



THE RELATIONSHIP BETWEEN ENVIRONMENTAL SANITATION AND THE INCIDENCE OF DIARRHEA IN TODDLERS IN HAMLET III RUGEMUK VILLAGE, LABU BEACH, DELI SERDANG

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Abstrak

Environmental sanitation is an important factor in the prevention of diseases, including diarrhea in toddlers. Hamlet III of Rugemuk Village in Deli Serdang has sanitation challenges that can affect public health. The purpose of the study was to determine the relationship between environmental sanitation and the incidence of diarrhea in toddlers in Hamlet III Rugemuk Village, Labu Beach, Deli Serdang. This study is a quantitative study with a cross sectional design, the population of this study is all mothers who have toddlers as many as 107 people. The sampling technique uses simple random sampling with representatives of mothers who have 51 toddlers. This study was analyzed by univariate and bivariate analysis using the chi-square test. The instrument used was a questionnaire. The results of the study found that there was no statistically significant relationship between the type of clean water facilities and the incidence of diarrhea (p -value = 1.103), there was a statistically significant relationship between the condition of family toilet facilities and the incidence of diarrhea (p -value = 0.047), there was a relationship between the condition of eligible waste disposal facilities and the incidence of diarrhea (p -value = 0.006), there was a relationship between the condition of wastewater disposal facilities and incidence of diarrhea (p -value = 0.001). Thus, it can be concluded that family latrines, garbage disposal facilities, and wastewater disposal facilities have a significant relationship with the incidence of diarrhea, while the relationship with clean water facilities is not statistically significant. In an effort to improve environmental sanitation, it is important for the surrounding community to improve family latrines, manage qualified waste and wastewater and carry out effective counseling.

Keywords: Diarrhea, Clean Water Facilities, Family Latrine Facilities, Wastewater Disposal Facilities, Waste Disposal Facilities

Introduction

Environmental sanitation is an effort to prevent diseases through the control of environmental risk factors, both physical, chemical, biological and social, which are the source chain of transmission, exposure and contamination of diseases and health disorders (Decree of the Minister of Health, 2021). The concept of sanitation also includes the maintenance of hygiene through waste management and liquid waste treatment. Environmental health related to sanitation has a significant impact on people's well-being. Poor sanitation conditions will have a negative impact on all aspects of life that are very vulnerable, such as a decrease in the quality of human life, water sources become polluted, the emergence of various diseases such as diarrhea, especially for toddlers (Maliga & Darmin, 2020).

Based on the 2022 National Socio-Economic Survey (Susenas), the Central Statistics Agency (BPS) recorded the percentage of households that have access to proper sanitation in Indonesia at

80.92%. The percentage of households that have access to proper sanitation in North Sumatra in 2022 is 82.30%. However, this still does not reach the target set in the 2020-2024 RPJMN, which is 90%. According to WHO, low access to sanitation is one of the causes of diarrhea. This is in accordance with Bloom's theory which states that the degree of public health is determined by environmental factors, behavior, health services, and hereditary factors (Hastia & Ginting, 2019).

Diarrheal disease is an endemic disease that has the potential to cause Extraordinary Events (KLB) and is still the cause of death, especially in toddlers in Indonesia. The results of the 2018 Basic Health Research show that the prevalence of diarrhea for all age groups is around 8%, while for toddlers it reaches 12.3%, and in infants around 10.6%. Meanwhile, based on *the 2018 Sample Registration System*, diarrhea remains one of the leading causes of death in neonates with a percentage of about 7%, and in infants aged 28 days reaches 6%. (Source: Directorate General of P2P, Ministry of Health of the Republic of Indonesia, 2023).

In a report by the Central Statistics Agency of North Sumatra Province, the number of reported diarrhea cases reached 70,243 cases. In the data, Deli Serdang stands out as the area with the second highest number of diarrheal incidents after the city of Medan in North Sumatra, recording 15,185 cases. (Source: North Sumatra Provincial Health Office, 2020).

Based on data from the Labu Beach Health Center, the number of diarrhea cases recorded in 2023 has experienced significant monthly fluctuations. In January, there were 129 cases of diarrhea, which increased to 146 cases in February. March showed a slight decline with 127 cases, followed by a further decline in April with 112 cases. In May, there was a slight increase to 118 cases, but declined again in June with 101 cases, which is the lowest number in the entire year. Cases increased again in July with 124 cases, then decreased again in August and September with 110 and 88 cases, respectively. October recorded a significant surge with 146 cases, the highest number along with February. In November, the number of cases dropped again to 127, and December closed the year with 112 cases. Overall, the total number of diarrhea cases recorded throughout 2023 reached 1,440 cases. (Labu Beach Health Center, 2023)

In 2024, the Pantai Labu Health Center recorded a much lower number of diarrhea cases compared to the previous year. In January, there were 28 cases of diarrhea, while February showed an increase with 45 cases. March recorded a decline again with 35 cases. (Labu Beach Health Center, 2024)

Based on field observations of 10 people, it was found that the bathroom was built with construction materials that were susceptible to damage, such as bamboo and burlap sacks, and was not equipped with a protective roof. This results in liquid waste from the bathroom being dumped directly around, contaminating groundwater and triggering the growth of bacteria that have the potential to cause diseases such as diarrhea. In addition, solid waste management is also still not optimal, shown by the habit of residents who throw garbage carelessly in various places and do not have garbage cans around the house. The purpose of this study is to determine the relationship between environmental sanitation and the incidence of diarrhea in toddlers in Hamlet III Rugemuk Village, Labu Beach, Deli Serdang

Research Methods

This study is a quantitative research with an analytical approach using a cross sectional design. The population consists of mothers who have toddlers in Hamlet 3 Rugemuk Village, with a total population of 107 people. The sampling technique uses Simple Random Sampling with the Lemeshow formula so that the research sample totals 51 people. Data collection is carried out through observation sheets. The research instrument is a questionnaire. The data collection technique was by interviewing respondents using a questionnaire. The data was analyzed using Chi-square. For the significance of the statistical calculation results, the meaning limit (degree of confidence) of 0.05 is used. Rejection of the

hypothesis if the p-value is <0.05 which means there is a meaningful relationship (HO is rejected). Meanwhile, if the p-value > 0.05 , it means that there is no meaningful relationship (HO failed to be rejected).

Research Results

Table 1 Distribution of characteristics of respondents and toddlers

Characteristic	Sum	Percentage
Respond		
Status Responding		
Mother	51	100
Age of Respondents		
18-25 Years	8	15.7
26-35 Years	17	33.3
36-45 Years	22	43.1
>46 years	4	7.8
Respondent Education		
Not Finished	2	3.9
SD	31	60.8
SMP	7	13.7
SMA	11	21.6
Toddler		
Gender of Toddlers		
Legal Law	17	33.3
Woman	34	66.7
Toddler Age		
0-12 months	3	5.9
13-24 months	15	29.4
25-36 months	13	25.5
37-48 months	10	19.6
48-59 months	10	19.6
Total	51	100

The table presents the distribution of the characteristics of respondents and toddlers in a study. Of the total 51 respondents, all of them are mothers. In the age category of respondents, there was significant variation, with the majority of respondents aged 36-45 years (43.1%), followed by respondents aged 26-35 years (33.3%), 18-25 years old (15.7%), and the least respondents over 46 years old (7.8%). Based on education level, the majority of respondents have completed secondary education (60.8% of high school and 13.7% of junior high school), while a small number have not completed elementary school (3.9%) and the rest have completed elementary school (21.6%).

In the toddler group, there were 51 toddlers who were the subjects of the study, with almost the same gender ratio, namely 33.3% males and 66.7% females. The age of toddlers also has a diverse distribution, with the largest number in the age range of 13-24 months (29.4%), followed by 25-36 months (25.5%), 37-48 months (19.6%), and 0-12 months and 48-59 months at 5.9% and 19.6%, respectively.

Table 2 Univariate Data

Variable	Sum	Percentage
Clean Water Facilities		
Qualify	38	74.5
Not Eligible	13	25.5
Family Toilet Facilities		
Qualify	35	68.6
Not Eligible	16	31.4
Waste Disposal Facilities		
Qualify	9	17.6
Not Eligible	42	82.4
Wastewater Disposal Facilities		
Qualify	18	35.3
Not Eligible	33	64.7
Incidence of Diarrhea		
Suffer	33	64.7
Not Suffering	18	35.3
Total	51	100

Univariate analysis was performed for each variable in the table. For the Clean Water Facility variable, out of a total of 51 respondents, 38 (74.5%) have qualified clean water facilities, while 13 (25.5%) do not meet the requirements. The Family Toilet Facilities variable showed that out of a total of 51 respondents, 35 (68.6%) had eligible family toilet facilities, while 16 (31.4%) did not meet the requirements. Furthermore, the variable Waste Disposal Facilities showed that only 9 (17.6%) respondents had eligible waste disposal facilities, while 42 (82.4%) respondents did not meet the requirements. The Wastewater Disposal Variable showed that 18 (35.3%) respondents had qualified wastewater disposal facilities, while 33 (64.7%) did not meet the requirements. Finally, the Diarrhea Incidence variable showed that 33 (64.7%) respondents suffered from diarrhea, while 18 (35.3%) did not suffer from it.

Table 3 Bivariate Data

Variable	Incidence of Diarrhea				Sum		P-Value
	Suffer		Not Suffering		N	%	
	N	%	N	%			
Clean Water Facilities							
Qualify	22	57.9	16	42.1	33	100	1.103
Not Eligible	11	84.6	2	15.4	18	100	
Family Toilet Facilities							
Qualify	19	54.3	16	45.7	35	100	0.047
Not Eligible	14	87.5	2	12.5	16	100	
Waste Disposal Facilities							
Qualify	2	22.2	7	77.8	9	100	0.006
Not Eligible	31	73.8	11	26.2	42	100	
Wastewater Disposal Facilities							
Qualify	4	22.2	14	77.8	18	100	0.001
Not Eligible	29	87.9	4	12.1	33	100	

The analysis of the table showed the relationship between the incidence of diarrhea and four different sanitation variables, namely clean water facilities, family latrine facilities, garbage disposal facilities, and wastewater disposal facilities. The table provides an overview of the number of

respondents who suffer from diarrhea and those who do not, depending on whether they have qualified sanitation facilities or not.

In the analysis of clean water variables, it was seen that out of a total of 33 respondents who had qualified clean water facilities, 22 of them suffered from diarrhea (57.9%), while of the 16 respondents who did not have qualified clean water facilities, 11 of them suffered from diarrhea (84.6%). Although there was a difference in the proportion of diarrhea incidence between the two groups, the results of the statistical test showed that the p-value was 1,103, indicating that there was no significant relationship between the type of clean water facilities and the incidence of diarrhea.

Meanwhile, in the analysis of family latrines variables, it was seen that out of a total of 35 respondents who had eligible family latrines, 19 of them suffered from diarrhea (54.3%), while of the 16 respondents who did not have eligible family latrines, 14 of them suffered from diarrhea (87.5%). A p-value of 0.047 indicates a significant relationship between the type of family toilet facilities and the incidence of diarrhea.

Then, in the analysis of waste disposal variables, it was found that out of a total of 9 respondents who had qualified waste disposal facilities, only 2 of them suffered from diarrhea (22.2%), while of the 42 respondents who did not have qualified waste disposal facilities, 31 of them suffered from diarrhea (73.8%). The results of the statistical test showed a p-value of 0.006, indicating a significant relationship between the type of waste disposal facility and the incidence of diarrhea.

Finally, in the analysis of wastewater disposal variables, it was found that out of a total of 18 respondents who had qualified wastewater disposal facilities, 4 of them suffered from diarrhea (22.2%), while of the 33 respondents who did not have qualified wastewater disposal facilities, 29 of them suffered from diarrhea (87.9%). The results of the statistical test showed a p-value of 0.001, indicating a significant relationship between the type of wastewater disposal facility and the incidence of diarrhea.

Discussion

1. The Relationship between Clean Water Facilities and the Incidence of Diarrhea

Clean water facilities are one of the important aspects of public health. The availability of sufficient and safe clean water is a key prerequisite for maintaining health, preventing disease, and improving the quality of life. Clean water facilities include various facilities and infrastructure that ensure public access to clean and suitable water for consumption.

In Rugemuk Village, the community relies on Drinking Water Supply (PAM) as the main means of getting clean water supply. PAM is the main source of clean water for the villagers, meeting their daily needs for water for drinking, cooking, and other household needs. With the PAM system, the people of Rugemuk Village can access clean water more easily and comfortably without having to rely on shallow wells or traditional springs. This not only increases the overall availability of clean water but also helps in maintaining the health and cleanliness of the environment, which is an important factor in preventing diseases and improving the quality of life of the local community. However, the maintenance and maintenance of the PAM system is the shared responsibility of the community, so good management is needed to ensure the smooth supply of clean water in Rugemuk Village.

Based on the data obtained, out of a total of 33 respondents who had qualified clean water facilities, 22 of them suffered from diarrhea (57.9%), while of the 16 respondents who did not have qualified clean water facilities, 11 of them suffered from diarrhea (84.6%). The proportion of diarrhea incidence tends to be lower among respondents who have qualified clean water facilities compared to those who do not. However, the results of the statistical test showed that the p-value was $1.103 > 0.05$, which indicates that this difference is not statistically significant.

Although there was no statistically significant relationship between the availability of clean water facilities and the incidence of diarrhea based on the p-value, the proportion of respondents suffering

from diarrhea still had a significant difference between the two groups. This suggests that although not statistically significant, there is a tendency that respondents who do not have qualified clean water facilities tend to have a higher risk of developing diarrhoea compared to those who have qualified clean water facilities.

2. The Relationship Between Healthy Toilets and the Incidence of Diarrhea

According to the regulation of the Minister of Health Regulation number 3 of 2014 concerning Community-Based Total Sanitation (STBM), latrines that are considered healthy are those that meet building standards and certain health criteria. The health criteria include the absence of the potential spread of hazardous materials from human fecal disposal and the ability to prevent disease vectors from spreading the infection to latrine users and the surrounding environment.

There are several types of healthy latrines, namely sharing/communal latrines, Semi-Permanent Healthy Latrines (JSSP), and Permanent Healthy Latrines (JSP). Sharing/communal latrines are latrine facilities that are shared by the community (more than one family). JSSP does not yet have a gooseneck structure, but it has a cover and is located inside the house. Meanwhile, JSP is a latrine that has been equipped with a gooseneck construction and installed in the house. In 2022, the percentage of households in Indonesia that use JSP reached 72.5%. Meanwhile, 18.7% use JSSP and 8.7% use shared/communal latrines. (Source: Directorate General of Disease Prevention and Control, Ministry of Health of the Republic of Indonesia, 2023)

Overall, nationally, 80.92% of households have access to adequate sanitation (Healthy Toilets). In North Sumatra Province, the percentage of access to sanitation reached 82.30%. (Source: Central Statistics Agency, Housing and Environmental Health Indicators 2022)

In this study, the category of healthy latrines is divided into two, namely qualified and unqualified. The majority of people have odorless latrines (72.5%), indicating that most respondents have latrines that do not have significant odor problems. Second, most of the latrines (70.6%) have met hygiene standards by not being touched by insects or rats, indicating relatively good sanitary conditions. Third, the majority of latrines (78.4%) are equipped with septictanks, which is a positive sign in domestic waste management. Fourth, most of the latrines (72.5%) do not contaminate the surrounding soil, indicating an effort to protect the surrounding environment. Fifth, most of the latrines (74.5%) are easy to clean which is an important factor in maintaining hygiene. Sixth, the majority of respondents (74.5%) feel safe using toilets, showing confidence in the quality and safety of the facility. Seventh, more than half (64.7%) of latrines are equipped with protective walls and roofs that help protect users from external weather and maintain cleanliness.

In conclusion, the results of this analysis show that most of the latrines in the area have conditions that meet fairly good sanitation standards, but there are still some aspects that need to be considered to improve the quality and cleanliness of the latrines, such as improving lighting and making floors and walls more waterproof.

Based on the table, out of a total of 35 respondents who had eligible family latrines, 19 of them suffered from diarrhea (54.3%), while of the 16 respondents who did not have eligible family latrines, 14 of them suffered from diarrhea (87.5%). The proportion of diarrhoea incidence tended to be lower among respondents who had eligible family latrines compared to those who did not.

The results of the statistical test showed that the p-value was $0.047 < 0.05$, which showed a statistically significant relationship between the availability of eligible family latrines and the incidence of diarrhea. From these results, it can be concluded that respondents who have eligible family latrines tend to have a lower risk of developing diarrhea compared to those who do not. Therefore, increasing the availability of eligible family latrines can be an important step in efforts to prevent diarrheal diseases in the community.

3. The Relationship between Waste Disposal Facilities and the Incidence of Diarrhea

In this study, the category of waste disposal facilities is divided into two, namely qualified and unqualified. From the results of the analysis, several findings can be identified. First, the majority of respondents (62.7%) do not have garbage cans, indicating that there are potential problems in waste management in the area. Second, almost all bins (92.2%) are not equipped with covers which can increase the risk of odor spread and disease transmission. Third, the majority of trash cans (74.5%) are not disposed of every day which can result in the accumulation of garbage and increase environmental health risks. Fourth, most of the trash cans (80.4%) leak which can pollute the surrounding environment and invite insects and other nuisance animals. Fifth, the majority of household waste (84.3%) is not disposed of in landfills, indicating a deficiency in the waste management system in the area. Sixth, most landfills are less than 10 meters away from drinking water sources (66.7%) which can increase the risk of drinking water contamination by garbage and waste.

In conclusion, the results of this analysis show that there are problems in waste management in the area, such as the lack of garbage cans, the lack of regular disposal activities, and the lack of separation between household waste and hazardous waste. This shows the need for efforts to increase awareness and better waste management practices in local communities, as well as improve infrastructure related to waste management.

From the data listed in the table, it can be seen that out of a total of 9 respondents who have qualified waste disposal facilities, only 2 of them suffer from diarrhea (22.2%), while of the 42 respondents who do not have qualified waste disposal facilities, 31 of them suffer from diarrhea (73.8%). The proportion of diarrheal incidence tends to be lower among respondents who have qualified waste disposal facilities compared to those who do not.

The results of the statistical test showed that the p-value was $0.006 < 0.05$, which indicates a statistically significant relationship between the availability of waste disposal facilities and the incidence of diarrhea. This shows that respondents who have qualified waste disposal facilities tend to have a lower risk of suffering from diarrhea compared to those who do not. Therefore, increasing the availability of qualified waste disposal facilities can be an important strategy in efforts to prevent diarrheal diseases in the community.

4. The Relationship Between Wastewater Disposal and the Incidence of Diarrhea

From the data obtained, several important findings can be concluded. First, the majority of respondents (66.7%) stated that their environment causes puddles that become nests for insects or mosquitoes. This indicates that there is a potential risk to the spread of diseases carried by insects or mosquitoes. Second, most respondents (60.8%) also reported that their environment emitted an unpleasant odor that could indicate sanitation problems or ineffective waste management. Third, the majority of respondents (62.7%) also complained that their environment caused humidity and unpleasant views indicating potential environmental health and comfort problems. Lastly, most of the liquid waste sewers (68.6%) are found to be unsealed which can increase the risk of environmental pollution by liquid waste.

In conclusion, the results of this analysis show that there are several problems in the surrounding environmental conditions that need to be addressed immediately, such as the handling of waterlogging, the management of unpleasant odors, humidity control, and the repair of liquid waste sewers. Remediation efforts and better management are needed to ensure that the environment remains clean, safe, and comfortable for local residents.

From the data presented in the table, it can be seen that out of a total of 18 respondents who have qualified wastewater disposal facilities, 4 of them suffer from diarrhea (22.2%), while of the 33 respondents who do not have qualified wastewater disposal facilities, 29 of them suffer from diarrhea

(87.9%). The proportion of diarrheal incidence tends to be lower among respondents who have qualified wastewater disposal facilities compared to those who do not.

The results of the statistical test showed that the p-value was $0.001 < 0.05$, which showed a statistically significant relationship between the availability of wastewater disposal facilities and the incidence of diarrhea. This means that there is a significant difference in the incidence of diarrhea between respondents who have qualified wastewater disposal facilities and those who do not. This suggests that respondents who have qualified wastewater disposal facilities tend to have a lower risk of suffering from diarrhea compared to those who do not. Therefore, increasing the availability of qualified wastewater disposal facilities can be an important step in efforts to prevent diarrheal diseases in the community.

Conclusion

The results of the data analysis showed important findings related to the relationship between environmental sanitation conditions and the incidence of diarrhea in toddlers in Ragemuk Village. First, there was no statistically significant relationship between the type of clean water facilities and the incidence of diarrhea (p-value = 1,103). This shows that the type of clean water facilities used does not have a significant relationship with the risk of diarrhea in toddlers. However, the second finding showed that there was a statistically significant relationship between the condition of family latrines and the incidence of diarrhea (p-value = 0.047). This indicates that the condition of family latrines plays an important role in determining the risk of diarrhea in toddlers. In addition, the third and fourth findings showed that there was a relationship between the condition of eligible waste disposal facilities (p-value = 0.006) and the condition of wastewater disposal facilities (p-value = 0.001) with the incidence of diarrhea in toddlers. Thus, it can be concluded that family latrines, garbage disposal facilities, and wastewater disposal facilities have a significant relationship with the incidence of diarrhea, while the relationship with clean water facilities is not statistically significant.

Suggestion

In an effort to improve environmental sanitation in Ragemuk Village, it is important for the surrounding community to improve family toilet facilities to improve the health of toddlers. Furthermore, qualified waste and wastewater management is needed to prevent the spread of diseases and maintain a balanced environmental quality. In addition, effective counseling needs to be carried out to increase public awareness of the importance of environmental sanitation quality in preventing diarrhea. This can be done by providing information on how to manage family latrines, waste management, and good wastewater. Thus, the community is more aware and willing to participate in maintaining the quality of environmental sanitation.

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