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How Nutrition and Sanitation Shape Toddler Development: A Closer Look at Health Risk Factors

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Abstract

Purpose: Toddler development is a condition of change in the form and function of organ and individual maturation. Under-five developmental disorders are still a case that requires special attention. The first 1000 days of a child's birth is the golden period for child development. Based on data Kemenkes in 2021 shows that there are 7,512.6 per 100,000 population (7.51%) of toddlers in Indonesia who experience developmental disorders. There are several factors that influence development, including nutritional status and family environmental sanitation. Nutritional status as measured by Body Mass Index (BMI) affects the development of toddlers. The relationship with nutritional status, if the nutritional status is poor then it becomes a factor that further disrupts the physical development of toddlers with optimal nutritional status.
Methodology: This study used a analytic design, with a cross-sectional approach. Sampling using fixed disease sampling method from Development Pre-Screening Questionnaire and Clean and Healthy Living Behavior questionnaire data and medical records of toddlers at Gatak Health Center. Data analysis using the chi-square test with SPSS 25. The sample size used was 91 samples.
Results: The results of chi-square nutritional status with the development of toddlers obtained OR = 6.618 (with p = 0.050). While the relationship between family environmental sanitation with the development of toddlers obtained OR 5.661 (with p=0.022).
Conclusion : Nutritional status and environmental sanitation are significantly associated with the development of toddlers.

Introduction

Development is related to aspects of changes in the form and function of organ or individual maturation (Ratnaningsih, 2019). The first 1000 days of a child's life is the golden period for child development. Fulfilling nutritional status is paramount for long-term health. Development in toddlers includes language development, cognitive development, psychosocial, moral, and motor development (Yulizawati, 2022). *The World Health Organization (WHO*) reports data on child development disorders, including 178 million children in the world who are malnourished and 3.5 to 5 million children under five years old or toddlers experience death due to malnutrition(World Health Organization, 2023). Indonesia is the third country with the highest prevalence of developmental deviations in the Southeast Asia region (Kemenkes, 2018). The prevalence of developmental deviations in children under 5 years of age in Indonesia was 7,512.6 per 100,000 population or about 7.51% (Kemenkes, 2021).

According to the Ministry of Health survey results, the prevalence of stunting or malnutrition in Central Java ranks quite high in Indonesia at 30.8%, with SKI data in 2023 stating that Sukoharjo District ranks ninth in the prevalence of developmental disorder cases in Central Java, at 24.3% (KEMENKES, 2021). Then, data from the Sukoharjo District Health Office in 2018 showed that 39.92% experienced stunting, with the highest percentage of malnutrition in Gatak District (15%) compared to Sukoharjo District (10.4%) and Bulu District (10.2%) in 2021 (Kemenkes, 2018). There are several factors that influence development, including nutritional status and family environmental sanitation. Nutritional status as measured by Body Mass Index (BMI) affects the development of toddlers (Wauran, 2016). The relationship with nutritional status, if the nutritional status is poor, it becomes a factor that further interferes with the physical development of toddlers with optimal nutritional status (Boyce, 2018).

Toddler development can be measured by anthropometric parameters, micro-nutrient status, physical activity level and body metabolism. In addition, inadequate nutrient intake, especially energy sources needed for muscle growth, while inadequate energy supply can cause the body to draw on energy stores in the liver and muscles, which causes less optimal nutrient metabolism (Ara, 2018). The most important nutrient obtained for the first time when a baby is born is breast milk because it contains high nutritional value. The nature of breast milk is easily absorbed by the toddler's body which can help development and provide immune substances that will protect against various types of diseases that can hinder the development of toddlers. Nutritional status according to the Principle of Nutritional Assessment is the state of the body which is the final result of the balance between nutrients that enter the body and their functions (Agustina, 2019). Environmental sanitation is an effort to control one's self against all physical environmental factors that can cause inhibition of one's development and immunity. Programs that have been implemented by Puskesmas Gatak, Sukoharjo are the Environmental Health Program (Aida, 2019).

The scope of the sector includes the availability of clean water, the home environment, the existence of latrines, landfills, cleanliness of daily food processing locations and sanitation in public places. Environmental sanitation conditions are a direct cause and a contributing factor to the spread and contraction of disease, hindering child development. Poor environmental sanitation is a common cause of disease (Aisah, 2019). The coverage of malnutrition in Gatak Sub-district is the highest in Sukoharjo District, along with the pros and cons of the influence of nutritional status and family environmental sanitation on the development of toddlers has motivated this study to determine the relationship between nutritional status and family environmental sanitation on the development of toddlers in Gatak Sub-district, Sukoharjo District (KEMENKES, 2021).

Research method

Study design, population and sampling technique

The research method used is analytical observational research type. In analytic observational research, researchers only observe facts in the field without any intervention on variables. This study uses a cross sectional approach, in which researchers take data at a certain time (Rahmat, 2016). The actual population of this study was toddlers aged 6 months-5 years who met the inclusion and exclusion criteria of the target population at the Gatak Health Center, Sukoharjo Regency. These toddlers are children who undergo routine examinations and get developmental services at Puskesmas Gatak Sukoharjo. This study was conducted at the Gatak Health Center, Sukoharjo Regency from October to December 2024 (Wahyudi Istianto, 2019). The sampling method technique used in this study used a non-probability sampling method of purposive sampling. The inclusion criteria are toddlers aged 6 months - 5 years at the Gatak Health Center. The exclusion criteria. The selection of case samples is toddlers aged 6 months - 5 years or toddlers who meet the inclusion criteria and exclusion criteria that have been set and are willing to become respondents (Almatsier, 2018).

This study has independent variables, namely nutritional status and family environmental sanitation, while the dependent variable is the development of toddlers. Nutritional status variables were assessed by measuring BMI/body mass index which is body weight divided by height in meters squared. (Aprilia, 2020). The research instrument for nutritional status variables was obtained from medical records from the health center which was measured using the IMT criteria for Indonesia / Asia from the Indonesian Ministry of Health. The measurement results were categorized as abnormal BMI, namely underweight (25 kg/m2) and normal BMI (18.5-25 kg/m2) (Cintya, 2015). The family environment sanitation variable was established based on the criteria of the household Cleand and Healthy Living Behavior questionnaire. In the questionnaire there are 10 questions, with 1 point for each correct answer. So that the results of the questionnaire are if the Cleand and Healthy Living Behavior score is <8, it means that the environmental sanitation is poor, while if the score is >8 to 10, it means that the environmental sanitation is good (Prasetyo, 2020).

Toddler development variables are determined based on the criteria of the Developmental Pre-Screening Questionnaire (Karusdianti, 2018). This questionnaire is adjusted to the age of toddlers, which consists of the ages of 6 months, 9 months, 12 months, 15 months, 18 months, 21 months, 24 months, 30 months to the age of 60 months or 5 years (Nurhayati, 2019). Respondents will later fill out a questionnaire according to the age of the toddler, then the questionnaire consists of 10 questions with the answers “Yes” and “No”. The interpretation of the results is that the

number of “Yes” <8 means that the toddler's development is deviant or disturbed, whereas if the number of “Yes” answers>8 means normal (Karusdianti, 2018).

Result

The study has obtained ethical feasibility from the Health Research Ethics Committee of Dr.Moewardi Surakarta Hospital with Number: 2.775/XII/HREC/2024. The sample obtained from fixed disease sampling was 92 toddlers. Data were then analyzed by bivariate test with chi-square using SPSS 25. **Univariate analysis,** Table 1 shows that research on the relationship between nutritional status and family environmental sanitation on the development of toddlers at the Gatak Sukoharjo Health Center was conducted on 91 respondents who met the research restriction criteria. This study aims to provide knowledge about the relationship between the independent variables, namely nutritional status and sanitation of the family environment with the dependent variable, namely the development of toddlers. The results of the univariate analysis of the respondent's characteristic data are shown in the results of descriptive analysis of respondent characteristics in Table.1 show that most respondents were aged 25-44 years (73.60%) or classified as early adulthood, while the remaining 14.30% of respondents were < 25 years old or classified as late adolescence and as many as 12.10% of respondents were > 44 years old or classified as late adulthood to the elderly. Not only that, it is also known that the majority of respondents have

Tabel 1 Description of Respondent Characteristics

Category	Frequency (n)	%
Age		
< 25 year	13	14,30
25 - 44 year	67	73,60
> 44 year	11	12,10
Toddler age		
≤ 3 age	58	63,70
> 3 age	33	36,30
Toddler body weight		
≤ 10 kg	28	30,80
> 10 kg	63	69,20
Toddler body height		
≤ 100 cm	72	79,10
> 100 cm	19	20,90
Toddler status nutrition		
Underweight	46	50,50
Normal	43	47,30
Overweight	2	2,20
Clean and Healthy Living Behavior Questionnaire		
Good	48	52,70
Bad	43	47,30
Developmental Pre-Screening Questionnaire		
Normal	12	13,20
Abnormal	79	86,80

toddlers aged less than equal to 3 years. In this study, the nutritional status of toddlers and Clean and Healthy Living Behavior Questionnaire were measured to determine the significance of their influence on the KPSP (Developmental Pre-Screening Questionnaire variable. Table 1 shows that most of the nutritional status of toddlers is classified as underweight (50.50%) and has a clean and healthy living behavior that is classified as good (52.70%).

Bivariate analysis of this study was conducted to see the relationship between nutritional status and family environmental sanitation on the development of toddlers. Bivariate analysis was conducted using the Chi-Square test. In

this test, if the p-value obtained is smaller or equal to 0.05, it can be concluded that the relationship between variables is significant. Meanwhile, if the p-value obtained is greater than 0.05, it can be concluded that the relationship between variables is not significant. The results of the bivariate analysis are shown in Table 2 and Table 3 (Kementerian Kesehatan RI, 2021).

Table 2 Relationship between Nutritional Status and Toddler Development

Characteristics	Developmental Pre-Screening Questionnaire		*P-Value*	*OR CI 95%*
	Normal	Deviate		
Nutritional status				
Underweight	10	36	0,050	6,618
Normal	2	41		
Overweight	0	2		

Table 2 shows that the p-value resulting from the Chi-Square test for the nutritional status variable on KPSP is 0.05, which is not more than the significance level (5%) so that the decision to reject the null hypothesis is obtained. This means that the nutritional status of toddlers has a significant effect on the development of toddlers (Supariasa, 2016).

Table 3 Relationship between Family Environmental Sanitation and Toddler Development

Characteristics	Clean and Healthy Living Behavior Questionnaire		*P-Value*	*OR CI 95%*
	Normal	Deviate		
Family Environmental Sanitation			0,022	
Good	10	38		5,661
Bad	2	41		

Table 3 shows that the p-value resulting from the Chi-Square test for the family environmental sanitation variable on Developmental is 0.02, which is smaller than the significance level (5%) so that the decision to reject the null hypothesis is obtained. This means that family environmental sanitation has a significant effect on the development of toddlers (Prasetyo, 2020).

Multivariate analysis in this study, conducted after univariate and bivariate analysis in this study, showed a significant relationship between variables. This study is to analyze the relationship between nutritional status and family environmental sanitation with the development of toddlers.

Table 4. Multivariate Analysis

Variable	Koefisien	P-value	OR (ExpB)	CI 95%		*Negelkerke R-square*
				Lower	*Upper*	
Family Environmental Sanitation	1,691	0,004	5,426	1,114	26,431	0,112
Nutritional status	0,129	0,005	1,138	0,210	6,157	

Source: Secondary Data 2024. Table 4 shows that there is a relationship between family environmental sanitation (p=0.004) and nutritional status (p=0.005) with the development of toddlers at Gatak Health Center, Sukoharjo. The strength of the relationship can be seen from the OR. The strength of the relationship is greatest to least from family environmental sanitation (OR = 5.426) and nutritional status (OR = 1.138). In the multivariate test both variables had a p

value <0.005 which means they have a significant relationship. The family environment sanitation variable is the variable most associated with the incidence of stunting (Kementerian Kesehatan RI, 2021).

Discussion

The characteristics of toddlers in this study (table 1) were dominated by toddlers with the most age, namely the age group <3 years with a percentage of 63.7%. The age of mothers who filled out the questionnaire was dominated at the age of 25-44 years (73.6%). The toddler's weight data was predominantly more than 10 kg, height <100 cm, with nutritional status conditions based on BMI in the underweight category (50.5%) (Permenkes, 2020). In the family environmental sanitation variable using the household clean and healthy living behavior questionnaire, it is predominantly in good condition (52.7%). Developmental examination based on the Developmental Pre-Screening Questionnare was found to be 83.6% deviant.

Sanitation can affect the development of toddlers, especially under three years old, who are very vulnerable to infectious diseases (Montolalu, 2022). Lack of environmental sanitation can cause the gastrointestinal tract to be disrupted, which will result in energy being diverted to the immune system to attack the disease. Therefore, toddlers will be at risk of developmental disorders that result in physical and mental disruption and can cause drastic weight loss (Evanirwana, 2021). One of the factors that influence the development of toddlers is nutritional status. Nutritional status can be assessed by BMI (Kasenda, 2015). Table 2 shows that there is a relationship between the variables of nutritional status and development with a value of (p=0.05). This is in line with several studies. The first study from Utanti and Azizah, which found that there was a relationship between nutritional status and growth and development aged 0-5 years.

Other studies show similar things, namely in the research of Kartika et.al (2020) reporting that poor nutritional status will increase the risk of toddlers or preschool children aged 2-5 years will experience motor development disorders. While the relationship between family environmental sanitation and toddler development is (p=0.022). The p value <0.005 states that there is a relationship between the two variables. This study is in line with the research of Aisah et al (2019) that personal hygiene and environmental sanitation have a relationship with the incidence of stunting in toddlers with an OR = 0.143. In this study, there were many houses that had poor sanitation so that it could be one of the risk factors for stunting or developmental disorders and the location of water sources far from the ground. According to Winslow, the criteria for a healthy home must meet physiological needs and psychological needs and we must keep the water source so that other materials do not easily contaminate it (Prasetyo, 2020). This is in line with the research of Montolalu et al (2022) using a cross-sectional design that personal hygiene and household sanitation are associated with the incidence of stunting in toddlers (p=0.45). This was done with direct interview techniques and there are still many houses with poor sanitation. There is also research by Adenike et al (2018) with the title “Relationship between Child Development and Nutritional Status of Under Five Nigerian Children”, which states that nutritional status in toddlers has a significant effect on the main development in toddlers. Interventions in the sample, given by providing full facilities for the development of toddlers over a long period of time. The research design was cross section, consisting of 415 toddlers and obtained data from the “Schedule of Growing Skills II” questionnaire and processed using SPSS 25 (Adenike, 2018).

Disturbed nutritional status can have an adverse impact on the development of toddlers, among the adverse effects there are impacts in the short and long term. The adverse effects of nutritional problems in the short term are the disruption of brain development, intelligence, and metabolic disorders in the body. Meanwhile, the long-term impact can lead to decreased cognitive abilities and learning achievement, decreased immunity so that it is easy to get sick, and a high risk for the emergence of diabetes, obesity, heart and vascular disease, cancer, stroke, and disability in old age, as well as uncompetitive work quality which results in low economic productivity (Nila Ignasia, 2023)

Aspects of environmental sanitation and personal hygiene play an important role in the incidence of stunting, such as the frequent exposure of children to infectious diseases, the low habit of washing hands with soap properly, which can increase the incidence of diarrhea. Things that are considered light, such as open defecation, can have a broad impact on health. Therefore, it is important to use healthy latrines, which meet health requirements that do not cause direct spread due to human feces and can prevent disease-carrying vectors in latrine users and the surrounding environment. The results showed that households whose children were stunted and had poor sanitation were 63.9% and those with good sanitation were only 37.5% while households whose children were not stunted had poor environmental sanitation of 36.1% and good environmental sanitation of 62.5%. (Wahdaniyah. Wilda Nurpatwa, 2022).

Conclusion

From the research conducted, it can be concluded that there is a significant relationship between nutritional status and family environmental sanitation on the development of toddlers at the Gatak Health Center.

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