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THE RELATIONSHIP BETWEEN ENVIRONMENTAL SANITATION AND THE INCIDENCE OF STUNTING IN TODDLERS

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ABSTRACT

Stunting is a condition of growth failure in infants (0-11 months) and toddlers (12-59 months) due to chronic malnutrition, especially during the first 1,000 days of life, resulting in children being too short for their age. Poor environmental sanitation can cause infectious diseases in toddlers, which can disrupt the digestive process in nutrient absorption and may lead to long-term stunting. The aim of this study is to determine the relationship between environmental sanitation factors and the incidence of stunting in toddlers. This observational analytical study used a case-control approach. The sample consisted of toddlers living in the Liliba Sub-district, totaling 74 toddlers: 37 cases (stunted) and 37 controls (not stunted). The research variables were wastewater management, availability of latrines, and handwashing habits. Data were collected by interview using questionnaire. The analytical test that will be used is the chi-square test. Data analysis was conducted using the chi-square test. The research results indicate a significant relationship between wastewater management (p=0.011), availability of toilets (p=0.040), and handwashing habits (p=0.011) with the incidence of stunting. Given the link between household wastewater management, toilet availability, handwashing habits, and the occurrence of stunting.

Keywords: handwashing; stunting; toilet; wastewater

INTRODUCTION

Stunting is a condition of growth failure in infants (0-11 months) and toddlers (12-59 months) due to chronic malnutrition, especially in the first 1,000 days of life, causing the child to be too short for their age. (Ramayulis, Kresnawan, Iwaningsih, 2018). Stunting is a very important public health problem because it has a significant impact on the quality of human resources in a generation (Helmyati, Atamaka, Wisnusanti, 2020).

In Indonesia, the incidence of stunting is still very high, with the prevalence of stunting also remaining high (more than 20%), making it a current public health issue. The government aims to reduce the prevalence of stunting to 14 percent by 2024, whereas in 2019 it reached 27.6 percent (Basic Health Research 2019) and decreased to 21.6 percent in 2023. Stunting will affect the quality of human resources. In children with stunting, body organs do not grow and develop optimally. Poor nutrition and low health levels will hinder brain development, which can reduce the brain's ability to record, absorb, produce, and reconstruct information. Therefore, providing psychosocial stimulation and diverse dietary care is necessary for toddlers to improve stunting (Akbar, 2022).

Stunting is caused by various factors, including parenting patterns, mother's education, mother's knowledge, genetics, energy adequacy levels, and history of infectious diseases. (Mizobe et al., 2013). Another factor that affects stunting in toddlers is poor environmental sanitation, which includes sanitation and the provision of clean water, handwashing habits with soap, defecation behavior, air circulation in the home, and natural lighting in the home, as well as lack of access to clean water and poor sanitation, which can increase the incidence of stunting (Neherta, Deswita, 2023).

Poor environmental sanitation can lead to infectious diseases in toddlers, such as diarrhea and worm infections, which can interfere with the digestive process during nutrient absorption. If this condition persists for a long time, it can result in stunting problems. Poor hygiene and sanitation behavior, as well as unsafe drinking water, play a role in the occurrence of diarrhea, which leads to worm infections (Sidauruk, Anwar, 2023).

In the city of Kupang, the prevalence of stunting decreased from 2022 to 2023. In 2022, stunting in Kupang city was at 21.5% or 5,497 stunted toddlers, with a community participation rate of 93%. By 2023, the stunting rate in Kupang had dropped to 17.2% or 4,019 stunted toddlers, with community participation at 96.1% (Olla, 2023). The purpose of this study is to examine the relationship between environmental sanitation and the incidence of stunting in toddlers.

METHOD

This study uses a case-control design, which is an analytical observational epidemiological study that examines the relationship between certain effects (diseases or health conditions) and specific risk factors. The case-control study design can be used to assess the extent to which risk factors play a role in the occurrence of diseases. The variables of this study are drinking water sources, drinking water treatment, wastewater management, availability of toilets, handwashing habits, adequacy of water intake, and E. coli content. The samples in this study consist of the total population, which is 37 toddlers identified as stunted and 37 non-stunted children to serve as controls. Inclusion criteria are families with children under 5 years old (toddlers), families whose water sources come from dug wells, piped water, or refillable bottled water (gallon), and families whose children consume inadequate amounts of water/ Data Analysis. The analytical test that will be used is the chi-square test to determine the analysis of the relationship between Environmental Sanitation and the incidence of Stunting in Toddlers in Liliba Village in 2024.

RESULT AND DISCUSSION

This study shows that none of the parents or caregivers in the case group had ever received a college education, while in the control group there were 5.4% who had a diploma III education dan 10.8 had 1 bachelor education, as seen in Table 1.

Table 1.
Distribution of Toddler Parents' Characteristics (education, and occupation)

Characteristics of parents	Cases		Control	
	f	%	f	%
Education				
elemntary school	18	48.6	13	35.1
Junior high school	8	21.6	7	18.9
Senior high school	11	29.7	11	29.7
Diploma III	0	0	2	5,4
Bachelor	0	0	4	10.8
Work				
Unemployed	0	0	0	0
Farmer/fisherman/laborer	23	62.1	20	54.0
Entrepreneur	11	29.7	8	21.6
Civil servant/military/Police	0	0	6	16.2
Others	3	8.1	3	8.1

Table 1 also shows that the most common occupation was farmer/fisherman/laborer, with 23 (62.1%) in the case group and 20 (54.0) in the control group.

Table 2.

Distribution of Frequency Characteristics by Gender, Birth Weight, and Toddler Age

characteristics of toddlers	Cases		Control	
	f	%	f	%
Gender				
Laki-Laki	15	40.5	16	43.2
Perempuan	22	59.4	21	56.7
Birth Weight				
≥2500gr	31	83.7	37	100
<2500gr	6	16.2	0	0
Age (month)				
0-6	0	0	0	0
7-12	0	0	0	0
1-3	25	67.5	25	67.5
4-8	12	32.4	12	32.4

Based on the data from the table, there are more female toddlers, with the case group totaling 22 (59.4%) and the control group totaling 21 (56.7%). Next, for birth weight ≥2500g, the case group had 31 (83.7%) and the control group had 37 (100%). Then, for toddlers aged 1-3 years, both the case and control groups had the same value, which was 25 (67.5%), as seen in table 2.

Table 3.
The relationship between environmental sanitation and the incidence of stunting

Variables	Cases		Control		p value	OR
	f	%	f	%		
Wastewater management						
Eligible	0	0	6	16.2		
Not Eligible	37	100	31	83.8	0.011	0.011
Availability of toilets						
Qualify	33	89.1	37	100		
Not eligible	4	10.8	0	0	0.040	0.040
hand washing habits						
Qualify	0	0	6	16.2		
Not eligible	37	100	31	83.8	0.011	0.011

Table 3 shows a bivariate analysis between environmental sanitation and stunting incidence where the p value of wastewater management = 0.011, availability of toilets = 0.040, hand washing habits = 0.011.

The short-term impacts of stunting are disrupted brain development, intelligence, physical growth disorders, and metabolic disturbances in the body, while the long-term impacts of stunting include decreased cognitive abilities and academic performance, and reduced immunity. (Wahyu,Ginting, 2022), therefore, stunting must be prevented from the beginning, starting from pregnancy. The risk factors for stunting are family and household factors, dietary factors, and the presence of infectious diseases. Family and household factors are divided into maternal factors and environmental factors, where environmental factors include inadequate sanitation and water supply, limited access to and availability of food, and others (Burhan, Kusdalinah, Nugraheni, Andriani, 2023).

The Relationship Between Wastewater Treatment and Stunting Incidence

Based on the results of the study conducted on the case-control group, 100% of respondents had drinking water treatment that met the requirements. The chi-square statistical test results obtained a p-value of 0 ($p \leq 0.05$), so H0 was accepted and H0 was rejected, meaning there was no relationship between drinking water treatment and stunting incidence in Liliba Village in 2024. This study is in line with research conducted by Rezki (2021) regarding the relationship between Environmental Health Factors and the

Incidence of Stunting in Toddlers in the Kassi Community Health Center Area of Makassar City in 2021, which stated that there was no relationship between drinking water sources and the incidence of stunting.

Household drinking water treatment, including boiling, is effective in killing microorganisms. Household drinking water treatment can improve the microbiological quality of drinking water through simple and affordable methods and reduce the incidence of diarrhea. Refill water, on the other hand, is essentially processed through filtration and disinfection. The filtration process is intended not only to separate suspended matter but also to separate colloidal compounds, including microorganisms, from the water. The disinfection process is intended to kill microorganisms that were not filtered by the previous process. This ensures that any pathogenic bacteria in drinking water are killed before consumption (Eka et al., 2021).

The Relationship between Wastewater Management and Stunting Incidence

Based on the results of the research that has been conducted in the case group, as many as (0%) respondents have Wastewater Management that meets the requirements, and 6 (16.2%) respondents in the control group have wastewater management that meets the requirements. The results of the chi-square statistical test obtained a p value of 0.011 ($p \leq 0.05$), meaning there is a relationship between wastewater management and the incidence of stunting in Liliba sub-district in 2024. This research is in line with research conducted by Hidayat (2023) which states that there is a relationship between wastewater management and stunting incidents. Soraya et al. also wrote that poor wastewater disposal channels are at high risk of causing stunting. This means there is a relationship between wastewater disposal facilities and the incidence of stunting (Soraya et al., 2022). This is because wastewater generated from kitchens and bathrooms is not disposed of through a proper drainage system. Instead, most households simply dump it, resulting in stagnant wastewater in their yards. Stagnant wastewater becomes a breeding ground for disease-causing microorganisms and a prime habitat for disease vectors such as cockroaches, flies, and mosquitoes. Poor waste management can pose a significant health risk. Some diseases caused by waste includediarrhea, typhus, cholera, and worms. Toddlers who experience repeated infections require more energy to fight disease. If this is not balanced with adequate nutrition, children will become malnourished and ultimately suffer from stunting.

The Relationship between Toilet Availability and the Incidence of Stunting

Based on the results of the study conducted in the case group, 33 (89.1%) respondents had latrines, and 4 (10.8%) respondents did not. Meanwhile, in the control group, all respondents (100%) had latrines. The chi-square statistical test results obtained a p-value of 0.040 ($p \leq 0.05$), so H0 was rejected and H0 was accepted, meaning there was a relationship between latrines availability and stunting incidence in Liliba Village in 2024. This is in line with research conducted by Rani Mariana (2021) on the relationship between water and basic sanitation and stunting incidence in the Yosomulyo Community Health Center, Metro Pusat District, Metro City, which stated a relationship between healthy latrines and stunting incidence.

Based on the research conducted, in the case group, the condition of the respondents' latrines could be said to be inadequate because some respondents lacked facilities, the floors and toilets were slippery, dirty, difficult to clean, and the floors were not waterproof. In the control group, all respondents had toilets with septic tanks, but some still faced risks, such as slippery floors that were difficult to clean. Unsanitary or risky toilets can transmit bacteria from feces to the human body through various sources, such as water, hands, insects, and soil, which can cause various diseases such as diarrhea, typhoid, cholera, and hepatitis. Toddlers with repeated infections require more energy to fight disease. If not balanced with adequate nutrition, children will become malnourished and ultimately lead to stunting.
Healthy, low-risk toilets are effective in breaking the chain of disease transmission. A healthy toilet

should have a toilet house, a waste disposal pit with a gooseneck or no gooseneck but with a lid, and a septic tank or pit. The toilet floor should be waterproof, non-slip, easy to clean, and have a wastewater drainage system. The high-risk toilets in both the case and control groups have led to a link between toilets and stunting. Therefore, attention is needed from all parties, especially families, regarding the importance of having a toilet connected to a septic tank, which is clean and easy to clean to avoid various kinds of diseases.

The Relationship Between Handwashing Habits and Stunting Incidence

Based on research conducted in the case group, 100% of respondents had handwashing habits that did not meet the requirements. In the control group, 6 (16.2%) respondents had handwashing habits that met the requirements, and 31 (83.7%) respondents had handwashing habits that did not meet the requirements. The results of the chi-square statistical test obtained a p-value of 0.304 ($p \leq 0.05$), so ho was rejected and ha was accepted, meaning there was a relationship between handwashing habits and the incidence of stunting in Liliba Village in 2024. This research is in line with research conducted by (Telan et al., 2022) which states that there is a relationship between handwashing habits and stunting. This is because handwashing habits affect the personal hygiene of toddler caregivers, namely mothers, who constantly interact with their toddlers. Based on observations, mothers as toddler caregivers do not wash their hands when feeding their toddlers, cleaning their children's diapers, or after defecating. This allows bacteria excreted through feces to stick to their hands, such as E. coli, which can cause watery and even bloody diarrhea, fever, nausea, and vomiting.

Handwashing with soap is an important practice. Inadequate handwashing practices include washing with water only or washing with soap without running water or clean water. Handwashing with soap should be done every time our hands are dirty, such as after defecating, after cleaning a baby or child's diaper, after defecating and urinating, before eating, and before feeding a child (Kementerian Kesehatan RI, 2010). Washing hands with soap and running water can break the chain of germs attached to the fingers. For optimal results, hands should be washed with clean running water, whether from a tap or poured with a dipper, using standard soap, and then dried with a clean towel or tissue (Kementerian Kesehatan RI, 2010).

Water is very important for humans because it plays many roles in human life. Clean water is widely used for daily needs such as drinking, cooking, washing, bathing, and so on. In fact, humans will die faster from a lack of water than from a lack of food (Marlinae, Khairiyati, Rahman, 2019). Water can also be beneficial in breaking the chain of infectious disease transmission, as long as the water meets clean water quality standards. If you wash your hands with unclean water, for example water containing Escherichia coli, your hands will still be dirty because they are still contaminated with E. coli and still at risk of spreading digestive tract diseases such as diarrhea. Therefore, the E. coli content in clean water should be 1 per 100 ml of water.

CONCLUSION

This study shows a significant relationship between stunting incidence and wastewater management (p=0.011), toilet availability (p=0.040) and handwashing habits (p=0.011). The association between household wastewater management, toilet availability, handwashing habits, and stunting suggests that environmental sanitation also plays a role in stunting in toddlers.

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