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Analysis of Stunting Incidence Based On Food Consumpted and Environmental Sanitation

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Abstract

The purpose of the study was whether there was an effect on the incidence of stunting in toddlers based on the type of food consumed and environmental sanitation in Ilomata Village, Bulango Ulu District. The type of research used is quantitative research, analytic survey design. The population is 53 respondents with a sample of this study amounting to 53 respondents. Data analysis used the chi-square test. The results of the study from 53 respondents to the stunting incident were 20 respondents (37.7%). Types of food consumed in the sufficient category were the most, namely 25 respondents (47.2%). environment in the sufficient category, with the most number of 28 respondents (52.8%). The type of food consumed was in the less category, namely 13 respondents with stunting events for the stunting category, namely 13 respondents (68.4%). Environmental sanitation category is lacking, namely 16 respondents with stunting incidents for the stunting category, namely 12 respondents (75.0%). Conclusion There is an effect of stunting based on the type of food consumed. The p value = 0.002 is obtained, where the p value is smaller than α = 0.05. There is an effect of stunting based on environmental sanitation. The p value = 0.001 is obtained, where the p value is smaller than α = 0.05. It is recommended for mothers who have children under five to be more concerned about parenting and infectious diseases in children.

Keywords: environment sanitation; food consumpted; incidence; nutritional deficiencies; stunting

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INTRODUCTION

One of the indirect causes of childhood stunting is the environment. It is well known that inadequate access to clean water, personal hygiene, and sanitation practices all contribute to stunting. The primary cause of infectious disorders including diarrhea and helminthiasis is poor basic sanitation, which includes the quality of clean and drinking water, the way waste is disposed of, how feces are disposed of, and how improper trash is handled (Anderson et al., 2009; WHO, 2007).

The digestive system's ability to absorb nutrients is hampered by infectious illnesses. A baby's weight may drop as a result of an infection; if this situation persists for an extended period of time without sufficient nutrition for the healing process, stunting may result (Purba et al., 2020). While maternal posture (short), too-close pregnancy distance, young moms, and inadequate nutrient intake all contribute to stunting, other direct factors include the health and nutritional quality of mothers prior to, during, and after childbirth (Purba et al., 2020; Shang et al., 2010).

Due to the nutrients required for toddlers' physical and intellectual development, nutritional deficiencies in toddlers not only increase morbidity and death rates but also have an impact on

growth and development. Toddlers' lack of nutrients is brought on by an unbalanced diet, which impairs their ability to grow and develop and fails to meet the requirements for nutritional adequacy. Stunting will make it more difficult for children in the future to develop cognitively and physically to their full potential (Ahmed et al., 2012; Osazuwa et al., 2011). Stunting can be caused by a variety of circumstances, including socioeconomic status, foods that are nutritionally inadequate for expectant moms, hygienic conditions in the surroundings, illnesses that mothers or babies may contract during pregnancy, and many more. Overall, Indonesia's consumption habits continue to be below PPH recommendations (Shang et al., 2010).

The Gorontalo Provincial Health Office's PSG monitoring data showed that 32.4% of toddlers were stunted in 2017, 32.5% were in 2018, and 30.5% of toddlers were stunted in 2019. Although the frequency of stunting episodes has declined, the monitoring data indicate that it is still below the WHO threshold of 20%, which puts it in the high category. According to the data, Ilomata Village in the Bulango Ulu district has the highest frequency of stunting among the villages in the Bone Bolango Regency, with a rate of 48.78%. According to observations made on environmental sanitation in the Puskesmas' working area, some continue to use public latrines and do not have waste water treatment.

The quality of basic sanitation in residential environments is relatively low in Indonesia, particularly in the research region and in communities situated on riverbanks, marshes, and peatlands. Some people still utilize river water as a clean water source for their everyday requirements, such as drinking, cooking, washing dishes, and maintaining personal cleanliness. The river's water quality deteriorates due to the practice of certain individuals who continue to excrete in it, as well as the disposal of trash and wastewater from homes (Siwila & Brink, 2019; Ziegelbauer et al., 2012). For those who live in places other than wetlands, well water is their primary supply of clean water in addition to river water. In addition, the lack of proper drainage channels results in the polluting of water from home wastewater.

METHOD

The research location was carried out in Ilomata Village, Bulango Ulu District, Bone Bolango Regency Indonesia. This research was carried out in December 2022. A cross-sectional study approach was used in this analytical kind of observational research. A cross-sectional study that assessed exposure, its effects, and analysis simultaneously was carried out to examine the fundamental sanitation link of the environment with stunting. The population in this study are all parents who have toddlers who live in the Ilomata Village area, Bulango Ulu sub-district, namely 53 toddlers in 2022. Sample in this study was all toddlers in Ilomata Village, Bulango Ulu District, totaling 53 people.

Based on the computation, a sizable sample of 53 toddlers was obtained, and two distinct population proportions from Lemeshow were ascertained using the hypothesis test formula (1) (Purba et al., 2020):

$$n = \frac{\left\{Z_{1-\alpha/2}\sqrt{\left(2P(1-P)\right)}+Z_{1-\beta}\sqrt{\left(P1(1-P1)\right)+P2(1-P2)}\right\}^2}{(P1-P2)^2} \times \text{Deff} \quad \ldots (1)$$

The minimum required number of samples expressed with N, the level of significance (for α = 0.05 is 1.96) declared Z_1-$\alpha/2$, the power of test (for 1-β = 80% is 0.842) declared Z_1-β , the proportion of the stunting incident in the exposed group risk factor was P1 , while P2 was the proportion of stunting incident in groups not exposed to risk factors, P was averaging P1 and P2. Because sampling techniques were clusters, then large samples were calculated by the design of the effect (times two). The minimum sample calculation result was 23. Then a large minimal sample was multiplied by 2 (the design effect value) so that it became 47 and then coupled with a large 10% sample of the result was being 50 and completed into 53.

Dependent variable was a stunting occurrence divided into 2 (two) categories that were stunting when Height-for-Age z score (HAZ) < -2 SD and normal when Height-for-Age z score (HAZ) ≥ -2 SD. The study included the following independent variables: personal hygiene, history of

infectious diseases, physical characteristics of clean water, sewage quality, toilet quality, exposure to pesticides, and cigarette smoke (Purba et al., 2020).

Variable toddler ages, personal hygiene, history of viral disorders, pesticide exposure, and cigarette smoke exposure were the primary data collected by a questionnaire interview. Data on the physical quality of clean water, the quality of sewage, and the quality of latrines were gathered through observation using a checklist. Using an infantometer, the length of the child's body was measured in order to gather data on the occurrence of stunting. Color, smell, and taste were among the physical attributes of the clean water samples. In order to make it easier to handle the data for each variable, the data processing method began with the editing phase and continued with number coding (Sobsey & Pfaender, 2002). The scoring method was used to determine the measuring results of each independent variable, which included personal hygiene, the physical quality of clean water, the quality of sewage, the quality of latrines, exposure to pesticides, and exposure to cigarette smoke. The results were then converted into categorics. Subsequently, the data was entered into SPSS software, examined, and shown as a univariate and bivariate table.

A univariate analysis of all independent factors and dependent variables was the first step in the data analysis process. The next step involved doing a bivariate analysis utilizing the covariance analysis on alpha ($\alpha = 0.05$) to determine the significance of the connection between an independent and dependent variable. In order to confirm that the sanitation elements are the environment affecting the stunting event, the covariance analysis was performed by controlling other variables that may affect the incidence of stunting (Purba et al., 2020).

RESULTS AND DISCUSSION

Based on the results of the interviews, the researchers obtained the following research results:

Table 1. Univariate analysis of stunting incidents in Toddler

No	Stunting incident	Amount	
		n	%
1	Stunting	20	37,7
2	Normal	33	62,3
	Total	**53**	**100,0**

Based on **Table 1**, the distribution of respondents is based on the incidence of stunting. The incidence of stunting was 20 respondents (37.7%) while the normal category of stunting was 33 respondents (62.3%).

Table 2. Univariate analysis in type of food consumed

No	Type of food consumed	Amount	
		n	%
1	Good	9	17,0
2	Enough	25	47,2
3	Not enough	19	35,8
	Total	**53**	**100,0**

Based on **Table 2**, the distribution of respondents based on the type of food consumed. The type of food consumed in the sufficient category was the most, namely 25 respondents (47.2%) then the type of food consumed in the less category, namely 19 respondents (47.2%), while the type of food consumed in the good category was at least 9 respondents (17 ,0%).

Table 3. Univariate analysis based on environmental sanitation

No	Environment sanitation	Amount	
		n	%
1	Good	9	17,0
2	Enough	28	52,8

3	Not enough	16	30,2
	Total	**53**	**100,0**

Based on **Table 3** Distribution of respondents based on environmental sanitation. Environmental sanitation in the sufficient category is the most, namely 28 respondents (52.8%) while environmental sanitation in the good category is the least, namely 9 respondents (17.0%).

Table 4. Analysis of the incidence of stunting based on the type of food consumed

No	Type of food consumed	Stunting incident				Total		p value
		Stunting		normal		n	%	
		n	%	n	%			
1	Good	1	11,1	8	88,9	9	100,0	0,002
2	Enough	6	24,0	19	76,0	25	100,0	
3	Not enough	13	68,4	6	31,6	19	100,0	
	Total	**20**	**37,7**	**33**	**62,3**	**53**	100,0	

Based on **Table 4** shows that the type of food consumed is in the good category, namely 9 respondents with stunting for the stunting category, namely 1 respondent (11.1%) and for the normal category, namely 8 respondents (88.9%), while for the type of food consumed enough category, namely 25 respondents with stunting events for the stunting category, namely 6 respondents (24.0%) and for the normal category, namely 19 respondents (76.0%) then for the type of food consumed the category is lacking, namely 13 respondents with stunting events for the stunting category namely 13 respondents (68.4%) and for the normal category, namely 6 respondents (31.6%).

Based on the results of the chi-square test analysis, a p value = 0.002 is obtained, where the p value is smaller than α = 0.05, which means that there is an effect of stunting based on the type of food consumed in Ilomata Village, Bulango Ulu District.

Table 5. Analysis of stunting events based on environmental sanitation

No	Environment sanitation	Stunting incident				Total		p value
		Stunting		normal		n	%	
		n	%	n	%			
1	Good	2	22,2	7	77,8	9	100,0	0,001
2	Enough	6	21,4	22	78,6	28	100,0	
3	Not enough	12	75,0	4	25,0	16	100,0	
	Total	**20**	**37,7**	**33**	**62,3**	**53**	100,0	

Based on **Table 5** shows that environmental sanitation is in the good category, namely 9 respondents with stunting events for the stunting category, namely 2 respondents (22.2%) and for the normal category, namely 7 respondents (77.8%), while in the environmental sanitation category, it is sufficient, namely 28 respondents with stunting incidents for the stunting category were 6 respondents (21.4%) and for the normal category namely 22 respondents (78.6%) then in the less category of environmental sanitation namely 16 respondents with stunting incidents for the stunting category namely 12 respondents (75, 0%) and for the normal category, namely 4 respondents (25.0%).

Based on the results of the chi-square test analysis, a p value = 0.001 was obtained, where the p value is smaller than α = 0.05 which means that there is an incidence of stunting based on environmental sanitation in Ilomata Village, Bulango Ulu District.

Stunting is an indicator used to describe the nutritional status of children with an index of body length for age (PB/U) or height for age (TB/U). A child is said to be stunted if he has a Z-score of -3

SD to -2 SD. Whereas it is normal if you have a Z-score value of -2 SD to 2 SD. Stunting in children is the long-term result of chronic consumption of low-quality diets combined with morbidity, infectious diseases and environmental problems (Grierson, 2007; Umar Kura et al., 2013).

Based on the research results obtained on the distribution of respondents based on the incidence of stunting. The incidence of stunting in the normal category is 33 respondents (62.3%), this is because the respondents always provide various types of food to toddlers, the type of food consumed there is a tendency that toddlers with normal nutritional status have intake of green vegetables, vegetables and fruit sources of vitamin A, vegetables and other fruits, nuts, and milk which are higher when compared to toddlers who are stunted.

The incidence of stunting was 20 respondents (37.7%), this was due to the level of education of a mother, where the results of the research from 53 respondents there were 28 respondents (52.8%) who had junior high school or junior high school education so that it affected the mother's knowledge in fulfilling the status toddler nutrition. Education is not only a benchmark for someone to understand the importance of nutritional needs, even someone with low education can get information about health from anywhere, not just at school. Low parenting style causes poor nutritional status of toddlers. If this happens during the golden age it will cause the brain to not be able to develop optimally and this condition is difficult to recover from. Parenting patterns that were lacking in this study were indicators of feeding practices. Mothers who have stunted children have a habit of delaying when feeding their toddlers. In addition, mothers feed toddlers without paying attention to their nutritional needs. This condition causes a toddler's food intake to be less both in terms of quality and quantity so that toddlers are prone to stunting.

The risk of becoming stunted is 3.7 times higher in children who are not exclusively breastfed (breastfeeding <6 months) compared to children who are exclusively breastfed (≥6 months). Research conducted by Purba et al., (2020)shows that children who do not receive colostrum are at a higher risk of stunting. This may be because colostrum exerts a protective effect on the newborn and infants who do not receive colostrum may have a higher incidence, duration and severity of diseases such as diarrhea which contribute to malnutrition.

Dietary diversity is one of the main nutritional problems in developing countries like Indonesia. In developing countries the majority of food intake is dominated by food sources of calories and the lack of intake of animal foods, fruits, vegetables. Several studies have reported that low dietary diversity is associated with an increased risk of stunting and other nutritional problems such as overweight, dyslipidemia, and metabolic syndrome. In the long term the incidence of stunting in toddlers will have an impact on decreased cognitive function, impaired memory, poor school performance which when adults will reduce income and work productivity.

Based on the research results obtained on the distribution of respondents based on the type of food consumed. The type of food consumed was in the sufficient category, namely 25 respondents (47.2%), this was because the respondents were still not fully prepared, where the intake of vegetables, fruit sources of vitamin A, nuts and milk consumed by stunted toddlers was lower than toddlers with normal nutritional status, food diversity is an illustration of the quality of food consumed by toddlers.

Then the type of food consumed was in the less category, namely 19 respondents (47.2%), due to the low parenting pattern of respondents towards toddlers causing poor nutritional status of toddlers. This will cause the brain to not be able to develop optimally and this condition is difficult to recover from. Parenting patterns that were lacking in this study were indicators of feeding practices. Mothers who have stunted children have a habit of delaying when feeding their toddlers. In addition, mothers feed toddlers without paying attention to their nutritional needs.

Meanwhile, the type of food consumed was in the good category at least, namely 9 respondents (17.0%). This was due to respondents paying attention to food consumption and the diversity of food given to toddlers so that toddlers were fulfilled with nutrition so that stunting was avoided.

Intake of green vegetables such as spinach can reduce the risk of stunting, because green vegetables contain a lot of iron which functions to prevent stunting. Intake of iron obtained from food if the amount is excessive it will be stored in the muscles and spinal cord. If the adequacy of iron is inadequate then the iron stored in the spine is used to produce hemoglobin decreases. If this condition persists it will result in iron anemia and lowered immunity, making it susceptible to infectious diseases which in the long term will have an impact on the growth of the liners of toddlers.

Previous studies have shown that toddlers who have low milk intake have a greater chance of experiencing stunting because milk contains a lot of calcium which functions to encourage toddlers' height growth.

One of the causes of stunting can be influenced by several factors such as environmental sanitation, food processing, and also mother's knowledge of stunting. Unhealthy environmental sanitation will affect the health of children under five and can ultimately affect the nutritional status of these children. In this environmental health factor, there is a relationship between clean water sources that are protected and those that are not protected, in which water is the most important chemical compound for survival, so it cannot be replaced by other compounds (4–6). Protected water sources can be in the form of ground water such as deep wells, shallow and springs. Unprotected water sources increase the risk of stunting higher than protected water sources. Poor hygiene practices and unsafe drinking water contribute to diarrhea which can result in death.

Based on the research results obtained on the distribution of respondents based on environmental sanitation. Environmental sanitation is in the sufficient category, with the most number of respondents, namely 28 respondents (52.8%). This is because respondents sometimes use a toilet because they do not yet have a bridge and still live in the neighborhood, then there is no place to wash their hands and clean water sources are still available. hitched a ride on a neighbor.

In the less category, namely 16 respondents (30.2%), this was due to the fact that the respondents did not have a family latrine and they still defecate openly, then the habit of not washing their hands when they are done with other activities. While environmental sanitation is at least in the good category, namely 9 respondents (17.0%) of respondents who have family latrines, hand washing facilities are available, thus ensuring health for the family.

In line with the results of research conducted by Ahmed et al., (2012) it showed that there were 87.9% of respondents whose hand washing habits were not good in the case group, while there were 45.5% of respondents in the control group whose hand washing habits were not good. The proportion of the case group was higher, 42.4% of respondents whose hand washing habits were still not good enough compared to the control group. The results of the chi-square test showed that the p-value of hand washing habits on the incidence of stunting was 0.000. This shows that there is a relationship between handwashing habits and the incidence of stunting in the working area of the Kotakulon Health Center, Bondowoso Regency. Respondents with poor hand washing habits have a risk of 0.12 times their toddler experiencing stunting.

According to Shang et al., (2010) the most influencing factor is that respondents do not wash their hands after contact with animals. Animals can easily and quickly spread disease to humans, namely through feces, fur, and skin, as well as the environment in which the animal lives. Even though animals look healthy and clean, germs that cannot be seen can infect humans and other animals. One of the bacteria from animals that can infect animals and spread to humans is E. coli O157, which is in the digestive system of animals.

CONCLUSION

Based on the results of research on the analysis of types of food consumed and environmental sanitation with the incidence of stunting in Ilomata Village, Bulango Ulu District, Indonesia. Incidence of stunting in Ilomata Village, Bulango Ulu District. The incidence of stunting was 20 respondents (37.7%) while the incidence of stunting was in the normal category, namely 33 respondents (62.3%). Types of food consumed in Ilomata Village, Bulango Ulu District. Types of food consumed in the sufficient category were the most, namely 25 respondents (47.2%). Environmental sanitation in Ilomata Village, Bulango Ulu District. Environmental sanitation is in the sufficient category, which is the most, namely 28 respondents (52.8%). There is an influence on the incidence of stunting based on the type of food consumed in Ilomata Village, Bulango Ulu District. The p value = 0.002 is obtained, where the p value is smaller than $\alpha = 0.05$. There is an effect of stunting based on environmental sanitation in Ilomata Village, Bulango Ulu District. The p value = 0.001 is obtained, where the p value is smaller than $\alpha = 0.05$.

CONFLICTS OF INTEREST

The authors declare no conflict of interest concerning the publication of this article. The authors also confirm that the data and the article are free of plagiarism.

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