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Factor associated with diarrhea incidence in coastal area Bungkutoko, Kendari, Indonesia

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Abstract

Diarrhea is a health problem that has not been resolved until now, even this disease is the main cause of death in toddlers both globally and nationally. Diarrhea cases in the Nambo Health Center work area, Kendari City have continued to increase over the past 3 years. Bungkutoko is one of the sub-districts located in the coastal area of Nambo District, Kendari City. Coastal areas include areas with inadequate sanitation access, with problems including the availability of clean water, toilets and other basic sanitation facilities that can be factors causing diarrhea. This study aims to determine the factors related to the incidence of diarrhea in the coastal area of Bungkutoko. An observational analytic with cross sectional design was conducted in this study. This study was carried out in June 2024 in Bungkutoko Village, Kendari City, Southeast Sulawesi Province. The sample consisted of 70 respondents obtained using non-probability sampling, accidental sampling techniques. Data were collected using questionnaires and observation sheets, then processed and analyzed using a computer program. Data were analyzed bivariately using chi square test and fisher exact (if not eligible for chi square test) with 95% confidence level (α = 0.05). The results showed there was a relationship between water treatment before drinking and the incidence of diarrhea (p-value = 0.03), and there was no relationship between hand washing behavior (p-value = 0.09) and the condition of waste disposal sites (p-value = 0.25) with the incidence of diarrhea in the coastal area of Bungkutoko, Kendari City. Therefore, it is expected that the community can process drinking water before consuming it to avoid diarrhea.

Keywords: Condition of Waste Disposal Sites; Diarrhea; Drinking Water Treatment; Hand Washing Behavior

1. Introduction

Diarrhea is a condition of defecation in a larger amount than usual (normal 100-200 ml per hour of stool), with liquid or semi-liquid (semi-solid) stool, can also be accompanied by increased defecation frequency. Another definition of diarrhea is a disease where the sufferer experiences frequent bowel movements and still has excessive water content. There are thousands of types of organisms that can infect the digestive tract and cause diarrhea. From the group of bacteria, there are four types of bacteria that cause diarrhea, namely: campylobacter, salmonella, shigella, and E. Coli. In general, the causative agents of diarrhea can be bacteria, viruses, parasites (fungi, worms and protozoa), food and drink poisoning containing bacteria or chemicals, and due to decreased immunity {immune deficiency)(1).

Diarrhea is a health problem that has not been resolved until now, even this disease is the main cause of death in children both globally and nationally. Diarrhea is a leading killer of children, accounting for approximately 9 per cent of all deaths among children under age 5 worldwide in 2021. This translates to over 1,200 young children dying each day, or about 444,000 children a year, despite the availability of a simple treatment solution. Deaths caused by diarrhea among children under 5 are highest in South Asia and sub-Saharan Africa (2).

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Diarrhea is a disease that has the potential to cause an outbreak and contributed to death rate in Indonesia, especially in toddlers. However, the number of diarrhea cases reported nationally has never reached the target for finding diarrhea cases in toddlers that has been set by the Indonesian Ministry of Health (3). Diarrhea is the second cause of death after pneumonia in the post-neonatal group (aged 29 days - 11 months) was 14%, up from 2020, which was 9.8% of deaths. In the toddler group (12 - 5 months), diarrhea is the number one cause of death, which is 10.3% or up from 2020 by 4.55%(4).

Based on the 2023 Indonesian Health Survey, the prevalence of diarrhea for all age groups were 2% or 17,551 cases with the age group > 5 years of 5% (3,530 cases) and followed by the elderly with age group > 55 years of 2.31% (3,311 cases). Meanwhile, in Southeast Sulawesi province, the prevalence of diarrhea reached 1.2% with the highest number of cases in Kendari City (5).

According to data from the Kendari City Health Office, the prevalence of diarrhea in Kendari City in 2018 was 5,321 cases (2.34%) where 58.9% of this number was toddlers with 2 deaths (CFR 0.04%). The prevalence of diarrhea in 2019 reached 23.47% or 5,614 cases with the number of cases in toddlers being 3,390 cases (60.4%) with 3 deaths (CFR 0.05%). The incidence of diarrhea continued to increase in 2020, namely 3.05% or 6,923 cases with 4,122 cases or 59.9% in toddlers with 3 deaths (6). Diarrhea cases in the Nambo Health Center work area have increased over the past 3 years. Data shows that in 2021 there were 48 cases of diarrhea at the Nambo Health Center, 82 cases in 2022, and 108 cases in 2023 (7),(8),(9). Bungkutoko Village is one of the villages located in the coastal area of Nambo District, Kendari City. Coastal areas include areas with inadequate sanitation access, with problems including the availability of clean water, toilets and other basic sanitation facilities.

Diarrhea is one of the diseases that are based on the environment. Two dominant factors are clean water facilities and feces disposal. These two factors will interact with human behavior. If the environmental factor is unhealthy because it is contaminated with diarrhea germs and accumulates with unhealthy human behavior, namely through food and drink, it can cause diarrhea (10). The results of the previous study showed a statistically significant relationship between the use of clean water and the incidence of diarrhea. Adequate water treatment and proper storage of water before use are very important in reducing the incidence of diarrhea, this is because although the source of drinking water is one of the media for transmitting bacteria that cause diarrhea. Thus, a clean and proper source of drinking water can prevent the occurrence of diarrhea (11). The use of healthy toilets can also affect diarrhea. The function of toilets from an environmental health aspect, among others, can prevent the development of various diseases caused by human waste. Meanwhile, the serious impact of defecating anywhere causes soil, water and air pollution because it causes odor. A place to dispose of feces that does not meet sanitation requirements will increase the risk of diarrhea by 2.55 times compared to families who dispose of their feces in a sanitary manner (12).

In addition, hand washing behavior and disposal mechanisms are also factors that determine the occurrence of diarrhea. One of the sanitation practices used by humans to maintain personal hygiene and stop the spread of germs is washing hands with soap and water (13). Based on the results of the systematic literature review, 17 journal articles were obtained which stated that there was a relationship between handwashing behavior with soap and the incidence of diarrhea in schools and 4 journal articles which stated that there was no relationship between handwashing behavior with soap and the incidence of diarrhea in children at school (14). Likewise, improper waste management can trigger diarrhea. Waste is all substances or objects that are no longer used, whether from households or industrial processes. Types of waste include inorganic and organic waste. Usually organic waste is easier to rot and pollute the environment. Therefore, action needs to be taken so that waste does not become a source of disease, especially diseases that can cause diarrhea (15).

Based on the description of the problems above, the researcher is interested in conducting research on factors related to the incidence of diarrhea in the coastal area of Bungkutoko, Kendari City, Southeast Sulawesi Province.

2. Material and methods

This type of study is observational analytic with a cross-sectional study design. This study was conducted in June 2024 in Bungkutoko Village which is a coastal area in Kendari City, Southeast Sulawesi. The sample of this study was 70 respondents that selected using non probability sampling, the accidental sampling technique. The variables included dependent variable of diarrhea incidence and independent variables included hand washing behaviour, water treatment before drinking and condition of the waste disposal site. Data collection was carried out by filling out questionnaires and observation sheets. Data were processed and analysed using a computer program. Univariate analysis was carried out to determine the characteristics of respondents and bivariate analysis with the chi square test

and fisher exact test to assess the significance of the relationship between the independent and dependent variables with 95% confidence level (α = 0.05).

3. Results and discussion

3.1. Characteristics of Respondents

Table 1 characteristics of respondents by age group, from 70 respondents, most are in the 41-50 years age group as many as 22 respondents (31.4%) and the least age group <20 years as many as 7 respondents (10.0%). As for gender, most respondents are women, namely 53 respondents (76.0%). In the education level variable, the majority of respondents have a last education of junior high school as many as 28 respondents and there is not a single respondent who is uneducated. Based on the type of work, the most are housewives as many as 41 respondents (58.6%) and the least 4 respondents are fishermen (1.4%).

Table 1 Distribution of Respondent Characteristics

Characteristics of Respondents	Frequency (n=70)	Percentage (%=100)
Age Group (Years old)		
<20	7	10.0
20-30	6	8.6
31-40	18	25.7
41-50	22	31.4
>50	17	24.3
Gender		
Male	17	24.3
Female	53	76.0
Level of Education Respondents		
Uneducated	0	0.0
Elementary School	11	15.7
Junior High School	28	40.0
Senior High School	23	32.9
Higher Education (Diploma/Bachelor/Master)	8	11.4
Occupations		
Student	6	8.6
Civil Servants	7	7.0
Self Employee	5	7.1
Fisherman	4	5.7
Housewife	41	58.6
Others	7	10.0

Source: primary data, 2024

3.2. The Relationship between the Implementation of Hand Washing Behavior with the Incidence of Diarrhea in Coastal Area Bungkutoko, Kendari

According to the Indonesian Ministry of Health in Handayani, washing hands with soap is one of the sanitation actions by cleaning hands and fingers using water and soap by humans to become clean and break the chain of germs. Washing hands with soap is also known as one of the efforts to prevent diseases including diarrhea. This is because hands are

often agents of germ carriers and cause pathogens to move from one person to another, either through direct or indirect contact (16). The following are the results of the analysis of the relationship between implementation of hand washing behavior and the incidence of diarrhea.

Table 2 Relationship between the Implementation of Hand Washing Behavior with the Incidence of Diarrhea in Coastal Area Bungkutoko, Kendari

Implementation of Hand Washing Behavior	Incidence of Diarrhea				Total		P Value
	Yes		No				
	n	%	n	%	n	%	
Yes	20	83.3	46	100	66	94.3	0.09
No	4	16.7	0	0.0	4	5.7	
Total	24	100.0	46	100.0	70	100	

Source: primary data, 2024

The qualified handwashing behavior is washing hands with running water and using soap. Based on table 2, it is known that out of 70 respondents, there are more respondents who implement handwashing behavior, namely 66 people with a percentage of (94.3%) and there are 4 people who do not implement handwashing behavior with a percentage of (5.7%). While out of 24 respondents who experienced diarrhea, there were 20 people implementing qualified handwashing behavior with a percentage of 83.3% and 4 people who did not implement qualified handwashing behavior with a percentage of 16.7%. Bivariate analysis using the Fisher test (there is an expected frequency value of more than 5) obtained a p-value of 0.09, which is> 0.05 so that there is no relationship between handwashing behavior and diarrhea in the coastal area of Bungkutoko, Kendari City. The results showed that most respondents had implemented qualified handwashing behavior because most respondents were adult age groups who already had good knowledge about handwashing behavior and had implemented correct handwashing behavior. Respondents who have implemented hand washing have successfully increased their chances of avoiding germs and bacteria that cause diarrhea.

In line with previous research which stated that out of 320 respondents, most respondents have practiced good hand washing as many as 169 respondents (52.8%), 147 respondents (45.9%) with sufficient category and only 3 respondents (1.3%) who have poor hand washing practices. This is because respondents have good knowledge about hand washing practices and have been aware of practicing hand washing before eating and after activities. The results of the analysis of the combination of sufficient and poor hand washing category cells using the Chi-Square test obtained a value (p = 0.978), this indicates that there is no relationship between student hand washing practices and diarrhea incidents in students at Semarang State University (17) .

Of the 24 respondents who experienced diarrhea, there were 4 respondents who did not implement good hand washing behavior, namely not using running water or not using soap. This cannot kill pathogenic bacteria on the hands so that the bacteria in the food contaminate the food and are swallowed when eating. Hands are a part of the body that is easily exposed to dirt and germs. When holding something, touching, cleaning vital organs after or before defecating or urinating and shaking hands, such activities can cause germs to stick to the skin of the hands and enter orally through the mouth because of the lack of cleanliness in washing hands with germs that are still attached to the hands. This is seen from the vulnerability of disease transmission through the hands that can enter the body orally. One way that can be done is by washing hands with soap before or after activities. This is done, one of which is to break the chain of diarrhea (18).

Another study explains that more than 40% of diarrhea cases can be reduced by washing hands with soap. There are several conditions that require good hand washing behavior, namely conditions before consuming drinks or food and activities from places that are sources of contamination such as toilets. One of the easiest steps to prevent disease in children is washing hands with soap (19).

3.3. The Relationship between Drinking Water Treatment and Diarrhea Incidence in Coastal Area Bungkutoko, Kendari

According to the Regulation of the Indonesian Minister of Health Number 3 of 2014 concerning Community-Based Total Sanitation, it explains that household drinking water and food management is the activity of managing drinking water

in households to improve and maintain the quality of water from water sources that will be used for drinking water (20). Quality water with good processing can prevent water-borne diseases such as diarrhea. The following is a table analyzing the relationship between water processing before consumption and diarrhea in the Bungkutoko Coastal Area, Kendari.

Table 3 The Relationship between Drinking Water Treatment with the Incidence of Diarrhea in Coastal Area Bungkutoko, Kendari

Drinking Water Treatment	Incidence of Diarrhea				Total		p-value
	Yes		No				
	n	%	n	%	n	%	
Yes	11	47.8	25	53.2	36	51.4	0.03
No	12	52.2	22	46.8	34	48.6	
Total	23	100.0	47	100	70	100.0	

Source: primary data, 2024

Based on table 3, it can be seen that 23 respondents who experienced diarrhea, most respondents did not process/boil their water before drinking as many as 12 respondents (52.2%) and only 11 respondents (47.8%) did not process their drinking water. In addition, of the 47 respondents who did not experience diarrhea, most respondents processed/boiled their water before consuming it, namely 36 respondents (51.4%) and 34 respondents (48.6%) who did not process their drinking water. The results of the bivariate analysis using the chi-square test with a p-value of 0.03 <α value, namely 0.03 <0.05, which indicates a relationship between drinking water treatment before consumption and diarrhea in the coastal area of Bungkutoko, Kendari City. Drinking water is water that has gone through a processing process or without processing that meets health requirements and can be drunk directly. Water that is not managed with household drinking water management standards (PAM-RT) can cause disease. Water for drinking must be processed first and the water container must be clean and closed. Diarrhea caused by unclean drinking water is usually related to microbiological and chemical agents that enter the digestive tract. Transmission of diarrhea can occur through the fecal-oral mechanism, including through contaminated or contaminated drinking water (21).

Water treatment before consumption can be done by filtration, chlorination, coagulation and flocculation (clumping) and disinfection by boiling which aims to obtain water with good drinking water quality and can kill germs (20). The simplest and most common way to do it in households is water treatment by boiling it. This boiling activity can kill germs or pathogenic bacteria, one of which is the cause of diarrhea. In line with other studies that show a significant relationship between the management of refilled drinking water in households (p = 0.000) and the incidence of diarrhea in Berbas Pantai Village, Bontang Selatan II Health Center work area, East Kalimantan (22).

Respondents who do not process water for consumption first because they use refill drinking water sources from depots using gallons. The water is purchased at the depot and directly consumed by the family. In this study, no gallon water quality testing was carried out so the quality of the water is unknown. In line with research stating that families with poor drinking water sources here, namely most mothers of toddlers use PDAM water, wells, gallons, for drinking needs, most of which are not boiled. It is not uncommon for families to be reluctant to boil drinking water before drinking. The community considers that water that is boiled first tastes worse than water that is not boiled and the community assumes that refilled gallon water does not need to be boiled again (23).

3.4. The Relationship between Waste Disposal Conditions and Diarrhea Incidence in Coastal Area Bungkutoko, Kendari

According to Wahyuningtyas, et al in Handayani, waste is solid waste that is classified into organic and inorganic substances that are considered no longer usable. Waste requires good processing so that it does not have an impact on the environment and health (24). In waste management, a temporary waste storage place is needed before being processed to the next stage. One of the requirements for a waste storage place is that it is closed so that it does not invite disease-transmitting vectors. The following are the results of the analysis of the relationship between the condition of the waste storage place and the incidence of diarrhea in the Bungkutoko Coastal Area, Kendari City.

Table 4 The Relationship between Condition of Waste Disposal Site with the Incidence of Diarrhea in Coastal Area Bungkutoko, Kendari

Condition of Waste Disposal Site	Incidence of Diarrhea				Total		p-value
	Yes		No				
	n	%	n	%	n	%	
Open	19	30.2	3	42.9	22	31.4	0.25
Closed	44	69.8	4	57.1	48	68.6	
Total	63	100.0	7	100.0	70	100	

Source: primary data, 2024

Based on table 17, out of 63 respondents who experienced diarrhea, only 19 respondents (30.2%) had a closed waste container and most of their waste containers were open, as many as 44 respondents (69.8%). Likewise, for those who did not experience diarrhea, out of 7 respondents, only 3 respondents (42.9%) had a closed waste container and 4 respondents (57.1%) had an open one. In other words, overall, the majority of respondents, both those who experienced diarrhea and those who did not, had an open waste container. This is not in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2023, the requirements for a waste container are made of strong material, closed, easy to clean, lined with plastic bags and not touched by hand to open it (25).

At this time, waste is a complex problem, because the increasing amount of waste produced, with various compositions, the increasing development of cities, limited funds available and other problems. The stages of waste management start from collection and storage, transportation, management and destruction, burning, and being used as fertilizer. Residential areas are one of the largest producers of waste from household activities. Waste that is not managed properly will become a nest for various agents and disease vectors (26).

Uncontrolled waste disposal is a suitable place for several organisms and is attractive to various animals such as flies which are vectors of disease transmission. The potential dangers caused are diarrhea, cholera, typhus spreading rapidly in places where waste management is inadequate. Trash bins must meet health requirements with the aim that trash bins do not become nests or breeding grounds for insects or disease-transmitting animals (vectors). Efforts that can be made by the community so that temporary shelters do not become nests for disease vectors are to provide and close trash bins tightly (15). Having uncovered rubbish can attract flies and other insects, so the incidence of diarrhea is greater compared to covered rubbish (27).

The results of the bivariate analysis with the Fisher exact test showed a p value of 0.25 <0.05 so that there is no relationship between the condition of the waste disposal site and the incidence of diarrhea in the coastal area of Bungkutoko. This is because according to the results of observations and interviews with respondents, the waste that has been collected in the waste disposal site is then burned so that no waste remains as a place for disease vectors. Thus, this method can prevent the occurrence of diarrhea. The results of this study are in line with research conducted in the work area of the Ambal I Health Center, namely that there is no relationship between waste disposal facilities and the incidence of diarrhea in the work area of the Ambal I Health Center. Household waste that is routinely produced is burned by local residents, so that no wet waste or organic waste is found scattered in the residential environment. This can prevent the spread of diarrhea through animal vectors of the disease (28).

4. Conclusion

Based on the results of the study, it can be concluded that water treatment before drinking is related to the incidence of diarrhea in the coastal area of Bungkutoko, while the condition of hand washing behavior and the condition of waste disposal sites are not related to the incidence of diarrhea in the coastal area of Bungkutoko, Kendari City. Therefore, it is hoped that the community can understand the importance of implementing good sanitation in their environment, especially in water treatment before drinking to avoid infectious diseases including diarrhea. In addition, it is necessary to pay attention to and improve other aspects of environmental sanitation that have quite an influence on the incidence of diarrhea in the coastal area of Bungkutoko, Kendari City.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants in this study.

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