

## ORIGINAL ARTICLE

**Relationship Of Water Source Location And Physical Quality Of Water With The Event Of Diarrhea In Toddlers (in Purwodadi Village, Purwodadi District, Pasuruan Regency)****Warda El Maida Rusdi<sup>1</sup>, Magda Budi Pramistyowati<sup>2</sup>, Danny Irawan<sup>3,4</sup>, Irmawan Farindra<sup>5</sup>**<sup>1</sup> Department of Public Medicine, Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya, Indonesia<sup>2</sup> Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya, Indonesia<sup>3</sup> Department of Internal Medicine, Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya, Indonesia<sup>4</sup> Internal Medicine Islamic Hospital of Jemursari Surabaya, Indonesia<sup>5</sup> Department of Anatomy and Histology, Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya, Indonesia**ARTICLE INFO****Article history:***Received :**June 10, 2022**Received in revised form :**August 16, 2022**Accepted : August 23, 2022***Keywords:**

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**ABSTRACT**

**Background:** Diarrheal disease is a health problem until how and is the leading cause of death in toddlers. It is supported by environmental sanitation and personal hygiene of the community which is still poor. The use as bad water sources will also affect the quality of the water, so it can increase the risk of diarrhea in the community.

**Method:** This type of research is analytical observational with cross sectional design. The samples used were 75 out of a population of 523 mothers who had toddlers and lived in Purwodadi Village, Purwodadi Subdistrict, Pasuruan Regency, with purposive sampling techniques. Using questionnaire method, as well as statistical test using chi-square with the help of computer software.

**Result:** The results of this study showed that there was a significant association between the location of the sheltered water source as many as 38 respondents (50.7%) and unprotected as many as 37 respondents (49.3%) with a value of  $p = 0.003$ , as well as the physical quality of water that qualified as many as 37 respondents (49.3%) and did not qualify as many as 38 respondents (50.7%) with a value of  $p = 0.000$ , against the incidence of diarrhea in toddlers, where the value of  $p \leq 0.05$ .

**Conclusion:** Location of water source and physical quality of water is related to the incidence of diarrhea in toddlers.

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**Introduction**

According to the World Health Organization (WHO), diarrhea is the presence of stools with a soft and liquid consistency and more frequent (three or more times a day).<sup>1</sup> Diarrhea in children is divided into acute diarrhea, persistent diarrhea, and dysentery. Acute diarrhea in children is classified based on the status of dehydration (no dehydration, mild/moderate dehydration, severe dehydration) and the symptoms appear suddenly in less than 14 days. Persistent diarrhea is acute diarrhea with or without blood lasting for 14 days or more and is classified based on the dehydration status, namely, moderate or severe. Dysentery is characterized by bloody diarrhea, usually caused by *Shigella*.<sup>2</sup>

In 2017, WHO states that cases of diarrhea in toddlers reach 1.7 billion with a death rate of around 525,000 people each year.<sup>3</sup> The prevalence of diarrhea in Indonesia, according to the 2018 National Basic Health Research (Riskesdas), the incidence of diarrhea in toddlers aged 1-4 years reached 11.5%. Five provinces in Indonesia with the highest prevalence of diarrhea in children under five are North Sumatra (14.2%), Papua (13.9%), Aceh (13.8%), Bengkulu (13.6%), and West Nusa Tenggara (13.4%). Based on gender, diarrhea in males (11.4%) was higher than females (10.5%). The prevalence of children under five with diarrhea in East Java reaches 56.6% of all districts and cities. Pasuruan, one of the regencies in East Java, has reached 64.3% with an incidence rate of 12,851 cases, while Purwodadi Subdistrict achieved 2,105 cases in 2015.<sup>4</sup> Diarrhea in children under five in Indonesia is an endemic disease that has the potential for Extraordinary Events (KLB). Toddlers are very susceptible to diarrhea because their immune system is still weak. The most common cause of deaths are dehydration and lack of sufficient fluids.<sup>5</sup>

Environmental factors include one of the factors related to the occurrence of diarrhea in toddlers, such as the lack of clean water availability, polluted water, lack of hygiene facilities, indiscriminate and unhygienic disposal of feces, poor personal hygiene, and lack of parental knowledge about cleanliness.<sup>6</sup> Many other factors can cause diarrhea either directly or indirectly, such as triggering agents and behavior factors.<sup>7</sup> Diarrhea can be caused by the lack of quality of hygiene and sanitation of the community's environment which is still poor. Poor environmental sanitation, will have an impact on the incidence of disease. The community needs to strive for a healthy and comfortable environmental sanitation, in order to avoid a disease.

The purpose of this study was to analyze the relationship between the location of water sources and the physical quality of water with the incidence of diarrhea in children under five in Purwodadi Village, Purwodadi District, Pasuruan Regency.

**Methods**

The study was analytical observational with cross-sectional design. Subjects were 75 of 523 mothers who had toddlers and lived in Purwodadi Village, Purwodadi Subdistrict, Pasuruan Regency with

purposive sampling techniques. Primary data obtained from using a questionnaire and will be tested for validity and reliability. In this study, researchers used the Chi-square statistical test with the Statistical Product and Service Solutions (SPSS) program to assess the significant relationship between the independent variable and the dependent variable.

**Results**

Based on the results of observations and data processing that has been carried out, data on the characteristics of respondents are obtained which aims to provide an overview of respondents based on several categories as follows

**Table 1 Characteristics of Respondents**

Characteristics	Respondents =75	
	F	(%)
<b>Mother's Age</b>		
21-30 Years Old	40	53,3%
31-40 Years Old	28	37,3%
>41 Years Old	7	9,3%
<b>Tingkat Pendidikan</b>		
Primary school	3	4,0%
Junior High School	10	13,3%
Senior High School	35	46,7%
Bachelor	27	36,0%
<b>Toddler Gender</b>		
Male	42	56,0%
Female	33	44,0%
<b>Toddler Age</b>		
1-2 Years Old	42	56,0%
3-4 Years Old	33	56,0%

Based on Table 1, the most susceptible mothers are 21-30 years old, with as many as 40 respondents (53.3%). Most of them work as housewives as many as 42 respondents (56.0%), with a high school education level of 35 respondents (46.7%). Boys are more than girls as 42 respondents (56.0%), with the most vulnerable are under five years old between 1-2 years as 42 respondents (56.0%).

**Table 2 Frequency Distribution of Respondents' Diarrhea in Purwodadi Village, Purwodadi District, Pasuruan Regency**

Diarrhea	Respondents =75	
	F	(%)
1. Diarrhea	28	37,3%
2. No Diarrhea	47	62,7%

Based on Table 2, it can be seen that the incidence of diarrhea in respondents as many as 28 respondents (37.3%) experienced diarrhea, while 47 respondents (62.7%) did not experience diarrhea in the last six months.

**Table 3 Results of the Relationship between Water Source Locations and Diarrhea in Toddlers in Purwodadi Village, Purwodadi District, Pasuruan Regency**

Water Source Location	Diarrhea Events				Total		P
	Diarrhea		No Diarrhea		F	%	
	F	%	F	%			
1. Protected	8	10,7%	30	40,0%	38	50,7%	0,003
2. Unprotected	20	26,7%	17	22,7%	37	49,3%	
Total	28	37,3%	47	62,7%	75	100%	

Based on Table 3, it can be seen that the location of respondents' unprotected water sources is 37 respondents (49.3%), while for protected water sources as many as 38 respondents (50.7%). The result of the statistical calculations using the Chi-Square test, p-value = 0.003 was obtained where the value was 0.05,

so it can be concluded that there is a significant relationship between the location of water sources and the incidence of diarrhea in children under five in Purwodadi Village, Purwodadi District, Pasuruan Regency.

**Table 4 Results of the Relationship between Physical Quality of Water and the Incidence of Diarrhea in Toddlers in Purwodadi Village, Purwodadi District, Pasuruan Regency**

Physical Quality of Water	Diarrhea Events				Total		P
	Diarrhea		No Diarrhea		F	%	
	F	%	F	%			
1. Qualify	6	8,0%	31	41,3%	37	49,3%	0,000
2. Not Eligible	22	29,3%	16	21,3%	38	50,7%	
Total	28	37,3%	47	62,7%	75	100%	

Based on Table 4, it can be seen that the physical quality of water respondents who do not meet the requirements are 38 respondents (50.7%), while for the physical quality of water that meets the requirements are 37 respondents (49.3%). The results of statistical calculations using the Chi-Square test obtained p value

= 0.000 where the value is 0.05, so it can be concluded that there is a significant relationship between the physical quality of water and the incidence of diarrhea in children under five in Purwodadi Village, Purwodadi District, Pasuruan Regency.

**Tabel 5 Relationship of Water Source Location and Physical Quality of Water with Diarrhea in Toddlers in Purwodadi Village, Purwodadi District, Pasuruan Regency**

No.	Variabel	p Value	Hypothesis
1.	Water Source Location	0,003	Accepted
2.	Physical Quality of Water	0,000	Accepted

Based on the table 4, results of statistical calculations with the Chi-Square test of the two research variables compared to the incidence of diarrhea in children under five in Purwodadi Village, Purwodadi District, Pasuruan Regency, it showed that the two variables had a significant relationship to the incidence of diarrhea, with each p value 0.05.

## Discussion

Based on the results of research from 75 respondents, 37 respondents (49.3%) were found with unprotected water sources. The location of this unprotected water source caused 20 respondents to experience diarrhea, which obtained p-value = 0.003 ( $\leq 0.05$ ), which means that there is a significant relationship between the location of the water source and the incidence of diarrhea in toddlers.

Water is a resource that must be owned by humans. Water also plays a role in transmitting disease transmission, because water can contain infectious germs. These infectious germs can be transmitted by faecal-oral route, through water lines and equipment lines that are washed with water.<sup>8</sup> Clean water sources will affect the cleanliness of the eating and drinking utensils used, if the water used is contaminated with germs, the eating and drinking utensils will also be contaminated which can later cause a chain of diarrhea transmission.<sup>9</sup>

This result is also strengthened by the research of Harsa (2019), which concludes that there is a relationship between the location of the water source and the incidence of diarrhea in children under five with a percentage of 58.3% of 75 respondents. Another

study conducted by Rahmawati (2018) regarding the risk factors for diarrhea related to environmental sanitation in infants in Ngijo Village, Karangploso District, Malang Regency, found that the incidence of diarrhea was most commonly found in respondents who still used water from dug wells and rivers.

Based on field observations, there are some respondents who still use unprotected water sources such as open wells and rivers, and the distance of the septic tank is still 10 meters from the water source. The results of the above discussion can be concluded that there is a relationship between the location of water sources with the incidence of diarrhea in children under five in Purwodadi Village, Purwodadi District, Pasuruan Regency.

The results of this research statistical test of 75 respondents, obtained 38 respondents (50.7%) with the physical quality of water that does not meet the requirements. The physical quality of water that does not meet these requirements causes 22 respondents to experience diarrhea, where the  $p$ -value = 0.000 ( $\leq 0.05$ ) means that there is a significant relationship between the physical quality of water and the incidence of diarrhea in children under five.

The physical quality of water needs to be considered before being used, where water that is suitable for use is water that meets health requirements. Minister of Health Regulation Number 492/MENKES/PER/IV/2010 mentions the requirements for drinking water quality, one of which is the physical requirements which include odorless, colorless, tasteless, and not cloudy water.<sup>10</sup>

The results of this study are in line with Profita's research (2014) which concludes that there is a relationship between the physical quality of water and the incidence of diarrhea in children under five, with a  $p$ -value = 0.012 ( $\leq 0.05$ ). Another study conducted by Kurniati *et al* (2013) also supports that the physical quality of water is related to the incidence of diarrhea in children under five in the work area of the Banget Ayu Health Center Semarang. The physical quality of water that does not meet these requirements contains many infectious germs, so the water used is contaminated and can cause diseases such as diarrhea.<sup>11</sup>

Based on the observations of the researchers, it was found that the number of respondents under five who did not experience diarrhea was greater than the number of respondents who had diarrhea. This can be caused by several factors, one of which is mothers of toddlers who treat water properly so that the water consumed is proper and safe to use and reduces the risk of toddlers getting diarrhea.

The results of observations in the field, it was found that several respondents whose water conditions did not meet health requirements, namely the water still smelled, colored, tasted, and cloudy. This condition can be caused because most respondents use water from open wells or river water. The results of the discussion above can be concluded that there is a relationship between the physical quality of water and the incidence of diarrhea in children under five in

Purwodadi Village, Purwodadi District, Pasuruan Regency.

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### Conclusion

Based on the results of research on 75 samples that have been carried out, it can be concluded that there is a significant relationship between the location of water sources and the incidence of diarrhea in children under five in Purwodadi Village, Purwodadi District, Pasuruan Regency with  $p$  value = 0.003  $< 0.05$ . and a significant relationship between the physical quality of water and the incidence of diarrhea in children under five in Purwodadi Village, Purwodadi District, Pasuruan Regency with  $p$  value = 0.000  $< 0.05$

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### Conflicts of Interest

There are no conflicts of interest declared by the author.

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