Relationship Between Environmental Sanitation and Stunting Incidents in Toddlers in Work Area of Kendal II Public Health Center

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Abstract. Malnutrition, sanitation and the environment are problems that are still often found to trigger stunting in toddlers in Indonesia. In 2021, the prevalence of stunting in Central Java among children under five years of age will be 20.9%. Kendal Regency in Central Java Province has a stunting prevalence of 21.2%, which is still high compared to the provincial level. It was recorded that 42% of residents use dug wells for clean water, 58% of residents do not have healthy latrines, 76% of residents dispose of household wastewater carelessly and waste management is still irregular. This study aims to determine the relationship between environmental sanitation and the incidence of stunting among toddlers in the work area of Kendal II Public Health Center, Kendal Regency. This research method is case-control with a sample size of 150 toddlers 0-59 months in the work area of Kendal II Public Health Center, Kendal Regency. Data were analyzed using the chi-square test, OR and logistic regression. The results of statistical tests show that all environmental sanitation variables are related to the incidence of stunting with a p-value <0.05. From the logistic regression test, it was found that the variable that had the most influence on the incidence of stunting was waste processing with OR = 18.681 (95% CI OR = 4.709-74.115), these results show that poor waste processing in households is 18.681 times greater than the potential risk of stunting children. compared to good household waste processing.

Keywords: environment sanitation, malnutrition, stunting, toddler, WASH.

1 Introduction

The Sustainable Development Goals (SDGs) target the 2nd sustainable development goal to eliminate hunger and all forms of malnutrition by 2030 and achieve food security, the target set is to reduce the stunting rate by 40% by 2025[1]. *Stunting* is a state of chronic malnutrition that is determined by comparing low-height and underweight for the age of children in general[2] and results in disrupted growth so that children do

T. Triwiyanto et al. (eds.), *Proceedings of the 6th International Conference of Health Polytechnic Surabaya (ICoHPS 2023)*, Advances in Health Sciences Research 72,
https://doi.org/10.2991/978-94-6463-324-5_53

not experience growth Besides stunted children will be more susceptible to disease, delays in thinking and when they become adults the risk of developing degenerative diseases[3, 4]. *Stunting* is still a health problem in the world, one of which is Indonesia. According to data from the Indonesian Toddler Nutrition Status Survey (SSGBI), the prevalence of stunting in 2021 is 24.4% or around 5.33 million children under five [5]. Based on the 2018 RISKESDAS, the prevalence of *stunting* in children aged 0-59 months in Central Java was 32.1%[6]. The prevalence of *stunting* in toddlers in Kendal Regency is 21.2%. Data from the Health Service for 2020 stated that there were 1,280 children (18%) with *stunting* in the work area of Kendal II Public Health Center.

The trigger for *stunting* comes from several factors such as poor environmental sanitation. Factors from environmental sanitation that can influence the occurrence of *stunting* are the availability of clean water, waste management, availability of healthy latrines and waste management. If sanitation conditions are bad, it can cause the prevalence of *stunting* cases to increase[7]. Based on height/age measurement data from the recap of stunting data in February-December 2022 from the Kendal II Health Center, as many as 415 toddlers who have been measured are stunted. From data from Kendal II Health Center, the highest village with stunting cases is Bandengan Village with 120 toddlers, then followed by Karangsari Village with 93 toddlers, Ketapang 66 toddlers, rotating as many as 43 toddlers, Banyutowo as many as 42 toddlers, Beam as many as 30 toddlers, Patukangan as many as 10 toddlers, Pegulon as many as 9 toddlers and at least in Pekauman Village as many as 2 toddlers. From the preliminary results, it shows that several villages with poor sanitation conditions were found, such as the presence of water sources close to polluting sources with a distance of < 10 m, turbid and smelly water quality, the discovery of garbage that is disposed of carelessly and not treated properly, careless disposal of household waste causing puddles in front of the house.

Research related to the relationship of environmental sanitation to the incidence of stunting in toddlers that has been conducted by previous researchers shows that there is a relationship between environmental sanitation and the incidence of stunting in toddlers. Research conducted by Wulandari [8] using the *cross-sectional* method showed a value of p = 0.008, this showed a significant relationship between environmental sanitation and the incidence of stunting in toddlers. Research conducted by Wahdaniyah [3] using case control research design showed the results that there was a meaningful relationship (*p-value* = 0.000) between environmental sanitation and the incidence of stunting in toddlers. From the research conducted by Yuliani [9], it was found that there is a relationship between environmental sanitation and the incidence of stunting in toddlers (p value = 0.000). Research conducted by Maudy Risma[10] on the relationship between environmental sanitation and the incidence of stunting in toddlers using case control found that there was no relationship between environmental sanitation and the incidence of stunting in toddlers (*p-value* = 1.170) and research conducted by Amrul Hasan[11] shows that there is a significant relationship between latrine access and the incidence of stunting in toddlers (*p value* = 0.001).

Based on the research that has been done, the advantages of each of these studies lie in the research methodology and location studied. Based on the background and problem formulation that has been described and supported by previous research that the purpose of this study is to analyze the relationship between environmental sanitation

and the incidence of stunting in toddlers aged 0-59 months. With this research, it is hoped that mothers can improve nutritional status in children and improve environmental sanitation to minimize the occurrence of disease infections both through the digestive tract and air.

2 Method

The type of research used is *case-control*. This research was conducted from February to March 2023 in the Work Area of Kendal II Public Health Center covering 9 subdistricts including Pegulon, Pekauman, Petukangan, Ngilir Balok, Bandengan, Karangsari, Banyutowo, and Ketapang, Central Java Province, Indonesia. The sample size used in this research was 150 toddlers aged 0-59 months. This research uses a ratio of 1:2 with cases of 50 toddelrs stunting and 100 toddlers not stunting. The samples were selected using purposive sampling and the control samples were selected using the Simple Random Sampling technique. The analyses used were chi-square, OR and multivariate logistic regression.

3 RESULTS AND DISCUSSION

3.1 Univariate Analysis

This analysis was conducted to see the description of the frequency distribution and percentage of the characteristics of the respondents. The results of the univariate analysis are shown in the following table:

Table 1. Frequency Distribution of Respondent Characteristics by Age in the Work Area of Kendal II Public Health Center

Characteristics	Stunting		Normal	
	N	%	n	%
Toddler Age				
0 – 24 month	18	36	59	59
25 – 36 month	25	50	22	22
37 – 48 month	4	8	14	14
49 – 59 month	3	6	5	5
Gender				
Male	27	54	56	56
Female	23	46	44	44

Based on Table 1. it is known that most cases of stunting in toddlers occur at the age of 25-36 months, namely 25 toddlers (50%). There are more males (54%) than females (46%). Stunting in toddlers is higher in boys (54%) than in girls (46%). Based on Table 2, the frequency distribution of environmental sanitation shows that as many as 21 people (42%) have a water source that comes from dug wells. A total of 20 people (40%) have a drinking water source that comes from PDAM and 16 people (32%) use an alternative drinking water source, namely gallon/bottled water. The number of

respondents who had latrine facilities was 21 people (42%) and 29 people who did not have latrine facilities (58%). Regarding wastewater treatment, 38 people (76%) still dispose of waste in open places. 14 respondents (28%) handled household waste by burning it, 17 people (34%) threw it directly to the landfill or was transported by officers, and 12 people (24%) still threw their rubbish into the river (Table 2).

Table 2. Frequency Distribution of Environmental Sanitation Based on Respondents' Water Source Information

Characteristics	Stunting		Normal	
	N	%	n	%
Clean water source				
TAPS	20	40	86	86
Dug Wells	21	42	13	13
River	9	18	1	1
Drinking Water Source				
TAPS	20	40	37	37
Dug Wells	14	28	5	5
Gallon Water/ Packaging	16	32	58	58
Latrine Ownership				
Exist	21	42	89	89
None	29	58	11	11
Wastewater Management Channel				
Open	38	76	37	37
Closed	12	24	63	63
Waste Treatment				
Landfilss	17	34	63	63
Burned	14	28	37	37
Landfilled	4	8	0	0
River	12	24	0	0
Dipossed of Caressly	3	6	0	0

3.2 Bivariate Analysis

Table 3 shows that ownership of clean and drinking water sources, ownership of toilets, ownership of wastewater treatment channels and poor waste management is a risk factor for stunting in toddlers. Families without access to clean water have a significant relationship (p-value = 0.000) with the incidence of stunting in toddlers. The results of the analysis obtained a value of OR = 9.214, meaning that having a poor clean water source has a 9.214 times greater risk of stunting in toddlers when compared with families who have access to clean water. Drinking water that is not treated and placed in a closed container shows a significant relationship (p-value = 0.001) with the incidence of stunting. From the analysis results, it was found that OR = 3.551, meaning that drinking water that is not treated and placed in a closed container has a 3.551 times greater chance of stunting in toddlers compared with drinking water that has been treated and placed in a closed container. Ownership of an unhealthy latrine has a significant (p-

value = 0.000) risk of being 11.173 times greater than that of a healthy and clean latrine. Not having a wastewater drain is 5.392 times more likely to experience stunting compared with a house that has a closed wastewater drain. The statistical results show a p-value = 0.000, indicating a relationship between ownership of wastewater channels and the incidence of stunting in toddlers. The results of the analysis regarding inappropriate waste management showed a significant result (p = 0.001, indicating a relationship between waste processing and stunting in toddlers. The results of the OR analysis show that improper waste processing has a 3.305 times greater risk of stunting compared with respondents who process properly.

Table 3. Relationship between Environmental Sanitation and the incidence of Stunting in Toddlers Aged 0-59 Months in Kendal II Public Health Center Working Area

Environmental Sanitation	**Stunting**				**Total**		***p***	**POR CI;95%**
	Exist		None					
	N	%	N	%	N	%		
Clean Water Source								
Not Eligible	30	60	14	14	44	29,3	0.000	9.214 (4.142-20.496)
Qualify	20	40	86	86	106	70,7		
Drinking Water Source								
Not Eligible	36	72	42	42	78	52	0.001	3.551 (1.704-7.398)
Qualify	14	28	58	58	72	48		
Latrine Ownership								
Unhealthy	29	58	11	11	40	26,7	0.000	11.173 (4.817-25.915)
Healthy	21	42	89	89	110	73.3		
Wastewater Management Channel								
Bad	38	76	37	37	75	50	0.000	5.392 (2.508-11.593)
Good	12	24	63	63	75	50		
Waste Treatment								
Bad	33	66	37	37	70	46,7	0.001	3,305 (1,621-6.737)
Good								

3.3 Multivariate Analysis

Multivariate analysis using multiple linear regression was carried out to assess which variable was most correlated between the quality of environmental sanitation and the incidence of stunting among toddlers in the Kendal II Health Center Working Area.

The results showed that all variables produced a p-value < 0.25 so that all variables could be included in the multivariate analysis.

Table 4. The Most Influential Relationship between Environmental Sanitation and Stunting Incidents

Variabel	B	Sig	OR (95% CI)	Confidentce Interval
Waste Treatment	2,928	0,000	18,681	4,709-74,115
Ownership of latrines	2,066	0.001	7,896	2,319-26,887
Wastewater Management Channel	2,171	0,003	8,769	2,078-37,016

Based on Table 4, the results of multivariate analysis using logistic regression show that 3 variables have a significant relationship with the incidence of stunting in toddlers, namely waste processing, latrine ownership and SPAL management. The Nagerkerke R Square value = 0.497, meaning that the independent variable in the model explains that the incidence of stunting is 49.7%. Of these three factors, the incidence of stunting is most influenced by waste processing with a p-value of 0.000<0.05, so it can be concluded that the absence of rubbish bins and improper waste processing can cause the breeding of insects or other animals, environmental pollution and cause the spread of disease.

Relationship between Waste Management and Stunting Incidents. Stunting can occur from several factors, one of which is that environmental sanitation, which lacks attention, can increase the prevalence of the risk of stunting in toddlers. Poor waste sanitation in the community is due to people's attitudes and habits towards waste management, causing the quality of public health to decline [12]. Based on this research, there is a relationship between environmental sanitation, namely waste processing, and a significant risk of stunting, with a p-value 0.000 < 0.05 (OR = 18.681), so it can be stated that poor waste processing has a big influence on increasing the prevalence of stunting cases. This is in line with research Linda Risyati [13] where the percentage of stunting cases in toddlers due to poor sanitation conditions is greater than in toddlers who are not stunted (p-value = 0.009 with OR = 3.640) [13, 14] and research conducted by Mayangsari et al (2021) [15] all shows that there is a relationship between household waste management and the incidence of stunting, this is caused by inadequate waste management and becomes a means of spreading disease within the family and surrounding community [16]. From the results of observations that have been made in residential areas in the Kendal II Community Health Center, animals or insects are often found around the kitchens of houses because the waste containers used do not have lids and are not watertight, thus causing many insects and nuisance animals to breed there. The low level of waste management in the working area of the Kendal II Public Health Center is evidenced by the findings of cases such as diarrhea in toddlers. Each respondent needs to have a place for waste disposal and processing, this is expected to prevent

the spread of disease. Studies say that if sanitation is paid attention to, especially waste disposal facilities and waste processing, vectors and other pests can be avoided and the risk of spreading disease can be minimized. This can make children less susceptible to disease and reduce stunting [9, 14]. Apart from that, it was still found that the houses of respondents who had stunted toddlers had rubbish strewn around which made them unsightly. The waste collection process is the responsibility of every respondent who produces waste and does not dispose of waste in ditches/culverts or rivers [17].

Relationship between Toilet Ownership and Stunting Incidents. A healthy latrine is a place to dispose of large and small water that is clean, healthy and does not facilitate the spread of disease, either directly or indirectly. Besides that, it must be able to minimize the presence of vectors that have the potential to carry disease [18, 19]. Feces disposal is a major concern in achieving a level of environmental health that is categorized as adequate. There are many problems currently occurring in the community regarding the limited space in yards, making it increasingly difficult for the minimum distance between a septic tank and a clean water source where the requirements for a healthy latrine are at least 10 meters and do not cause odors [14]. The results of research that has been carried out directly show that the majority of respondents' family latrines experienced stunting at 58%. The results of the analysis show that the p-value is 0.001 < 0.05, meaning that latrine ownership has a significant relationship with the incidence of stunting in toddlers. Most of the people still do not have proper latrines. The results of the regression analysis show that people who do not have a toilet are at risk 7,896 times compared to respondents who have a healthy toilet. If the use of latrines is not good and the community still disposes of feces carelessly, it can contaminate the environment, thereby facilitating the transmission of pathogens originating from feces [20]. Toddlers who get sick easily can have an impact on the nutritional intake of the body so they will experience weight loss due to a lack of food intake that is absorbed by the toddler. If this happens continuously it can lead to chronic nutrition so that toddlers are stunted in growth [21]. This is in line with the explanation that toilet cleanliness is the main concern in handling stunting in toddlers, starting from making construction that meets health requirements, minimizing the practice of open defecation, disposing of toddler feces in toilets and continuing to maintain the cleanliness of latrines while still paying attention to certain nutritional interventions for toddlers [22, 23].

Relationship between Wastewater Management Facility and Stunting Incidents. Wastewater is the result of both domestic and other activities that are disposed of in a liquid form that has been contaminated and is generally hazardous to human health and can affect the life expectancy for a healthy life [24]. The results showed that most of the owners of wastewater disposal facilities did not meet the requirements of as many as 38 respondents (76%). The regression results show that wastewater disposal facilities have a relationship with the incidence of stunting in children under five, this can be seen in the p-value of 0.003 <0.05 and OR = 8.769. This means that the availability of sewerage channels in households has the potential to be 8.769 times more at risk of stunting than respondents who have sewerage channels. Inadequate sewerage can

become a breeding ground for disease and insects and other animals can live in areas filled with dirty water, thereby polluting the environment and causing various environmental diseases, one of which is stunting [19]. The results of this study are also in line with property Rani Mariana (2019) which shows that there is a relationship between ownership of sewerage channels (p-value 0.041 <0.05) and stunting [25]. Most of the respondents still channeled the wastewater directly into the gutters/culverts and surrounding rivers, while the respondents directly disposed of the wastewater which immediately flowed into the yard of the house, causing stagnant water around the house. Inadequate wastewater drainage can become a breeding ground for disease and insects and other animals can live in dirty places with standing water, polluting the environment and causing various environmental diseases such as stunting [26, 27]. Waste processing installations can be in the form of trenches or pipes used to drain waste from water sources. Depending on the source, the composition of wastewater at certain times and places varies greatly [28]. Protection of household liquid waste is the implementation of processing activities of household waste originating from laundry, bathroom and kitchen activities, which can meet environmental hygiene quality standards and health requirements and break the chain of disease transmission [29].

4 Conclusion

The conclusion of this study shows that environmental sanitation such as waste management, latrines ownership and inadequate sewerage has a relationship with the incidence of stunting in toddlers in the working area of the Kendal II Health Center, Kendal Regency, Indonesia. The results of each variable show that the p-value is <0.05.

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