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Determinants of Diarrhea Incidence in Islamic Boarding School: A Case Study at Poskestren

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Abstract: Diarrhea is one of the most common infectious diseases. A survey of students in Islamic boarding schools showed that 9 out of 10 students experience diarrhea every month. This can be caused by several factors, such as environmental, sanitation, lack of knowledge, etc. Furthermore, the main factor in the spread of diarrhea is poor sanitation habits. This research will be able to answer the key determinants contributing of diarrhea incidence in Islamic Boarding Schools, especially in Poskestren Mazro'atul Fattah Al-Maliky Islamic Boarding School, Lamongan. This research is an analytical descriptive which uses primary data in the form of questionnaires. The independent variables studied were behavioral factors (hand and nail hygiene), environmental factors (latrines and clean water), other factors (knowledge, food, drink and psychological), while the dependent variable was the incidence of diarrhea. The result is behavioral and environmental factors are partially related to the incidence of diarrhea in students of the Mazro'atul Fattah Al-Maliky Islamic Boarding School which has a significance value of both ($p < 0.05$). Otherwise, knowledge, food and drink, and psychological factors have no influence on the incidence of diarrhea. Keeping the environment clean and implementing good sanitation behaviour were very important in preventing the spread of diarrheal diseases. Therefore, it is necessary to support and develop the poskestren programme on clean and healthy living behaviour in Islamic boarding schools.
Keywords: Diarrhea, Hygiene, Poskestren, Boarding School

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Introduction

Diarrhea is one of the most common diseases. In 2019, the incidence of diarrhea was 2,549 people with a case fatality rate (CFR) of 1.14% (Indonesian Ministry of Health, 2019; Indonesian Ministry of Health, 2020). Diarrhea is an increase in the frequency of defecation more than 3 times with the consistency of liquid faeces followed by mucus or blood (Almayehu et al, 2020). Based on the duration of its occurrence, diarrhea is divided into acute and chronic (Rokhmah et al., 2017). Acute diarrhea is an event that occurs less than 2 weeks, while chronic occurs more than 2 weeks (Ningsih et al., 2017). Based on data from the profile of Sekaran Lamongan health care, the incidence of diarrhea was the highest morbidity rate in 2023, which was 883 cases. Morbidity is one of the indicators used to measure the health status of the population. The higher the morbidity, the worse the health status.

Pondok Pesantren Mazro'atul Fattah Al-Maliky is located in Siman Village, Sekaran District, Lamongan Regency, East Java. A survey of students shows that 9 out of 10 students experience diarrhea every month. This may be caused by several factors, such as environment, sanitation, lack of knowledge, etc. Inadequate wastewater treatment facilities and limited access to clean water continue to be significant problems in Indonesia. In fact, the main factor in the spread of diarrhea is poor sanitation habits. Therefore, people in these circumstances are more likely to be exposed to contaminated water, which increases the likelihood of diarrhea transmission (Sakti et al., 2023). In addition, the

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absence of a Poskestren program focused on clean and healthy living behavior (PHBS) at Mazro'atul Fattah Al-Maliky Islamic Boarding School, particularly in enhancing students' knowledge and promoting behavioral change, may contribute to the high incidence of diarrhea in the Islamic Boarding School.

This study aims to identify the key determinants contributing to diarrhea incidence in Islamic boarding schools, with a specific focus on Poskestren Mazro'atul Fattah Al-Maliky. The findings from this research can serve as a valuable reference for the development and planning of the Poskestren program, which functions as a community-based health promotion initiative in collaboration with the Sekaran Lamongan Health Center.

Previous research conducted by Trikora & Siwiendrayanti (2015) states that the most common contributors that cause diarrhea are unhygienic practices, such as preparing food with unwashed hands after defecating or cleaning faeces and factors that affect the quality of canteen sanitation facilities. In addition, there are food-related issues (snacks) that are often consumed by children today are usually some kind of hawker food (meal) and light street food (snack) where the food is consumed in unfavourable packaging. (Trikora and Siwiendrayanti, 2015). In line with Utami & Luthfiana's research (2016), which states diarrhea can be triggered by fecal-oral transmission, i.e through food or drinks contaminated with bacteria or direct contact with the patient's hands or indirectly with tools (dirt, flies, food, liquids, dirty fingers).

Therefore, the contributing factors to diarrhea are as follows:

1. Behavioural : such as: a. Handwashing habits, not in the habit of washing hands with soap before eating, after urination and after defecation. b. Unhealthy food preparation, such as food stored in open spaces without a lid, so that flies easily fall on the food.
2. Environmental and personal hygiene : inadequate access to clean water and poor environmental and personal hygiene. In addition, there are factors that can increase susceptibility to diarrhea in the affected population, such as child age, malnutrition, especially malnourished children, immunodeficiency or immunosuppression, and measles (Utami and Luthfiana, 2016).
3. Age : which is most prevalent in the first two years of life, with the highest incidence in the 6-11 month age group.
4. Seasonal factors The incidence of diarrhea can vary according to the geographical location of the area. In subtropical regions, bacterial diarrhea is more common in summer season, while viral diarrhea is more common in winter season. In tropical areas such as Indonesia, rotavirus diarrhea can occur throughout the year and is more common in the dry season, while bacterial diarrhea is more common in the rainy season.
5. Latrine : The risk of diarrhea is higher in families that do not have their own latrines. People's personal hygiene is supported by routine situations that pollute the neighbourhood, especially in areas with water problems and unhealthy defecation habits. Provision of public toilets can reduce the risk of diarrhea.
6. Water Source : the quality of water used by families plays a critical role. While raw water may be treated before use, some households directly use untreated water.The quality of raw water depends on where it comes from. There are several sources of water, for example: rainwater, underground water (dug wells, pump wells), surface water (rivers, lakes) and springs The risk of diarrhea in families using dug wells is 1.2 to 6 times higher than in families using pump wells (Utami and Luthfiana, 2016).

Based on the preceding explanation, determinants of diarrhea incidence can be classified into two broad categories: behavioral and environmental (Utami & Luthfiana, 2016; Trikora and Siwiendrayanti, 2015). Most boarding schools would not have health education programs or proper sanitation infrastructure. The very purpose, therefore, is to find out the local behaviors and practices that trigger the outbreak of diarrhea disease. This would certainly point to specific health promotion strategies, like the Poskestren program, that could be useful in hygiene and sanitation awareness among communities. Furthermore, the findings from this study can further contribute to identifying necessary data for interventions, not only in this boarding school but also in other similar institutions. This may lead to knowledge of the local factors that will result in community-based health programs for students' health on a wider basis.

Materials and Methods

This research was an observational analytical research by explaining a phenomenon or characteristic of a particular condition either individually or in groups. Then researchers analyzed between risk factors and effect factors on a health phenomenon (Notoatmodjo, 2014). This study design used cross sectional. This research used primary data in the form of questionnaires. The population was all students of the Mazro'atul Fattah Al-Maliky Islamic Boarding School, Sekaran District, with total of 126 students consisting of 81 male students, and 45 female students. The minimum sample size based on the Slovin formula is 56 samples. The sample in this study was students at the Mazro'atul Fattah Al-Maliky Islamic Boarding School, Sekaran District, who met the following criteria:

1. Inclusion criteria:
   a. Registered santri in the Mazro'atul Fattah Al-Maliky Islamic Boarding School, Sekaran District.
   b. Santri who are willing to be respondents
2. Exclusion criteria:
   a. Santri who has experienced diarrhea with severe dehydration so they need treatment at the hospital.

Consecutive sampling were usedwhere this non-probability method included the selected subject based on availability or proximity to the researcher, not through a random process.

The independent variables studied were behavioral factors (hand and nail hygiene), environmental factors (latrines and clean water), other factors (knowledge, food, drink and psychological) of students at the Mazro'atul Fattah Al-Maliky Islamic Boarding School, while the dependent variable was the incidence of diarrhea.

This study used primary data obtained from a questionnaire totaling 41 questions divided into 11 questions representing behavioral factors, 11 questions representing environmental factors, 18 questions representing other factors, and one question representing the incidence of diarrhea. Then the results are recorded on a computer or laptop to be processed and processed data. Each question has 3 Linkert-type answer options, i.e : no (0), sometimes (1), yes (2). Each of the 21 answers had the highest score of 2 and the lowest 0, but there were 6 questions that had a reverse score. This questionnaire has been tested for validity and reliability.

This study used univariate and bivariate data analysis. In univariate analysis, data are grouped based on each variable to obtain an overview of each variable using percentage size (Notoatmodjo, 2014). To determine the percentage of risk factors obtained, the data is then processed statistically in the form of frequency of the variables to be studied. Meanwhile, to prove the influence between two variables using bivariate analysis. The bivariate statistical test used is Logistic Regression. Logistic regression tests are used to compare several sample groups with the same variable and coincide with the variable under study on an ordinal scale. The significance level used is 95% with a meaning value of 5% (p = 0.05). If the p value > 0.05 then the hypothesis is rejected, while if the p value < 0.05 then the hypothesis is accepted (Notoatmodjo, 2014).

Result and Discussion

Table 1. Respondent Gender Characteristic

	Frequency	%
Male	30	51,7
Female	28	48,3
Total	58	100

The general description of respondents is known based on the gender of the respondents of the students of the Mazro'atul Fattah Al-Maliky Islamic Boarding School. Based on table 1. It was found that the students of the Mazro'atul Fattah Al-Maliky Islamic Boarding School were 30 male students (51.7%) and 28 female students (48.3%).

Table 2. Incidence of Diarrhea

Incidence Diarhea	Frequency	%
Occasionally (1-2x/month)	47	81
Often (3-4x/month)	9	15,5
Always (>5x/month)	2	3,4
Total	58	100

Incidence of Diarrhea in students have various conditions, while this can be seen in table 2. The data shown that the highest prevalence occurs in students who occasionally experience diarrhea (1-2 times per month), as many as 47 students (81.0%).

Table 3. Determinants of Diarrhea Incidence

Determinant	Mean	**Category**
Behavior	1.588	Good
Environment	1.508	Good
Knowledge	1.343	High
Food and Drink	1.633	Good
Psychological	1.172	Enough

Determinants of diarrhea among students at Mazro'atul Fattah Al-Maliky Islamic Boarding School through interviews using questionnaires. The observation of each determinant used was approached in the aspects of behaviour, environment, knowledge, eating and drinking pattern, and psychological. Each questionnaire contains a series of questions and score assignment in each answer. The analysis of determinants was conducted by describing the answers of each question and counting an average value. As shown in Table 3, the determinants for diarrhea among students at Mazro'atul Fattah Al-Maliky were found to be "good" in behavioral, environmental, and food and drink factors. Only psychological factors was in enough category.

Table 4. Analysis of Determinants of Diarrhea Incidence

	Chi-Square	df	Sig.
Pearson	222.415	255	0.82
Deviance	175.867	255	1.00
Link function : Logit			

The statistical analysis of regression logistic function is to understand the impact of the independent variable (behavioral, environmental, knowledge, food

and drink, as well as psychological), on the dependent variable (incidence of diarrhea).

Table 4. The Good of Fit test is used to evaluate whether the logistic regression model matches the observational data. The decision is taken based on the significance value (sig), where if the significance value exceeds alpha (sig > 0.05), it can be concluded that the logistic regression model is in accordance with the observation data. Based on the information in the table above, Pearson's significance value is (sig = 0.820 > 0.05). Thus, it can be concluded that the logistic regression model corresponds to the observational data.

Table 5. Test Result Determinants of Diarrhea Incidence

		Estimate	*Nagelkerke*	*Sig.*	*95% Confidence Interval*	
					Lower Bound	*Upper Bound*
Threshold	[Diare = 0]	-2.226	0.105	0.413	-7.551	3.099
	[Diare = 1]	2.463		0.375	-2.978	7.904
Location	QP	-0.102		0.049	-0.271	0.057
	QL	-0.153		0.038	-0.015	0.297
	QPe	0.110		0.508	-0.227	0.427
	QMM	0.049		0.628	-0.138	0.237
	QPs	0.191		0.513	-0.325	0.007

Table 5. was the result of ordinal logistic regression test. Based on the table, information is given that the value of the Nagelkerke test (Pseudo R-Square) is 0.105. This can be interpreted as the ability of the independent variable, consisting of behavioral, environmental, knowledge, eating and drinking factors, as well as psychology, to influence the dependent variable, namely the incidence of diarrhea, by 10.5%. In the table, there is a significance value (Sig), where the analysis decision is based on whether the value (sig < 0.05), which indicates that the variable has a significant impact on the dependent variable. According to table 5, it was informed that behavioral factors and environmental factors have significance values are (sig = 0.049 < 0.05) and (sig = 0.038 < 0.05). Therefore, it can be concluded that partially, behavioral and environmental factors affect the incidence of diarrhea in Santri Pondok Pesantren Mazro'atul Fattah Al-Maliky. Conversely, the significance value of other factors does not meet the significant requirements (sig > 0.05), so it can be interpreted that knowledge, food and drink, and psychological factors have no significant influence on the incidence of diarrhea in Santri Pondok Pesantren Mazro'atul Fattah Al-Maliky.

The incidence of diarrhea in respondents in the data obtained previously showed that the students of the Mazro'atul Fattah Al-Maliky Islamic Boarding School from male students amounted to 30 students (51.7%), while the female student was 28 students (48.3%). This data is important, because some studies show that gender is related to the incidence of diarrhea. Other studies have shown that the incidence of diarrhea tends to be more common in men in the majority of all groups, as indicated by results grouped by gender. The analysis included 785 male participants, accounting for 56.2% of the total study participants (95% CI 53.6-58.9), compared to 611 female participants, who included 43.8% (95% CI 41.1-46.4). This may be related to other mechanisms, such as variations in environmental exposure or physiological differences between patients (Jawad Hashim et al., 2019).

The prevalence of diarrhea in students of Mazro'atul Fattah Al-Maliky Islamic Boarding School with the highest condition was occasionally experiencing diarrhea (occurs 1-2 times in 1 month) as many as 47 students (81%). This relates to several factors, ranging from behavioral factors, environment, knowledge, and psychological factors.Trikora and Siwiendrayanti (2015) conducted a previous study, which reported that unsanitary practices such as using unwashed hands to cook after defecation or cleaning feces, as well as the state of sanitation facilities, are factors most often associated with the development of diarrhea. Diarrhea is a common condition that can be caused by a variety of factors, including infections, food intolerances, or certain medications. Practicing good hygiene, especially frequent handwashing with soap and water, can help prevent the spread of diarrhea-causing infectious agents.

From the results obtained ranging from behavioral factors; Nail hygiene is still fairly poor. This is supported by research by Ibrahim et al (2021) which shows that in respondents who experience diarrhea, it is found that a significant percentage of respondents show poor nail hygiene. Specifically, of all respondents with diarrhea who were evaluated for nail hygiene, 64.9% had dirty nails. In addition, it was also observed that 68.2% of these children had longer nails which were considered unhygienic (Ibrahim et al., 2021). Maintaining good personal hygiene habits can also reduce the risk of diarrhea.

In addition, ensuring that the environment is clean and healthy, can also help prevent the spread of infectious agents that can cause diarrhea (Trikora and Siwiendrayanti, 2015).Most cases of diarrhea are caused by bacterial infections that spread through the fecal-oral route. This means that the bacteria that cause the infection are' present in the feces of an infected person, and can be transmitted to others through contaminated water or food. This is closely related to water sources, which have the potential to spread diseases through microorganisms both transmitted through the water itself, known as water-borne disease, and through equipment that has been washed with water, called water-washed disease (Harsa, 2019). Water hygiene is very important in preventing the spread of diarrheal diseases. Poor water hygiene practices, such as not washing hands before eating or drinking, using

untreated water for cooking, or leaving uncovered water containers outside, can increase the likelihood of contamination and transmission of these pathogens (Utami and Luthfiana, 2016).Preventing diarrhea requires access to clean and safe drinking water, good sanitation practices, and good hygiene habits. Communities can ensure safe water sources by treating water with disinfectants, filtering it, or boiling it before consumption. In addition, individuals can practice good hygiene by washing their hands with soap and water, especially before preparing or consuming food, after using the toilet. Therefore, it is very important to prioritize sanitation education and infrastructure development as part of public health efforts to improve public health and welfare (Utami and Luthfiana, 2016).

There are several factors that are thought to be related to the incidence of diarrhea, ranging from behavioral factors and environmental factors have significance values respectively are (sig = 0.049 < 0.05) and (sig = 0.038 < 0.05). Clean living behavior has a significant association with the incidence of diarrhea. Daily hygiene practices, including proper handwashing after using the toilet or before touching food, can play a role in preventing the spread of diarrhea-causing pathogens (Nawalia et al., 2022). In addition, proper domestic waste management, environmental hygiene, and the use of clean water also play an important role in reducing the risk of diarrhea. The adoption of clean living behaviors can be key in reducing the prevalence of diarrhea, especially in areas where access to sanitation and hygiene facilities is generally limited. Education and health promotion related to clean living practices are important steps in efforts to prevent diarrhea and improve overall public health (Irianty et al., 2018). A clean environment has a positive effect on the incidence of diarrhea, in research Ibrahim et al (2021) explained that the availability of sanitation facilities has a crucial role in efforts to prevent the spread of diarrhea. In this context, environmental characteristics play a very important role in encouraging optimal hygiene practices and reducing the incidence of diarrhea. Findings from this study show that as many as 73.5% of families in the community have latrines, reflecting that a large portion of the population has access to safe and hygienic sanitation facilities. In addition, this study found that as many as 89.4% of families in the majority have complied with the guidelines set by the Ministry of Health regarding the installation and maintenance of latrines. In another study, as described in Getachew et al's (2018) study, out of a total of 736 people surveyed from 736 households, there were 163 people (22.1%) who had risk factors for diarrheal morbidity, including roofing material [AOR: 1.99, 95% CI (1.1–3.82)], handwashing facilities [AOR: 0.52, 95%CI (0.33–0.82)], the presence of latrine facilities [AOR: 1.65, 95% CI (1.01–2.72)], presence of feces around the yard [AOR: 1.65, 95% CI (1.01–2.72)]. These findings suggest that these factors have a significant association with diarrheal morbidity (Getachew et al., 2018). In addition to the risk of water contamination, inadequate hygiene practices, such as not washing hands after using the toilet, can also contribute to the spread of diarrhea. Human feces contain a variety of bacteria that can survive on various surfaces and objects for long periods of time, so pathogens can easily spread from one individual to another. Therefore, maintaining environmental cleanliness and implementing good sanitation practices are very important in efforts to prevent the spread of diarrheal diseases.

Conclusion

The highest incidence of diarrhea conditions in students was occasionally experiencing diarrhea (occurs 1-2 times in 1 month) as many as 47 students (81%) found in the Mazro'atul Fattah Al-Maliky Islamic Boarding School. Behavioral and environmental factors are partially related to the incidence of diarrhea in students of the Mazro'atul Fattah Al-Maliky Islamic Boarding School which has a significance value of both ($p < 0.05$). The incidence of diarrhea can be prevented by applying clean and healthy living such as washing hands before eating and consumption of clean drinking water, in this study it was found that the behavior of water consumption in students was not good so that the transmission of diarrhea through fecal-oral still occurs.

In this case, the role of poskestren was crucial to enhance the knowledge and behaviour change of students in the boarding school. Thus, it is necessary to encourage the development and subsequent involvement of students in poskestren programmes related to create a clean and healthy living behaviours and personal hygiene and sanitation.

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