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Relationship between water sources and diarrhea incidence in North Buton Regency

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Abstract

Background: The condition of water sources in the unprotected category is classified as unsafe sanitation facilities. This is very risky for endangering the people who use it as a source of clean water for their daily needs. In North Buton Regency, based on monitoring, unprotected water sources are still found, both dug wells and springs which are used by the community to meet their clean water needs.

Method: quantitative analytical, with a cross sectional study design. This research was carried out using a household survey method using a questionnaire, as well as observationally using an observation sheet. The sample in this study was 3,640 households, this number was obtained from 91 villages, where each village was represented by 40 households selected using the simple random sampling method.

Result: The results of this study show that there is a significant relationship between the use of dug well water sources and the incidence of diarrhea based on statistical tests using the chi square test, obtaining a p value of 0.000 < 0.05. There is a relationship between the use of spring water and the incidence of diarrhea in North Buton Regency with a p value of 0.000 < 0.05.

Conclusion: There is a significant relationship between dug wells and spring water sources and the incidence of diarrhea in North Buton Regency.

Keywords: Clean Water; Diarrhea; Relationships; Water Sources

1. Introduction

Diarrhea is the second leading cause of death in children under five years old, and the cause of death for approximately 525,000 children every year. Diarrhea can last several days, and it can leave the body without the water and salt necessary for survival. In the past, for most people, severe dehydration and fluid loss were the main causes of death from diarrhea[1].

In Indonesia, it is estimated that there are around 200-400 cases of diarrhea per 1000 population every year, so it can be estimated that there are more than 60 million cases of diarrhea every year [2]. In Southeast Sulawesi Province, 34,195 cases of diarrhea were recorded, and in North Buton Regency there were 916 cases recorded in 2020 [3].

Many factors cause diarrhea, morbidity and death. One of the high levels is generally caused by contaminated water and food sources. In the world, 780 million individuals have limited access to adequate drinking water and 2.5 million have limited access to adequate sanitation [2]. Consumption of drinking water from improved sources reduces the incidence of water-borne diseases and the risk of death[4]. Drinking unsafe water is one of the main factors causing diarrhea in children[5][6][7]. Improving water quality can reduce the incidence of diarrhea[8].

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The condition of water sources in the unprotected category is classified as unsafe sanitation facilities. This is very risky for endangering the people who use it as a source of clean water for their daily needs. In North Buton Regency, based on monitoring, unprotected water sources are still found, both dug wells and springs which are used by the community to meet their clean water needs.

Based on the study above, research was conducted with the aim of finding out the relationship between clean water sources used by the community to meet their daily needs and the incidence of diarrhea in North Buton Regency in 2022.

2. Material and methods

This type of research is quantitative analytical, with a cross sectional study design. This research was carried out using a household survey method using a questionnaire, as well as observation using an observation sheet. The survey was carried out with the aim of obtaining information about the water sources used by respondents for their daily needs, and observation sheets were used for direct observation/observation of the water sources used by respondents, namely the types of dug wells and springs. This research was carried out in North Buton Regency, Southeast Sulawesi Province in 2022. The sample in this study was 3,640 households, this number was obtained from 91 villages, where each village was represented by 40 households selected using the simple random sampling method. Respondents in this study were housewives aged 17-56 years. The research results obtained were then input using the Microsoft Excel application, and then analyzed using the SPSS version 20.0 application. Analysis of the relationship between the independent variable and the dependent variable uses the chi square test.

3. Result and Discussion

3.1. Univariate Analysis

Based on the survey results and validation carried out with the results of observations at clean water source facilities, the distribution of respondents for each variable was obtained, namely dug wells and springs as independent variables, and the incidence of diarrhea as the dependent variable. From the validation results, the distribution of respondents was obtained as follows:

3.1.1. Facilities for digging wells

The dig wells referred to in this research are dug wells that are used by the community to meet their daily clean water needs. The distribution of respondents who use dug wells can be seen in table 1 below:

Table 1 Distribution of Respondents Who Use Dug Wells as a Source of Clean Water in North Buton Regency in 2022

Dig Well	n	%
Not Protected	392	10.77
Protected	3,248	89.23
Total	3,640	100.00

Resource: Primary data, 2022

Based on table 1 above, out of 3,640 respondents, the majority of respondents used protected dug wells, namely 3,248 (89.23%) respondents. However, there are still respondents who use unprotected dug wells for their daily needs, namely 392 (10.77%) respondents.

3.1.2. Springs

The springs referred to in this research are water that comes from springs that are used by the community to meet their daily clean water needs. The distribution of respondents using spring water is presented in table 2 below:

Table 2 Distribution of Respondents Who Use Springs as a Source of Clean Water in North Buton Regency in 2022

Spring	n	%
Not Protected	67	1.84
Protected	3,573	98.16
Total	3,640	100.00

Resource: Primary data, 2022

Table 2 above shows that of the 3,640 respondents, the majority used water that came from protected springs, namely 3,573 (98.16%) respondents. However, there are still respondents who use water from unprotected springs for their daily needs, namely 67 (1.84%) respondents.

3.1.3. Diarrhea incident

The incidence of diarrhea referred to in this study is diarrheal disease experienced by people in all age groups based on the history of the disease they have experienced and been diagnosed with diarrhea since the last 6 months. The distribution of diarrhea incidents among respondents is presented in table 3 below:

Table 3 Distribution of Respondents Who Have One or More Family Members Suffering from Diarrhea in North Buton Regency in 2022

Diarrhea incident	n	%
Diarrhea	621	17.06
Not Diarrhea	3,019	82.94
Total	3,640	100.00

Resource: Primary data, 2022

Table 3 above shows that of the 3,640 respondents, the majority of family members have never experienced diarrhea in the last 6 months, namely 3,019 (82.94%) respondents. However, there are still family members of respondents who have experienced diarrhea since the last 6 months, namely 621 (17.6%) respondents.

3.2. Bivariate Analysis

3.2.1. Relationship between the use of dug wells and the incidence of diarrhea

Based on the data obtained, an analysis was then carried out to determine the relationship between the use of dug wells and the incidence of diarrhea. The relationship between these two variables is presented in table 4 below:

Table 4 Relationship between the use of dug wells and the incidence of diarrhea in North Buton Regency in 2022

Dig Well	Diarrhea incident				Total		*P* Value
	Diarrhea		Not Diarrhea				
	n	%	n	%	n	%	
Not Protected	94	23.98	298	76.02	392	100	0.000
Protected	527	16.23	2,721	83.77	3,248	100	
Total	621	17.06	3,019	82.94	3,640	100	

Resource: Results of Primary Data Analysis in 2022

Table 4 shows that 23.98% of the 392 respondents who used unprotected dug wells as a source of clean water for their daily needs had experienced diarrhea, while 76.02% of those who had never experienced diarrhea had experienced diarrhea. Then, of the 3,248 respondents who used protected dug wells, 16.23% of their family members had experienced diarrhea, while 83.77% had never experienced diarrhea. The results of statistical tests using the chi square

test obtained a p value of 0.000 < 0.05. This shows that there is a significant relationship between the use of dug well water sources and the incidence of diarrhea.

3.2.2. Relationship between the use of spring water and the incidence of diarrhea

Based on the data obtained, an analysis was then carried out to determine the relationship between the use of spring water and the incidence of diarrhea. The relationship between these two variables is presented in table 5 below:

Table 5 Relationship between Spring Water Use and Diarrhea Incidence in North Buton Regency in 2022

Springs	**Diarrhea incident**				**Total**		***P* Value**
	Diarrhea		Not Diarrhea				
	n	%	n	%	n	%	
Not Protected	29	43.28	38	56.72	67	100	0.000
Protected	592	16.57	2,981	83.43	3,573	100	
Total	621	17.06	3.,19	82.94	3,640	100	

Resource: Results of Primary Data Analysis in 2022

Table 5 shows that 43.28% of the 67 respondents who used unprotected springs as a source of clean water for their daily needs had experienced diarrhea, while 56.72% had never experienced diarrhea. Then, of the 3,573 respondents who used protected dug wells, 16.57% of their family members had experienced diarrhea, while 83.43% had never experienced diarrhea. The results of statistical tests using the chi square test obtained a p value of 0.000 < 0.05. This shows that there is a significant relationship between the use of spring water and the incidence of diarrhea.

Water is vital in human life [9], plants [10] and animals [11]. For daily needs, humans use the water sources around them. Most of the water sources closest to homes come from groundwater, so humans build water sources such as dug wells. Apart from that, people can also take advantage of springs which are usually far from their living environment. However, because of necessity, people try to obtain it.

The conditions of dug wells in North Buton Regency vary. Most of them are classified as protected, but there are still some that are not protected. These unprotected dug wells are partly because some have no well walls, no well rim, no watertight floor around them, and also do not have waste disposal channels. Apart from that, dug wells were still found with a distance of less than 10 meters from the latrine. Likewise with springs. Some people use protected springs, but there are still those who use unprotected springs. Unprotected springs do not have their own reservoir and the springs are not closed and do not have protection around them, making it easier for pollutants to enter the spring water source.

Water sources that will be consumed by the community must be kept clean. Water source pollution can come from the surrounding environment, so the water source facility must be protected from sources of pollution. Water for hygiene and sanitation purposes, water sources must be protected from sources of pollution, disease-carrying animals and vector breeding sites, and safe from possible contamination [12]. Unprotected water sources can be contaminated by bacteria, which can cause diarrhea. The use of unprotected water sources is related to the incidence of diarrhea experienced by the community [13].

Regular detection of bacteria in various water sources such as municipal water, water supply for businesses or homes, recreational waters, and so on is needed to identify and prevent potential health/environmental risks to ensure public health globally [14].

This research shows that there is a relationship between the use of dug wells and springs and the incidence of diarrhea. This happens because the majority of people who use unprotected water sources suffer from diarrhea, while the majority of people who do not have diarrhea use protected water sources. This research is in line with research conducted by Marini et al [15], Slamet Ifandi [16], and Italia et al [17].

Dug wells have the potential to be a source of transmission of diarrheal disease due to well water being contaminated by fecal coliforms. Shallow dug wells are more easily contaminated with fecal coliforms compared to deep dug wells [18]. Water can be related to the depth and type of well, its operation, maintenance and the presence of pollution sources in the vicinity such as latrines[19] and rubbish dumps[20][21].

Significant health consequences of consuming unsafe water include dysentery and other diarrheal diseases due to microbiological contaminants. Drinking water pollution continues to increase in urban areas due to demographic expansion, and puts many communities at risk[22]. The main cause of fecal contamination in this water source is thought to be anthropogenic. Therefore, it is necessary to formulate a policy aimed at managing and increasing resources[23].

4. Conclusion

There is a relationship between dug wells and spring water sources and the incidence of diarrhea in North Buton Regency, with a P value of 0.000 < 0.05. Communities must pay more attention to the safety of water sources when constructing clean water facilities. Water sources that are consumed daily are safer from contamination by polluting materials if the water sources are protected, both in terms of construction and distance from sources of pollution such as latrines, rubbish dumps and industrial waste.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors in the making of this scientific article have no conflict of interest.

Statement of informed consent

All informants/respondents involved in this study have stated their consent as informants/respondents to be interviewed and provided information/information in accordance with research needs.

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