

# THE RELATIONSHIP BETWEEN ENVIRONMENTAL SANITATION WITH THE EVENT OF DIARRHEA IN TODDLERS

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## ABSTRACT

The purpose of this study was to determine the relationship between the environment and the incidence of diarrhea in children under five in the working area of the Nogosari Public Health Center, Boyolali Regency. This research method uses an observational design with a cross sectional approach. The subjects of this study were housewives who had toddlers and had suffered from diarrhea with a population of 328 people. The results showed that there was a relationship between drinking water sources ( $p = 0.001$ ), latrine ownership ( $p = 0.018$ ), type of house floor ( $p = 0.001$ ). 0.036) with the incidence of diarrhea in children under five and there is no relationship between the physical quality of clean water ( $p = 0.307$ ) with the incidence of diarrhea in children under five.

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## 1. INTRODUCTION

Diarrhea is still one of the main causes of morbidity and mortality. Almost all geographical areas of the world and all age groups are attacked by diarrhea, but severe disease with high mortality is mainly found in infants and children under five[1]. In North America, children suffer from diarrhea more than 12 times per year, while according to Zubir, diarrhea causes death by 15-34% of all deaths, approximately 300 deaths per year. Based on the results of Ratnawati's research, 35% of all under-five deaths are caused by acute diarrhea[2], [3]. In Indonesia, the diarrhea morbidity rate in 2002 was 6.7 per 1,000 population, while in 2003 it increased to 10.6 per 1,000 population. The death rate from diarrhea is still quite high. The National Health Survey shows that diarrhea is the second leading cause of death, namely 23.0% in infants and number three, which is 11.4% in infants.[4]. The coverage of diarrhea finding in Central Java has increased from 2005 to 2007 although it is still below the expected (100%) which is 80%. This is because the discovery of diarrhea sufferers has not been maximized by cadres, health centers, private and government hospitals. The number of cases of diarrhea in children under five every year on average is above 40% of the total coverage of diarrhea sufferers, namely in 2006 it was 40.6% and in 2007 it was 48.1%.

Based on data from the Boyolali District Health Office, the number of diarrhea sufferers was 16,489 cases, for diarrhea in toddlers it was 4,259 cases. Diarrhea is an environment-based disease. Several factors related to the incidence of diarrhea are inadequate supply of clean water, water contaminated with feces, lack of hygiene facilities (unhygienic disposal of feces), poor personal and environmental hygiene, undercooked food preparation and storage of cooked food at room temperature that is not should[5]. Many factors are directly or indirectly driving the occurrence of diarrhea, namely agent, host, environmental and behavioral factors[6]. Environmental factors are the most dominant factors, namely the means of providing clean water and disposal of feces, both factors interact with human behavior. If environmental factors are not healthy because they are contaminated with diarrhea germs and accumulate with unhealthy human behavior, then diarrhea transmission can easily occur[7].

Based on the results of the study, it was found that there was a significant relationship between diarrheal illness and clean water sources, latrine ownership, type of floor, house lighting and house

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ventilation.[8]. Rahadi concluded that there was a relationship between latrine ownership, SPAL distance, type of floor and the incidence of diarrhea[9]. Based on the results of Wibowo's research[10], it is known that there is a significant relationship between the occurrence of diarrhea with feces disposal and the type of drinking water source. Puskesmas Nogosari is one of the areas where the number of diarrhea sufferers has increased from 2007-2008 as many as 660 people to 837 people. Based on data from the Nogosari Health Center, the number of children with diarrhea in children under five in Nogosari District in 2007 was 181 children, in 2008 there were 293 children under five, while in 2009 there were 328 children. Based on the description above, the researcher is interested in conducting research on the relationship between environmental sanitation and the incidence of diarrhea in children under five in the Nogosari Public Health Center, Boyolali Regency.

## **2. METHOD**

### **2.1 Research Type and Design**

This research is a research in the form of an observational survey with a cross-sectional approach, which is a study conducted by observing for a moment or within a certain time period and each study subject is only made one observation during the study. The subjects of this study were all houses in which there were toddlers and had suffered from diarrhea in the working area of the Nogosari Public Health Center, Boyolali Regency.

### **2.2 Inclusion and exclusion criteria**

Inclusion criteria are general characteristics of research subjects that are eligible for research or as respondents. The inclusion criteria in this study were:

- a. All houses in which there are children under five and have suffered from diarrhea.
- b. Is a house that is domiciled (lived permanently) and has a house in the working area of the Nogosari Health Center, Boyolali Regency.

Exclusion criteria are research subjects who cannot represent the sample because they do not qualify as research samples. Exclusion criteria in this study are:

- a. All houses in which there are no toddlers and or there are toddlers but who have never suffered from diarrhea.
- b. One house in which there are more than one family who has a toddler and does not have a livestock barn who suffers from diarrhea.
- c. Not a house that is domiciled (lived permanently) and has a house in the working area of the Nogosari Health Center, Boyolali Regency.
- d. Not willing to be a research subject or a respondent.

### **2.3 Population and Sample**

The population in this study were all houses that had toddlers and had suffered from diarrhea who lived in the working area of the Nogosari Public Health Center, Boyolali Regency, as many as 328 toddlers. The sampling technique used in this study is using Simple Random Sampling, which is a random sampling method in which each population has an equal chance of being selected as a sample.

### **2.4 Research Variables and Data Collection**

The research variable using the independent variable in this study is environmental sanitation which includes drinking water sources, physical quality of clean water, latrine ownership and type of house floor. The type of data in this study is quantitative data, obtained from interviews using questionnaires and direct observations regarding the source of drinking water, the physical quality of clean water, the ownership of the latrine and the type of floor of the house.

## **3. RESULTS AND DISCUSSION**

### **3.1 Characteristics of Respondents**

This study aims to determine the relationship between environmental sanitation and the incidence of diarrhea in children under five in the working area of the Puskesmas Nogosari, Boyolali Regency. The number of research respondents was 60 people. The discussion on the characteristics of respondents is used to find out the general description of respondents based on age, occupation, education, age of toddlers and gender of toddlers.

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## 1. Age

Characteristics of respondents based on the age of 60 respondents were grouped into 3 parts, namely less than 20 years, 20-35 years and age more than 35 years. The age group results are shown in Table 1.

Table 1. Frequency Distribution of Respondents by Age Group

Respondent Age	f	(%)
< 20 years	1	1.7
20-35 years old	54	90.0
> 35 years old	5	8.3
Total	60	100

Based on Table 1, it is known that the majority of respondents are aged between 20-35 years, as many as 54 respondents (90%), and the minimum age is less than 20 years, namely one respondent (1.7%).

Table 2. Frequency Distribution of Respondents by Type of Work

Job Responder	f	(%)
civil servant	1	1.7
entrepreneur	7	11.7
Private	12	18.3
Farmer	4	6.7
Housewife	34	56.7
Laborer	2	3.3
Total	60	100

Based on Table 3, it is known that the type of work of the respondents is mostly housewives, as many as 34 respondents (56.7%) and the least is working as a civil servant, which is one respondent (1.7%).

Table 3. Frequency Distribution of Respondents Based on Education Level

Education Respondents	f	(%)
SD	8	13.3
junior high school	16	26.7
senior High School	34	56.7
Bachelor	2	3.3
Total	60	100

Based on Table 4, it is known that the education level of the most respondents is SMA, which is 34 respondents (56.7%) and the least is undergraduate education, which is as many as two respondents (3.3%).

Table 4. Frequency Distribution of Respondents by Age

Respondent Age of toddler	f	(%)
0.5-1.5 years	30	50
1.6-3.5 years	24	40
> 3.5 years	6	10
Total	60	100

Based on Table 4, it is known that the most respondents have children aged 0.5-1.5 years, as many as 30 respondents (50%), and at least the age of toddlers is above 3.5 years, as many as six respondents (10%) .

Table 5. Frequency Distribution of Respondents by Gender of Toddlers

Respondent Gender	f	(%)
Man	28	46.7
Woman	32	53.3

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Total	60	100
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Based on Table 5. it is known that the most respondents have female children under five, as many as 32 respondents (53.3%) and at least male sex, as many as 28 respondents (46.7%).

### 3.2 Univariate Analysis

The results of research on drinking water sources are shown in Table 7.

Table 6. Frequency Distribution of Respondents Drinking Water Source

Respondents Source of drinking water	f	(%)
Protected	16	26.7
Unprotected	44	73.3
Total	60	100

Based on Table 6, it is known that the respondents' drinking water sources are mostly obtained from unprotected springs, which is 73.3% and the least is obtained from protected springs, which is 26.7%.

Table 7. Frequency Distribution of Respondents' Clean Water Physical Quality

Respondents Physical quality of clean water	f	(%)
Qualify	29	48.3
Not eligible	31	51.7
Total	60	100

Based on Table 8. it is known that the physical quality of clean water in most respondents has not met the requirements, namely 51.7% and at least has met the new requirements, which is 48.3%.

Table 8. Physical Frequency Distribution of Respondents' Clean Water

Physical respondents clean water	f	(%)
Smelly water	5	8.3%
Taste water	5	8.3%
Colored water	6	10%
cloudy water	30	50%
Total	46	76.6%

Based on Table 8. it is known that the most clean water in the respondents is cloudy water, which is as much as 50% and the water has the least smell and taste, which is 8.3%.

Table 9. Frequency Distribution of Respondents' Toilet Ownership

Toilet Ownership Respondents	f	(%)
Have	35	58.3
Do not have	25	41.7
Total	60	100

Based on Table 9. it is known that the majority of respondents own latrine ownership, which is 58.3% and at least does not have one, which is 41.7%. Type of floor of the house. The results of the study on the types of house floors are shown in Table 11.

Table 10. Frequency Distribution of House Floor Types on Respondents

Respondent Type of House Floor	f	(%)
Water proof	33	55
Not waterproof	27	45
Total	60	100

Based on Table 10, it is known that the type of floor of the respondent's house at most has a waterproof floor, which is as much as 55% and at least has a floor that is not waterproof, as much as 45%.

Table 11. Distribution of the Frequency of Diarrhea in Respondents Toddler

Respondents Diarrhea Kejadian	f	(%)
Diarrhea	43	71.7
No diarrhea	17	28.3
Total	60	100

Based on Table 11. it is known that the incidence of diarrhea in respondents, namely as many as 43 toddlers (71.7%) and those who do not experience diarrhea, as many as 28.3%.

### 3.3 Bivariate Analysis

Bivariate analysis aims to determine the relationship between the independent variable and the dependent variable by using the Chi square test ( $\chi^2$ ). The existence of a relationship with the incidence of diarrhea in children under five was indicated by the p value  $< 0.05$ .

1. The relationship between drinking water sources and the incidence of diarrhea

Statistical testing between drinking water sources and the incidence of diarrhea in toddlers

Table 12. Results of the Relationship between Drinking Water Sources and Diarrhea Kejadian  
Diarrhea incidence

Drinking Water Source	Diarrhea		No diarrhea		total		p
	f	(%)	f	(%)	f	(%)	
Protected	6	10	10	16.6	16	26.7	0.001
Unprotected	37	61.7	7	11.7	44	73.3	
Total	40	71.7	7	28.3	60	100	

Based on the table, it is known that the source of drinking water that is not protected is 44 respondents (73.3%). The results of statistical analysis showed the p-value = 0.001 0.05, meaning that it was concluded that there was a relationship between the source of drinking water consumed and the incidence of diarrhea in children under five.

2. The relationship between the physical quality of clean water and the incidence of diarrhea in toddlers

Testing the relationship between the physical quality of clean water The complete results can be explained in Table 14

Table 13. Results of the Relationship between Physical Quality of Clean Water

Physical quality Diarrhea No diarrhea clean water	Diarrhea		No diarrhea		total		p
	F	(%)	f	(%)	f	(%)	
Fulfil	19	31.7	10	16.6	29	48.3	0.307
Does not meet the	24	40	7	11.7	31	51.7	
Total	43	71.7	17	28.3	60	100	

Based on Table 13, it is known that the physical quality of clean water that meets the requirements of respondents with diarrhea is 29 people (48.3%) and 31 people who do not meet the requirements (51.7%). Statistical results show p-value = 0.307 0.05, which means that the conclusion drawn is that there is no relationship between the physical quality of clean water and the incidence of diarrhea in children under five.

3. Relationship between latrine ownership

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The statistical test between latrine ownership and the incidence of diarrhea in children under five is shown in Table 14.

Table 14. Results of the Relationship between Toilet Ownership and the Incidence of Diarrhea in Toddlers

Ownership diarrhea Latrine	Diarrhea incidence				total	p
	Diarrhea		No diarrhea			
	F	(%)	f	(%)		
Have	21	35	14	23.3	29	58.3
Do not have	22	36.7	3	5	25	41.7
Total	43	71.7	17	28.3	60	100

Based on Table 14 is known that respondent 35 people (58.3%) had more latrines than those who didn't have latrines were 25 people (41.7%). Test results with *Chi Square* shows the  $p$ -value = 0.018 0.05, which means that the conclusion is that there is a relationship between latrine ownership and the incidence of diarrhea in children under five.

4. The relationship between the type of floor of the house with the incidence of diarrhea in toddlers

Statistical testing of the relationship between the type of floor of the house with the incidence of diarrhea in children under five is shown in Table 16.

Table 16. Results of the Relationship between Type of House Floor and the Incidence of Diarrhea in Toddlers

Floor Type	Diarrhea incidence				total	p
	Diarrhea		No diarrhea			
	F	(%)	f	(%)		
Water proof	20	33.3	13	21.7	33	55
Not waterproof	23	38.4	4	6.6	27	45
Total	43	71.7	17	28.3	60	100

Based on Table 16, it is known that the type of floor of the house in the respondents that is waterproof is 55% and that is not waterproof as much as 45%. Statistical results show  $p$ -value = 0.036 0.05, which means that the conclusion is that there is a relationship between the type of floor of the house and the incidence of diarrhea in children under five.

### 3.4 Summary of bivariate analysis results

The results of the summary of the bivariate analysis of the relationship between drinking water sources, physical quality of clean water, latrine ownership and type of house floor with the incidence of diarrhea in children under five can be shown in Table 17.

Table 17. Summary of Bivariate Analysis Results Relationship of Drinking Water Sources, Physical Quality of Clean Water, Ownership of Toilets and Type of House Floor with Diarrhea in Toddlers

No	Variable	p value	Hypothesis
1	Source of drinking water	0.001	There is a relationship
2	Physical quality of clean water	0.307	No connection
3	latrine ownership	0.018	There is a relationship
4	Type of house floor	0.036	There is a relationship

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Of the four research variables, there is no relationship between the physical quality of clean water and the incidence of diarrhea in children under five, where the statistical test results show  $p$  value = 0.307.

### 3.5 discussion

The results of statistical tests showed that the physical quality of clean water was not associated with the incidence of diarrhea in children under five ( $p = 0.307$ ). Based on observations in the field, it can be explained that the condition of water that does not meet health requirements is not directly consumed by respondents. This is because the water that will be used is first deposited in a storage area so that it is separated from dirt in the form of soil or mud. After that, just boil the water until it boils. The physical quality of clean water in most of the respondents did not meet the requirements as much as 51.7%. Based on the results of this study, it is known that from 48.3% of respondents whose physical quality of clean water meets the requirements, as many as 31.7% have diarrhea and 16.6% do not experience diarrhea. Of the 51.7% respondents whose physical quality of clean water does not meet the requirements, ie as many as 40% had diarrhea and 11.7% did not experience diarrhea. The results of the statistical test showed that there was a relationship between family latrine ownership and the incidence of diarrhea in children under five, where  $p$  value = 0.018. Research data shows that 58.3% of respondents who already have family latrines, meaning that 41.7% of respondents' families do not have latrines and 46.7% of respondents defecate in their gardens or yards. Therefore, of the 60 respondents in the study, there were 22 respondents who had diarrhea. By not having their own latrine, it can cause diarrhea in the respondents because the feces that are not buried tightly will attract flies and rats which will have an impact on environmental health. According to Notoatmodjo (2003), The requirements for disposal of sewage that meet health regulations are not to contaminate the surrounding soil surface, not to contaminate the surrounding surface water, not to contaminate the water in the surrounding soil, and to not be exposed to dirt so that it can be used as a vector for laying eggs and breeding. The results of this study are in line with the results of research by Rahadi (2005) which concludes that there is a relationship between latrine ownership and the incidence of diarrhea in Panganjuran Village, Kudus Regency, as many as 68.7% of the population have family latrines. The incidence of diarrhea in toddlers is caused because as much as 22.1% of human feces is disposed of in the garden or yard of the house. Another research, namely Zubir et, al (2006) concluded that in addition to drinking water sources, the place for excreta disposal is also an important sanitation facility in influencing the incidence of diarrhea. Disposing of feces that do not meet sanitation requirements can pollute the residential environment, soil and water sources. From an environment contaminated with feces that accumulates with unhealthy human behavior, not washing hands properly after working or playing on the ground (children), through food and drink it can cause diarrhea. The results of this study are also in line with the research of Wibowo et.al (2004) which concluded that there is a significant relationship between the incidence of diarrhea and the place of disposal of feces. The results of the statistical test showed that there was a relationship between the type of floor and the incidence of diarrhea in toddlers where the  $p$  value = 0.036. There are 45% of research respondents whose type of floor is not waterproof. This kind of condition is very vulnerable to the health of toddlers. From the type of floor of the respondent's house that is not waterproof, there are 23 toddlers who experience diarrhea, while the type of floor that is waterproof there are 20 toddlers who experience diarrhea. This condition reflects that the type of floor can affect health. Notoatmodjo (2003) stated that the requirement for a healthy house is the type of floor that is not dusty in the dry season and not wet in the rainy season. With many respondents who have floors that are still not waterproof, it is very possible for the floor to become a nest of germs, dust, and can be a trigger for diarrhea in toddlers. The activity of the respondent's toddler playing on the floor of the house causes contact between the non-waterproof floor of the house and the toddler's body. This situation raises various germs that stick to the body of toddlers. Unfavorable conditions can cause diarrhea in toddlers. The results of this study are in line with the results of research by Rahadi (2005) which concluded that the type of floor is associated with the incidence of diarrhea. This is because there are still many floors made of soil which will cause the room to be dirty and become a nest of microorganisms and easily absorb water which may contain microorganisms. The results of this study are in line with the results of research by Rahadi (2005) which concluded that the type of floor is

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#### 4. CONCLUSION

Based on the results of research conducted in the area of the Nogosari Public Health Center, conclusions can be drawn, namely: There is a relationship between drinking water sources and the incidence of diarrhea in children under five; There is no relationship between the physical quality of clean water with the incidence of diarrhea in children under five; There is a relationship between the ownership of family latrines and the incidence; diarrhea in toddlers; There is a relationship between the type of floor of the house with the incidence of diarrhea in toddlers.

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