (52.8%) and animal food (38.3%). The Chi-Square test results show that the relationship between food consumption diversity and the incidence of stunting in toddlers has an Asymp value. Sig. (2-sided) 0.000 < 0.05, the calculated Chi-Square value is 20.17 > Chi-square table 3.841, so it can be concluded that there is a significant relationship between the diversity of family food consumption and the incidence of stunting in toddlers.

Keywords: Diversity; Family; Food Consumption; Stunting; Toddlers.

Introduction

Food is a biological basic commodity that sources calories, protein, minerals, and vitamins to meet nutritional needs. Food has further become a very important part of national life, especially in the strategic sectors of the economy and security, because the food sector is a mass industry that involves many people starting from the fields of production, processing, distribution, consumption, and other supporting systems (Suhaimi 2008). Every living human needs food to grow and maintain life. Food also functions as a source of energy for humans to carry out daily activities. To support all human activities, healthy and nutritious food sources are needed (PERSAGI 2009). According to Almatsier (2009), food is all ingredients that can be used as food. The body needs a diversity of types of food and nutritional balance in food consumption patterns to live a healthy, active, and productive life. Food diversification is an effort to increase the availability and consumption of food diverse, nutritionally balanced food on local resource potential. Diversification of food consumption or food diversification must be implemented to create higher quality and competitive human resources. The diversity of food groups consists of staple foods, side dishes, vegetables, fruit and water, and variety within each food group. Children under five (toddlers) and school-age children need quality, balanced, and varied nutritional intake (Ministry of Health of the Republic of Indonesia 2018).

Indonesia is the fourth country with the highest stunting rate in the world. Approximately 9 million, or 37 percent of Indonesian toddlers, are stunted. To prevent stunting, protein consumption greatly influences the increase in height and weight of children over 6 months. Children who received a protein intake of 15 percent of the total calorie intake required were proven to have a taller body than children with a protein

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intake of 7.5 percent of the total calorie intake. Children aged 6 to 12 months are recommended to consume a daily protein of 1.2 g/kg body weight. Meanwhile, children aged 1–3 years need a daily protein of 1.05 g/kg body weight (Tobarasi 2021).

Stunting is a problem of chronic malnutrition caused by inadequate nutritional intake over a long period due to providing food that does not meet nutritional needs. Stunting occurs in the womb and only appears when the child is two years old. Malnutrition at an early age results in infant and child mortality, causing sufferers to get sick easily and have less than optimal body posture as adults (Suhaimi 2019b). One of the direct causes of stunting is inadequate nutritional intake. The level of nutritional intake is determined by the quality and quantity of food (Sediaoetama 2010). Toddlers who experience obstacles in growth are caused by a lack of adequate food intake and recurring infectious diseases, making it difficult to overcome growth disorders, which result in the possibility of stunting. The lack of diversity in food consumption is influenced by two factors, namely internal factors and external factors (Hidayati 2020). Internal factors that influence the diversity of food consumption are income, nutritional knowledge, culture and religion, and preferences. External factors include production, availability, and distribution of food ingredients.

UNICEF (2013) states that stunting is defined as the percentage of children aged 0 to 59 months whose height is below minus (moderate and severe stunting) and minus three (chronic stunting). This is measured using child growth standards issued by WHO. Apart from stunted growth, stunting is also associated with suboptimal brain development, which causes poor mental and learning abilities and school performance. Stunting and other conditions related to malnutrition are also considered risk factors for diabetes, hypertension, obesity, and death due to infection.

Toddlers are undergoing a very rapid growth process, so they need relatively more food substances of higher quality. So, toddler consumption should receive priority in family food distribution. Good food is food that not only meets quantity standards but also meets food quality standards. Food that is plentiful but with inadequate nutritional composition is not a good menu for toddlers, nor is food that fulfils all nutritional needs but in insufficient quantities also not a good menu for toddlers (Hadi 2005).

The diversity of food available in a region does not guarantee good diversity in family food consumption. This is related to the food security of a region that does not guarantee family food security. Many factors determine family food security (Suhaimi et al. 2022).

Based on data from the Batang Alai Selatan sub-district health center in 2019, the prevalence of stunting was 238 children under five, with a percentage of 13.8. Also, based on data from the Food Security and Fisheries Service of Hulu Sungai Tengah Regency in 2019, the Energy Adequacy Number (EAN) was 1,851.27 Kcal/Cap/Day with an Desirable Dietary Pattern (DDP) score of 93.91. Based on the background description, this research aims to determine the diversity of food consumption in families of stunted toddlers and determine the relationship between the diversity of food consumption and stunting in toddlers in Batang Alai Selatan District.

Method

Place and time of research

This research was conducted in Batang Alai Selatan District, Hulu Sungai Tengah Regency, South Kalimantan Province. The research period starts from December 2021 to August 2022.

Data Types and Sources

The data sources used in this research are primary data and secondary data. Primary data is obtained directly by researchers in the field through respondents through observation, interviews and distributing questionnaires. The target data for primary data is found directly by field researchers. Secondary data is data collected by data collection institutions and published to the public. The data required in this research are data on the diversity of food consumption in Batang Alai Selatan District, Hulu Sungai Tengah Regency for 2021. This data was obtained from the Food Security and Fisheries Service of Hulu Sungai Tengah Regency. Stunting data for Batang Alai Selatan District, Hulu Sungai Tengah Regency for 2021. This data was obtained from the Batang Alai Selatan District Health Center. Primary data was obtained from the results of those who have children under five in the Batang Alai Selatan District, Hulu Sungai Tengah Regency. Other secondary data is still related to the objectives of this research.

Types of research

This type of research is associative, which aims to determine the influence or relationship between two or more variables. This research has the highest level compared to descriptive and comparative because, with this research, a theory can be built that can function to explain, predict and control a symptom (Sujarweni 2015).

Sampling Method

This research was conducted in Batang Alai Selatan District, Hulu Sungai Tengah Regency. Sub-district area voters were considered purposively, namely by taking samples for certain reasons adapted to the research

objectives (Singarimbun 2015). The reason for choosing this area was based on the data received that in this sub-district, the prevalence of stunting is quite high in Hulu Sungai Tengah Regency, namely with a total of 238 children under five or 27.07% in 2021.

Based on the incidence of stunting in toddlers, all toddlers in the selected subdistricts were used as research targets. The number of respondents in this study was determined to be 23 stunted toddlers from the initial number of 238 toddlers using the Slovin formula (Nursalam, 2008). For the data to be homogeneous, 23 samples of toddlers who were not stunted (normal) were also taken.

Collection Method

Data collection through observation, interviews, recording and 24-hour recall. The 24-hour recall is one of the data collection techniques used to obtain data on toddler food consumption. The principle of the Recall method is to record the type and amount of food consumed in the previous 24-hour period (Supariasa et all, 2020). The 24-hour recall was carried out three times within two days. Repetition is intended to obtain more accurate real household consumption data. This method is accurate, fast to implement, easy, cheap, and does not require expensive and complicated equipment.

Data Analysis Method

Toddler Food Consumption Patterns

Answering the first objective, namely knowing the diversity of food consumption in families of children under five, is obtained using the Desirable Dietary Pattern (DDP) approach. Various types of food have been converted to the same units, namely grams/day (Madanijah, 2004).

Chi-Square Analysis

Answering the second objective, using the Chi-Square model to test whether there is a relationship between the diversity of food consumption in families of children under five and the incidence of stunting. The diversity of food consumption is calculated using the expected food pattern in Batang Alai Selatan District, the formula is:

$$X^2 = \frac{\Sigma(Oi-Ei)^2}{Ei} \quad (1)$$

Where:
X^2 = Chi-Square
Oi = observation frequency
Ei = expected frequency
Dk = k-1

The testing criterion is to reject Ho if $X^2 \geq X^2 (1-\alpha) (k-1)$ and otherwise, Ho is accepted, α=real level of testing

Result and Discussion

Diversity of Food Consumption in Families of Stunting Toddlers in Batang Alai Selatan District

The diversity of individual food consumption is measured using the Individual Dietary Diversity Score (IDDS) questionnaire. Food consumption diversity is a qualitative measure of food consumption that can reflect a person's nutritional adequacy, both macro and micro. IDDS positively correlates with the density of micronutrients in complementary foods and the adequacy of macro and micronutrients. The following are the results of food consumption patterns among toddlers in Batang Alai Selatan District using the Desirable Dietary Pattern (DDP) approach.

Table 1. DDP Scores for Toddlers in South Batang Alai District

Food Group	Calories	%	% EAN	Weight	Energy Adequacy Number Score	Actual Score	Score Max	Gap and EAN Score and Max	DDP Score
Grains	759.4	52.8	54.2	0.5	26.4	27.1	25.0	2.1	25.0
Tubers	19.4	1.3	1.4	0.5	0.7	0.7	2.5	-1.8	0.7
Animal Food	551.4	38.3	39.4	2.0	76.7	78.8	24.0	54.8	24.0
Oils and Fats	2.6	0.2	0.2	0.5	0.1	0.1	5.0	-4.9	0.1
Oily Fruit/Seeds	4.2	0.3	0.3	0.5	0.1	0.2	1.0	-0.9	0.1
Nuts	25.7	1.8	1.8	2.0	3.6	3.7	10.0	-6.3	3.6
Sugar	6.4	0.4	0.5	0.5	0.2	0.2	2.5	-2.3	0.2
Vegetables and Fruits	65.4	4.5	4.7	5.0	22.7	23.4	30.0	-6.6	22.7
Others	4.1	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Total	1438.6	100.0	102.8	11.5	130.5	134.1	100.0	34.1	76.4

The table above shows that the average energy consumed by families of toddlers in Batang Alai Selatan District is 1438.6 kcal/day, with a DDP score of 76.44. This value shows that the standard energy consumption for toddlers is insufficient, namely 2100 kcal/cap/day (Hardinsyah 1996).

1. Grains

The grain food group is the most consumed by toddlers in Batang Alai Selatan District compared to other food groups. The average number of grain food groups consumed was 759.4 kcal per day, and the DDP score for grains exceeded the maximum score of 25.0. Because rice is the main staple widely used for consumption, other commodities, such as corn and wheat, are processed into various kinds of preparations.

2. Tubers

Types of tuber commodities include cassava and its processed products, sweet potatoes, potatoes, taro and sago. The average consumption of the tuber food group for toddlers in Batang Alai Selatan District is 19.4 Kcal per day with a DDP score of 0.7, which means it is still below the maximum DDP score of 2.5.

3. Food/Animals

Animal food is a food group that also exceeds the maximum score with a value of 78.8. Apart from consuming fish, meat and eggs, toddlers in Batang Alai Selatan District consume milk to complete their nutritional needs. The average consumption of toddlers from the animal food group is 551.4 Kcal per day.

4. Oils and fats

The average consumption of the oil and fat food group for toddlers in Batang Alai Selatan District is 2.6 Kcal per day with a DDP score of 0.1, which means it is not sufficient for the maximum DDP score.

5. Oily fruits/seeds

The average consumption of the oily seed fruit food group is 4.2 Kcal and the DDP score is 0.1, which means it is insufficient for the maximum score for this food group, namely 1. Only a small amount of energy is obtained from these oily fruit/seeds, such as processed foods that use coconut milk, candlenuts and chocolate.

6. Nuts

The average consumption of the legume food group was 25.7 Kcal, and the DDP score was 3.6. Calories are obtained from various preparations such as peanuts, tempeh, tofu, and soy sauce.

7. Sugar

The average consumption of the sugar food group is 6.4 Kcal per day. The DDP score obtained from this food group is 0.2, which means it does not meet the maximum score of 2.5. The commodities consumed include granulated sugar for tea, brown sugar for cakes, syrup and other ready-made drinks.

8. Vegetables and Fruits

The average vegetable and fruit food group consumption for toddlers in Batang Alai Selatan District is 65.4. Kcal per day and DDP score 22.7. The score obtained is quite far from the maximum score, namely 30. This is because toddlers do not like vegetables, and the calories obtained from this food group are mostly from fruit.

9. Other

The average for the miscellaneous food group is 4.1 Kcal. Consuming spices, tea, and others is not intended to meet nutritional needs.

Based on the table above, it can be concluded that the grain food group has the highest % EAN value, namely grains reaching 54.2% and animal foods with % EAN 39.4%.

Food Consumption Patterns with Stunting Incidents

Table 2. Food Consumption Patterns with Stunting Incidents among Toddlers in Batang Alai Selatan District.

Food Consumption Patterns	Nutritional status		Amount
	Stunting	Not Stunting	
Not Various	21	6	27
Various	2	17	19
Amount	23	23	46

Based on Table 2 above, it is known that there are 21 respondents with the consumption category not diverse and nutritional status stunting, 6 samples with the category not diverse and nutritional status not stunting, 2 samples with the category diverse and nutritional status stunting and 17 samples with categories diverse and nutritional status not stunted.

The Relationship between Food Consumption Diversity and Stunting among Toddlers in South Batang Alai District

The research results regarding the relationship between food consumption diversity and stunting in Batang Alai Selatan District toddlers using Chi Square analysis with SPSS version 24 tools can be seen in Table 3.

Based on the Chi-Square test results between the diversity of food consumption and the incidence of stunting among toddlers in the research area, the value

of Asymp. Sig. (2-sided) 0.000 < 0.05, it can be concluded that there is a significant relationship between the diversity of food consumption and the incidence of stunting in toddlers. This can also be interpreted as the more diverse food consumption in families of toddlers, the incidence of stunting will decrease, and conversely, the less uniform the food consumption in families of toddlers, the incidence of stunting will increase. And based on the "Chi-square test" output table, it is known that the calculated chi square value is 20.17 > Chi square table 3.841, so it can be concluded that H1 is accepted and H0 is rejected, so it can be interpreted that there is a significant relationship between the diversity of family food consumption and the incidence of stunting.

Table 3. Chi Square Analysis Results

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.175[a]	1	.000		
Continuity Correction[b]	17.575	1	.000		
Likelihood Ratio	22.379	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.737	1	.000		
N of Valid Cases	46				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.50.
b. Computed only for a 2x2 table

The analysis results show a relationship between food consumption diversity and stunting in toddlers (0.000 < 0.05). This research is in line with research conducted by Wantina (2017). The analysis results show a relationship between food consumption diversity and stunting in toddlers aged 6-24 months (p<0.05). The more diverse the food consumption, the better the nutritional status. Education about the diversity of food consumption is needed, especially for mothers with toddlers.

The diversity of people's food is usually greatly influenced by the conditions of the region or area where they live and how much the community can obtain and utilize existing natural resources, apart from that it is influenced by other external factors such as social, economic, cultural customs and also community knowledge (Suhaimi et al. 2022). The research results of Astuti and Sumarmi, (2020) state that the diversity of food consumption among stunted toddlers in urban areas is slightly better than in rural areas.

The diversity of family food consumption in the research area was 46 respondents, 27 of whom fell into the non-diverse food consumption category and 19 other respondents fell into the diverse category. The consumption of grains and animal foods dominates the diversity of food consumption in the research area. This is due to the habits of village people who prefer food made from grains and animal foods. Diversity in food consumption is an important factor in minimizing the incidence of stunting in toddlers (Widyaningsih et al., 2018), because it ensures that the nutrients in the food consumed can carry out their respective functions so that the body's needs will be met and overcome malnutrition and achieve food security conditions, steps What must be taken is to increase the quantity and quality of food consumption.

The condition of food consumption in the research area is in line with the opinion of Hanafie (2010) which states that consuming a variety of foods can ensure that the nutrients in the food consumed can carry out their respective functions so that the body's needs will be met and to overcome nutritional deficiencies and achieve food security conditions, steps that What must be taken is to increase the quantity and quality of food consumption. Food as a source of nutrients (carbohydrates, fats, proteins, vitamins, minerals and water) is the main basis for humans to achieve health and well-being throughout their life cycle. Fetuses in the womb, babies, toddlers, children, teenagers, adults and the elderly need food that meets nutritional requirements to maintain life, grow and develop, and achieve work performance (Karsin 2004).

The diversity in food consumption by toddlers greatly influences their nutritional status. This is reinforced by the opinions of Purwaningrum and Wardani, (2013) and Suhaimi et al. (2023) who state that nutritional status directly influences the food consumed daily. According to Kridawati (2012), toddler food intake is very important because toddlers are a group that shows rapid body growth, so they require high levels of nutrients per kg of body weight. Toddler food must be sufficient in quality and quantity to prevent physical growth and development disorders. Low resistance to disease, intelligence levels that are less than they should be, low work performance and sports performance are forms of manifestation of the impact of suboptimal nutritional conditions.

This shows that toddlers who consume various foods will have better nutritional status. In line with Murdiati and Amaliah, (2013), food consumed in a variety of sufficient and balanced quantities will be able to meet nutritional needs. Consuming various foods is very good for supplementing the substances the body needs.

The same research results from Widyaningsih et al. (2018) also show that 41% of toddlers aged 24-59 months experience stunting. The chi-square test shows a relationship between birth length, parenting patterns and food diversity with stunting ($p<0.05$). The most dominant risk factor for stunting is food diversity. This is in accordance with the theory of Supariasa, (2020) that the food intake consumed by children can directly influence the child's nutritional status. Based on the results of Riskesdas (2018), the problem of stunting in Indonesia is still quite serious, around 37.2% or around 9 million children are stunted. The consequences of not consuming a variety of foods will result in impaired growth and development in toddlers. Murdiati and Amaliah (2013) stated that nutritional problems arise from consuming only delicious and filling food. Meanwhile, balanced nutrition must be achieved from various foods consumed because no food has perfect nutritional content, so there is a need to diversify the food consumed. Wantina et al. (2017) added that the more diverse food consumption, the better nutritional status. Education about the diversity of food consumption is needed, especially for mothers with toddlers (Wantina et al. 2017).

There are two categories of causes of stunting, namely direct and indirect causes, directly due to nutritional problems caused by low nutritional intake. The indirect influences are food availability, parenting patterns, clean water, sanitation and health services (Ministry of Health of the Republic of Indonesia 2013). According to Suhaimi (2019a), nutritional interventions alone are not enough to overcome the problem of stunting, environmental sanitation and cleanliness factors also influence the health of pregnant women and children's growth and development because children under two years old are vulnerable to various infections and diseases.

Conclusion

The DDP score for food diversity for toddlers in Batang Alai Selatan District reached 76.44. The food consumption criteria for toddlers in Batang Alai Selatan District is still not diverse because it is still dominated by the grain food group (52.8%) and animal food (38.3%). Asymp value. Sig. (2-sided) 0.000 < 0.05, the calculated chi-square value is 20.17 > Chi-square table 3.841, indicating a significant relationship between the diversity of family food consumption and the incidence of stunting in toddlers.

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