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Article

## Analysis of Elementary School Children's Behavior on the Incidence of Diarrhea in Berbek Village, Sidoarjo Regency

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**Abstract**

Diarrheal diseases often occur in school children with a frequency of liquid bowel movements three or more times a day. Environmental and behavioural factors affect diarrhea in children. This study aims to analyze the relationship between elementary school children's behaviour and diarrhea in Berbek Village in 2024. Observational analytical research with a cross-sectional approach was conducted in three elementary schools in Berbek Village. The study population was 529 children from grade 4 to grade 6, with samples taken by stratified random sampling. Data were collected through observation and interviews using questionnaires and analyzed with the Chi-square test. The results showed that there was a significant relationship between knowledge ( $p=0.000$ ), attitude ( $p=0.000$ ), attitude ( $p=0.000$ ) and behaviour ( $p=0.003$ ) on the incidence of diarrhea. Still, there was no relationship between infrastructure facilities ( $p=0.891$ ) and school policies ( $p=0.891$ ). It is recommended that schools expand students' knowledge and attitudes about clean and healthy living behaviours (PHBS) with visual media that are attractive and easy to understand, and teachers provide examples of the implementation of PHBS in schools and complete school infrastructure facilities to be more adequate.

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## Introduction

One of the gastrointestinal tract infections that is a health problem around the world, including in Indonesia, is diarrhea. Diarrhea is defined as bowel movements with a liquid consistency (discharge) three or more times in one day (24 hours), according to the World Health Organization (WHO) WHO (2017). Liquid and frequent bowel movements (defecation) are the main criteria for identifying diarrhea. If a person has a bowel movement three times a day but not liquid, it is not considered diarrhea. If a person has a bowel movement with liquid stools but no more than three times a day, it is also not considered diarrhea[1].

According to the World Health Organization (WHO), diarrhoea is the second leading cause of death among children under the age of five worldwide, and every year, about 525,000 children die from diarrhoea[2]. Based on data from the East Java Provincial Health Profile 2022[3], Sidoarjo is ranked second highest after Surabaya in East Java with 12,117 cases. The highest number of diarrhea cases in

Sidoarjo Regency has been in Waru District for the past three years, namely in 2021[4] as many as 3,092 cases; in 2022[5], as many as 4,838 cases; and in 2023[6] as many as 3,585 cases in the work area of the Waru Health Center. The Waru Health Centre's working area has seven villages with diarrhea cases. Data on diarrhea among elementary school-age children, namely 6-12 years old, for the last three years, was obtained in Berbek Village with 43 cases in 2021, 219 cases in 2022 and 190 cases in 2023. Berbek Village in Sidoarjo Regency is one area that still faces challenges related to diarrhea in elementary school-age children. The local health centre data shows that diarrhea among elementary school-age children has been relatively high recently. This raises concerns because diarrhea can result in severe dehydration, malnutrition, and even death if not appropriately treated[7].

Factors that cause diarrhea cases can be poor sanitation and unhealthy behaviour, which are often risk factors for diarrhea[8]. Environmental factors affecting diarrheal disease incidence include clean water facilities (SAB) and the provision of garbage cans and restrooms[9]. Another factor that causes diarrhea in school-age children is behavioural factors. Children aged 6-12 years need to understand their bodies' cleanliness compared to adults fully. School-age children play and eat during breaks, especially without remembering to wash their hands. The condition supports this in 3 schools in Berbek Village with the unavailability of hand washing stations with soap. In MINU Berbek, only one hand washing station is available for one school. This supports children's behaviour in avoiding getting used to washing their hands before and after eating and doing activities. This can lead to an increase in the rate of disease spread, including diarrhea, which has a high risk of transmission. In line with the study[10] the results showed a relationship between the habit of washing hands with soap and cases of diarrhea in SD ADVENT Sario; 29% of students said they had diarrhea because they were not used to washing their hands with soap. This shows that many elementary school students still need to learn how to wash their hands properly or are not even used to washing their hands with soap.

The behavioural factors of children in random snacks are also still found in 3 schools in Berbek Village: buying food with red sauce colours, sellers who sell food by leaving it open, and the seller's environmental conditions close to wastewater sewers. In line with the results of the study[11] it was found that there was a significant relationship between the behaviour of snack habits and the prevalence of diarrhea, namely the level of hygiene and snack behaviour that occurred in elementary schools 1, 2, and 3, the most unclean results were obtained for the first student at the snack place 20.86%, the second in the cleanliness of the place of sale or around the seller 20.51% and the third hand washing 20.34%. Based on this data, it is because the food sold is not covered, which causes flies that can cause disease and also reduce aesthetic value. The use of low-quality food-colouring ingredients can also be harmful to health. Places selling snacks should be far from garbage cans, dirty drains, or toilets, and the place must be neat and clean. The goal is to maintain the cleanliness and hygiene level of the food or snacks used by consumers.

The researcher conducted a study on 3 elementary schools in Berbek Village because school is a place where children experience physical, social and mental development so that the school environment can affect their lives and the epidemiological prevalence of this disease in school children in Indonesia is still high[12]. This study is in line with[12] There is a relationship between the environmental cleanliness level and the incidence of diarrhea in school-age children. If the environment is unhealthy and contaminated with bacteria, diarrhea will quickly spread due to unclean human behaviour. Research on children's behaviour towards the incidence of diarrhea has been carried out in various countries. Studies in Bangladesh show that children with good knowledge of hygiene practices tend to have a lower risk of developing diarrhea[13]. Meanwhile, research by[14] shows that investments in sanitation and clean water infrastructure can yield significant health benefits. Policies that support increased access to sanitation and clean water facilities in schools can help reduce the incidence of diarrhoea.

Policies that can be implemented support improving sanitation facilities and school access to clean water. However, in Berbek Village, many schools still lack basic facilities such as soap and handwashing stations, which can be a significant obstacle in preventing diarrhea. In addition, this study will evaluate the effectiveness of health education programs in schools in improving students' knowledge, attitudes, and actions towards diarrhea prevention. Previous studies in several countries have shown that comprehensive health education interventions can significantly reduce the incidence of diarrhea[15]. However, the effectiveness of similar programs in Indonesia, especially in Berbek Village, has yet to be widely studied. Thus, this study will make a significant contribution to understanding the factors that influence the behaviour of primary school-age children towards the incidence of diarrhea in Berbek Village and how appropriate interventions can be implemented to reduce the incidence of diarrhea among students.

Materials and Method

**Research subjects.** This study covers all elementary school-age children from grades 4, 5, and 6 in 3 elementary schools in Berbek Village, Waru District, Sidoarjo Regency, in 2024

**Research Design.** This type of research uses an observational analytical method with a cross-sectional approach[16].

**Instruments and Equipment.** This research instrument uses a questionnaire sheet to measure related variables: knowledge, attitudes, infrastructure, and school policies related to diarrhea cases in elementary school children. The questionnaire has been tested for validity and realism.

**Data Collection Methods.** The sampling technique uses probability sampling, especially stratified random sampling, with a lottery technique of 141 samples. The data collection technique uses questionnaire sheets and observation sheets.

**Data Analysis.** In the bivariate analysis to determine the relationship between the behaviour of elementary school-age children and the incidence of diarrhea, a statistical test was used, namely the Chi-square Prevalence Ratio Test with the SPSS (Statistical Product and Service Solutions) application version 16.0

**Research ethics.** his research has been declared ethically feasible according to 7 (seven) WHO 2011 standards published by the Health Research Ethics Commission (KEPK) of the Health Polytechnic of the Ministry of Health Surabaya.

Results

Table 1

Frequency distribution of diarrhea incidents: knowledge, attitudes, actions, infrastructure, school policies and behavior of elementary school age children

Variable	Category	Frequency (F)	Percentage (%)
Occurrence of diarrhea	Diarrhea	98	69.5
	No diarrhea	43	30.5
	Total	141	100
Knowledge	Good	94	66.7
	Less	47	33.3
	Total	141	100
Attitude	Good	139	98.7
	Less	2	1.3
	Total	141	100
Action	Good	45	31.9

	Less	96	68.1
	<b>Total</b>	<b>141</b>	<b>100</b>
Infrastructure	Quality	31	22
	Not eligible	110	78
	<b>Total</b>	<b>141</b>	<b>100</b>
School policies	Quality	31	22
	Not eligible	110	78
	<b>Total</b>	<b>141</b>	<b>100</b>
Behaviour	Good	136	96.6
	Less	5	3.4
	<b>Total</b>	<b>141</b>	<b>100</b>

Based on Table 1, it is known that the incidence of diarrhea in students in grades 4, 5, and 6 in three elementary schools in Berbek Village in the last three months reached 98 children (69.5%), while 43 children (30.5%) did not experience diarrhea. Of the respondents, 94 children (66.7%) showed good knowledge regarding the incidence of diarrhea, and 139 children (98.7%) showed a good attitude in preventing diarrhea. However, only 96 children (68.1%) showed less action in avoiding diarrhea. The results of the infrastructure assessment showed that 110 infrastructure facilities (78%) did not meet the requirements. The evaluation of school policies on preventing diarrhoeal diseases also showed that 110 assessments (78%) were not eligible. However, the frequency of behaviour of elementary school children in grades 4, 5, and 6 towards the incidence of diarrhea showed that 136 children (96.6%) had good behaviour. This picture proves the students' behaviour in the three elementary schools was good.

Table 2

Relationship between knowledge, attitudes, actions, infrastructure, school policies, and behaviour with the incidence of diarrhea in elementary school children

Variable	Category	Occurrence of diarrhea				Total		P
		Diarrhea		Tidak diare				
		n	%	n	%	n	%	
Occurrence of diarrhea	Diarrhea	98	70	42	30	140	100	0.000
	No diarrhea	0	0	1	100	13	100	
	Total	94	66.7	47	33.3	141	100	
Knowledge	Diarrhea	91	90.1	5	9.9	96	100	0.000
	No diarrhea	7	15.6	38	84.4	45	100	
	Total	98	67	43	33	141	100	
Attitude	Diarrhea	0	0	45	100	45	100	0.000
	No diarrhea	94	97.9	2	2.1	96	100	
	Total	94	66.7	47	33.3	141	100	
Action	Diarrhea	20	69	11	31	31	100	0.891
	No diarrhea	73	66	37	34	110	100	
	Total	93	67	48	33	141	100	
Infrastructure	Diarrhea	73	66	37	34	110	100	0.891
	No diarrhea	20	69	11	31	36	100	
	Total	93	67	48	33	141	100	
School policies	Diarrhea	98	70	38	30	136	100	0.003

No diarrhea	0	0	5	100	5	100
Total	98	67	43	33	141	100

Based on Table 2, the results of the chi-square test show that with a value of  $p = 0.000 < 0.05$ ,  $H_0$  is rejected, which means that there is a relationship between knowledge, attitudes, and actions towards the incidence of diarrhea in elementary school-age children in the three schools in Berbek Village. On the other hand, the chi-square test with a value of  $p = 0.891 > 0.05$  showed that  $H_0$  was accepted, meaning there was no relationship between infrastructure and school policies on the incidence of diarrhea in elementary school-age children in all three schools in Berbek Village.

Discussion

This study aimed to see how elementary school-age children reacted to diarrhea cases in Berbek Village, Sidoarjo Regency, and how these behaviours were related to their knowledge, attitudes, and actions to prevent diarrhea. The study showed that although children's knowledge about diarrhea was very diverse, most understood it well.

The study showed that out of 146 respondents, only six children (4.1%) did not know about diarrhea, while 140 children (95.9%) knew. These results indicate that high knowledge correlates with good handling of diarrhea, while less knowledge correlates with poor behaviour. Using the Chi-Square Test, it was found that the value of  $p = 0.001 < 0.05$  means a relationship exists between knowledge and the incidence of diarrhea in elementary school-age children in Berbek Village. However, even though knowledge is good, there are still outbreaks of diarrhea because knowledge is only sometimes applied in daily practice.

This study is in line with a study [17] that found a significant relationship between school-age children's knowledge of PHBS and the number of cases of diarrhea. Other research by [18] also showed a correlation between knowledge and clean and healthy living behaviours (PHBS). High knowledge is expected to translate into effective preventive measures, such as washing hands with soap and avoiding unhygienic foods. However, more than knowledge alone is needed to prevent diarrhea because knowledge is often not followed by proper behaviour. In addition, the study results showed that children in grades 4, 5, and 6 had a good understanding of diarrheal diseases and how to prevent them, including washing hands and consuming snacks. This knowledge is essential for changing behaviour, in accordance with the theory[19] which states that knowledge comes from understanding obtained through sensing.

The assessment of the attitude of elementary school-age children showed that 144 children (98.7%) had a good attitude in preventing diarrhea, while only two children (1.3%) had a poor attitude. Although the majority have a good attitude, some still prefer random snacks outside of school. The Chi-Square statistical test results with a  $p = 0.000 < 0.05$  showed a relationship between attitude and the incidence of diarrhea. Research [17] and [20] support these findings, suggesting that a positive attitude towards PHBS is associated with diarrhea prevention efforts. Research by [21] found that a positive attitude towards clean and healthy living practices (PHBS) can reduce children's diarrhea risk. However, although children's attitudes tend to be positive, this is only sometimes reflected in daily actions. Knowledge of PHBS is essential to form a good attitude. Interaction, communication, education, and simulation effectively increase children's knowledge and attitudes towards diarrhoea prevention.

Although the knowledge and attitude of elementary school children towards preventing diarrheal diseases is quite good, their actions still need to be improved. Only 45 students (31.9%) had good actions in preventing diarrhea, while 96 students (68.1%) had terrible actions. The Chi-Square statistical test results showed a value of  $p = 0.000 < 0.05$ , indicating a relationship between actions and



the incidence of diarrhea. This study is in line with the findings [22], which show a significant relationship between PHBS action and the incidence of diarrhea. This shows the importance of teachers, parents, and the school environment in encouraging appropriate actions so that elementary school students are more aware and willing to change actions to prevent diarrhea. Strong support from the school environment is needed, such as the active role of teachers, education and counselling, adequate facilities and infrastructure, school policies, and student participation.

According to L. Green's theory in Notoatmojo states that enabling factors facilitate or support certain behaviours. The availability of facilities and infrastructure such as clean water, landfills, restrooms, and nutritious food is essential in supporting the implementation of PHBS. An assessment of infrastructure facilities in three primary schools showed that 36 facilities were eligible, while 110 were not. The chi-square test results showed a value of  $p = 0.891 < 0.05$ , which means there was no relationship between school supplies and the number of diarrhea cases, in line with research that states that the availability of adequate facilities such as clean water, clean toilets, and handwashing facilities is critical in preventing diarrhea [23]. The limitations of these facilities can be an obstacle to practical diarrhea prevention efforts.

Facilities and infrastructure in schools also play an essential role in supporting clean and healthy living behaviours. Good facilities in the school environment can reduce the risk of diarrheal diseases. Providing handwashing facilities with soap, running water, and clean toilets is essential to create a hygienic environment. Although the infrastructure is inadequate, this study highlights the importance of information media in disseminating knowledge about health as one of the prevention of diarrhea. Research [24] confirms that the media is essential for communicating health information. In addition, research by [25] emphasizes the importance of access to adequate sanitation facilities in schools to prevent diarrhoea.

Schools play an essential role in developing understanding and knowledge about health through health literacy policies. Health literacy is critical to the development of individuals and communities, and schools must provide information and solutions to prevent disease. The chi-square test results showed a value of  $p = 0.891 < 0.05$ , indicating no relationship between school policies and diarrhea cases. However, research [26] shows the importance of school policies in supporting health literacy improvement. Research by [27] found that school-based health and nutrition programs can improve student attendance and academic performance by reducing the incidence of water-related illnesses such as diarrhea.

Hygiene education should be an integral part of the school curriculum to ensure that children understand the importance of hygiene in preventing disease. In Berbek Village, hygiene education can be integrated into the primary school education program to increase awareness and hygiene practices among students. By understanding and implementing good hygiene practices, the incidence of diarrhea among primary school students will likely be significantly reduced.

In Notoatmodjo's book, behaviour is defined as diverse human activities. Lawrence Green's theory states that behaviour is influenced by predisposing, permissive, and reinforcing factors. A total of 141 elementary school-age students showed good behaviour related to diarrhea cases, while five students showed poor behaviour. The chi-square test results showed a  $p = 0.003 < 0.05$ , indicating a correlation between behaviour and diarrhea cases. This study is supported by findings [28] and [29], which show a significant association between PHBS and the risk of diarrhea. Referring to Lawrence Green's theory, the knowledge and attitudes of elementary school-age children greatly influence their behaviour. To change children's behaviour, educating them on proper handwashing techniques and

increasing hand soap use in schools is essential. The role of teachers is vital in encouraging clean and healthy living practices

This study's results align with various international studies that show the importance of health education and environmental support in preventing diarrhea in children. For example, research by [30] shows that structured and sustainable educational interventions in schools can improve children's knowledge and behaviour regarding hygiene and disease prevention.

In elementary school, there are various factors that affect children's behaviour related to PHBS. For example, there needs to be more educational posters about PHBS and how to wash hands correctly, as well as a lack of understanding of the importance of hand washing and proper techniques. Observations and questionnaires show that poor handwashing habits can increase the risk of diarrhea. Based on the results of this study, it is recommended that children get adequate health education. Research [31] shows that good health education can increase children's knowledge about diarrhea. Media such as leaflets, posters, comics, videos, films, and educational games can be used to provide health education.

## Conclusions

The results of the study showed that the level of knowledge was good (95.9%) and poor (4.1%), good attitude (98.7%) and poor (1.3%), good (31.9%) and poor (68.1%) actions, infrastructure facilities were qualified (24.7%) and not qualified (75.3%). School policies were qualified (75.3%) and unqualified (24.7%). The results of Bivariate analysis showed a significant relationship between knowledge ( $p=0.001$ ), attitude ( $p=0.000$ ), and behaviour ( $p=0.003$ ) on the incidence of diarrhea, but there was no relationship between infrastructure facilities ( $p=0.891$ ) and school policies ( $p=0.891$ ).

Based on the research results, the suggestions are as follows: 1. School principals should use attractive and easy-to-understand visual media to increase students' understanding of clean and healthy living behaviours (PHBS) 2. Equip school infrastructure facilities to be more adequate 4. Principals are advised to establish policies regarding disease prevention to increase student compliance in maintaining cleanliness and preventing diseases, such as diarrhea, in the school environment.

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## Informed Consent Statemen

Informed consent was obtained from all subject involved in the study.

## Conflicts of Interest

The authors declare no conflict of interest.

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