

# The Relationship Between Home Environmental Sanitation and the Incidence of Dengue Fever in Lhok Bengkuang Village, Tapaktuan District, South Aceh Regency

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## Abstract

Dengue hemorrhagic fever (DHF) is a disease caused by the dengue virus which is transmitted through the bite of the *Aedes aegypti* or *Aedes albopictus* mosquito. Based on the problem, most people have poor housing conditions, dirty water reservoirs, and lots of garbage piles around the house. The purpose of this study is to determine whether there is a relationship between home environmental sanitation and the incidence of dengue hemorrhagic fever in Lhok Bengkuang village, Tapaktuan district, South Aceh Regency. As well as analyzing the condition of the house, the condition of the water reservoir, and the waste disposal system. This study uses a quantitative research method with a *cross-sectional* approach. The population in this study were 611 heads of families with a sample size of 86. Data collection used questionnaires and direct interviews. Data analysis used the Chi-Square Test. The results of the study showed a significant relationship between house conditions (*p-value* = 0.000), water reservoir conditions (*p-value* = 0.000), and waste disposal systems (*p-value* = 0.000) with the incidence of Dengue Hemorrhagic Fever in Lhok Bengkuang village. The conclusion of the study is that poor house conditions have a relationship with the incidence of Dengue Hemorrhagic Fever, then poor water reservoir conditions have a relationship with the incidence of Dengue Hemorrhagic Fever, and poor waste disposal systems also have a relationship with the incidence of Dengue Hemorrhagic Fever.

**Keywords:** Dengue Fever Incident; Sanitation; Home Environment

## Introduction

*Dengue hemorrhagic fever* (DHF) is a disease caused by the dengue virus, transmitted through the bite of the *Aedes aegypti* or *Aedes albopictus* mosquito. *Dengue hemorrhagic fever* (DHF), commonly known as *dengue hemorrhagic fever* (DHF), is one of several infectious diseases that cause health problems worldwide, especially in developing countries (Hermansyah et al., 2024). The incidence of DHF is closely related to environmental sanitation conditions that support the breeding grounds of the *Aedes aegypti* mosquito as its vector. *Aedes aegypti* and *Aedes albopictus* act as primary and secondary vectors for several major mosquito-borne diseases, including dengue fever (Jami'atulhita & Wulandari, 2022). Factors contributing to the increasing incidence of dengue fever include high or dense vector populations, high population density associated with housing development, increasing urbanization, increasing modes of transportation, and minimal awareness of sanitation in the home environment (Nurhayati et al., 2023). The condition of homes, water reservoirs, and waste disposal systems are closely related to the growth and reproduction of dengue mosquitoes, which are transmitted by the *Aedes aegypti* mosquito. Dengue fever is caused by

the *Aedes aegypti* mosquito, which breeds in poor environments and uncovered holes. The spread of environmental diseases such as dengue fever may be caused by unhealthy living environments and poor community behavior (Husin et al., 2024).

According to the WHO (*World Health Organization*), sanitation is the effort to control various physical environmental factors that affect humans, especially those that influence, or damage, health, physical development, or survival (Hiskia et al., 2021). Sanitation also encourages handwashing with soap as part of hygiene care. In other words, sanitation includes controlling all elements of the human physical environment, including water, air humidity, temperature, soil, wind, houses, and other inanimate objects (Pereiz et al., 2024). Sanitation is a component of public health that is influenced by environmental health (Alamsyah, 2024). Assessment of home environmental sanitation includes components of the house, sanitation conditions, and occupant behavior using a healthy home assessment instrument that has been explained in the technical guidelines for healthy home assessment of the Ministry of Health of the Republic of Indonesia (Hanifah, 2022).

According to reports from the European Centre for Disease Prevention and Control (ECDC) and the World Health Organization (WHO), dengue cases have increased rapidly worldwide in recent decades, with cases reported to the WHO increasing from 505,430 in 2000 to 6 million in 2023 and approximately 6,000 deaths reported from 192 countries. This makes 2023 the year with the highest number of dengue cases in history (Mardianita et al., 2024).

In Indonesia, in 2022 the number of dengue cases in Indonesia reached 143,000 cases, with the highest number of dengue incidents in the provinces of West Java, East Java and Central Java. The distribution of deaths due to dengue was concentrated in the three largest provinces, namely West Java, East Java and Central Java which had 58% of the total 1,236 deaths. Dengue cases occurred equally in women (49%) and men (51%). Then there was a decline in cases in 2023 with the number of cases 114,720 and 894 deaths IR 41.36 / 100,000 population and CFR 0.78%. In 2024, cases began to increase with the number of 186,324 cases IR 66.58 / 100,000 population and 1120 deaths CFR 0.6%. These dengue cases were reported from 481 districts/cities in 36 provinces. Deaths occurred in 246 districts/cities in 32 provinces (Ministry of Health, 2023).

According to reported data, there were 2,079 dengue fever cases in Aceh in 2022, with 16 deaths. This number represents an increase from the previous year. The incidence rate (IR) for dengue fever in 2022 was 38 per 100,000 population (Hanif et al., 2023).

South Aceh Regency also reported an increase in dengue fever cases every year. which showed 60 cases in 2019, and decreased to 10 cases in 2020, in 2021 recorded 16 dengue fever cases and 1 death, while in 2022 showed an increase to 67 dengue fever cases with the same number of deaths, namely 1 and there were 69 cases and 2 deaths throughout 2023. The health center with the highest number of dengue fever sufferers from 2022 to 2024 was the Lhok Bengkuang Health Center working area, which was 47 cases, Drien Jalo Health Center 19 cases, Kluit Utara Health Center 9 cases, Sawang Health Center 6 cases and Menggamat Health Center 4 cases (South Aceh Regency Health Office, 2024).

Based on the initial survey at the Lhok Bengkuang Community Health Center, the data obtained covers the years 2022 to 2024 where 47 cases of DHF were reported, 1 of whom was reported dead. Referred to from the perspective of village-level data, the Lhok Bengkuang Community Health Center's working area consists of 8 villages with the number of cases, namely 6 cases in Batu Itam Village, 17 cases in Lhok Bengkuang Village, 11 cases in Lhok Bengkuang

Timur Village, 6 cases in Pasar Village, 2 cases in Panton Luas Village, 2 cases in Panjupian Village, 2 cases in Air Pinang Village and 1 case in Lhok Rukam Village. Of the eight villages, the researcher chose Lhok Bengkuang Village, which had 17 cases which ranked first and the number of DHF sufferers with 1 death in the Lhok Bengkuang Community Health Center's working area, with the highest number of sufferers in children, namely 8 children aged <15 years.

The person in charge of the Dengue Fever Program at the Lhok Bengkuang Community Health Center stated that based on the problem, most people in Lhok Bengkuang village have the habit of closing windows without curtains or blinds, and not installing wire mesh on window vents, with damp and dark house conditions. Many residents also often pile up organic and inorganic waste, and do not manage waste properly. In addition, the cleanliness of water reservoirs is often neglected, with the non-use of larvicide or abate powder, the absence of covers on water reservoirs, and the absence of traps or mosquito repellents. These conditions have the potential to become breeding grounds for the Aedes aegypti mosquito, the cause of dengue fever (DHF).

This study was conducted to identify the relationship between sanitation and the home environment with the incidence of dengue fever in Lhok Bengkuang village, with the hope of providing insight to develop strategies for handling environmental and public health problems and increasing public awareness of the importance of maintaining the cleanliness of their environment. The purpose of this study is to determine whether there is a relationship between home environmental sanitation and the incidence of dengue fever in Lhok Bengkuang village, Tapaktuan District, South Aceh Regency. As well as analyzing the condition of the house, the condition of the water reservoir, and the waste disposal system.

## Method

This research design is a quantitative study using an analytical design to determine the relationship between home environmental sanitation (Independent variable) in the incidence of dengue fever (Dependent Variable) as an effort to prevent Dengue Hemorrhagic Fever (DHF). This research method uses a quantitative method because the research data is in the form of numbers and analysis using statistical data with a cross-sectional approach. This research was conducted in Lhok Bengkuang village, Tapaktuan sub-district, South Aceh Regency. The population in this study were all heads of families in Lhok Bengkuang village, Tapaktuan sub-district, South Aceh Regency in 2022 to 2024 totaling 611 families with a sample of 86. This study uses the Slovin formula so the sample obtained in this study was 86 respondents. This research sample was taken using the Slovin formula where this formula is usually used in survey research with a large sample size, so a formula is needed to get a small sample but can represent the entire population. The margin of error set is 10% or 0.01 with the formula  $n = N / 1 + N (e)^2$ . The sampling technique used purposive sampling. The data collection technique used a questionnaire. SPSS was used for univariate and bivariate analysis. The chi-square test was used to answer the hypothesis.

## Result

### Univariate Analysis

Univariate results based on House Conditions, Water Storage Conditions, and Waste Disposal Systems, and Dengue Fever Incidence in Lhok Bengkuang Village (Table 1).

Table 1. Frequency Distribution of Respondents

No	Frequency Distribution of Respondents	n	%
1. Housing Condition	Not Good	55	64.0
	Good	31	36.0
	<b>Total</b>	<b>86</b>	<b>100.0</b>
2. Condition of water reservoirs	Not Good	56	65.1%
	Good	30	34.9%
	<b>Total</b>	<b>86</b>	<b>100.0</b>
3. Waste disposal System	Not Good	52	60.5%
	Good	34	39.5%
	<b>Total</b>	<b>86</b>	<b>100.0</b>
4. incidence of dengue hemorrhagic fever	Never	66	76.7%
	Ever	20	23.3%
	<b>Total</b>	<b>86</b>	<b>100.0</b>

Based on Table 1, it shows that out of 86 respondents who have poor house conditions, there are 55 respondents (64.0%), while the condition of the house is good there are 31 respondents (36.0%). This shows that the majority of respondents have poor house conditions, while in the variable of poor water reservoir conditions there are 56 respondents (65.1%), while those who have good water reservoir conditions there are 30 respondents (34.9%). This shows that the majority of respondents have poor water reservoir conditions, in the variable of poor Waste Disposal System there are 50 respondents (58.1%), Good Waste Disposal System there are 36 respondents (41.9%). This shows that the majority of respondents have poor Waste Disposal System. Respondents who have never had dengue fever are 66 respondents (76.7%), while those who have had dengue fever are 20 respondents (23.3%).

## Bivariate Analysis

Based on the results of the analysis between the relationship between house conditions, water reservoir conditions, and waste disposal systems with the incidence of Dengue Fever in Lhok Bengkuang village (Table 2).

Table 2. Bivariate Analysis Result

Variable	Dengue Incident						P-value
	Never		Ever		Total		
	Category	n	%	n	%	n	%
Housing Condition	Good	30	45.5	1	5.0	31	36%
	Not Good	36	54.5	19	95.5	55	64%
	<b>Total</b>	<b>66</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>86</b>	<b>100.0</b>
Condition of water reservoirs	Good	29	43.9	1	5.0	30	34.9
	Not Good	37	56.1	19	95.0	56	65.1
	<b>Total</b>	<b>66</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>86</b>	<b>100</b>
Waste Disposal System	Good	33	50.0	1	5.0	34	39.5
	Not Good	33	50.0	19	95.0	52	60.5
	<b>Total</b>	<b>66</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>86</b>	<b>100</b>

Based on table 2 shows the relationship between the condition of the house, the condition of the water reservoir, and the waste disposal system, to the incidence of dengue fever in Lhok Bengkuang village. Respondents who have



good house conditions with never dengue fever incidents are 30 respondents (45.5%), while respondents with poor house conditions with ever dengue fever incidents are 19 respondents (95.5%). The results of the statistical test obtained a p-value = 0.000, it can be concluded that there is a significant relationship between house conditions and dengue fever incidents. Respondents who have good water reservoir conditions with never dengue fever incidents are 29 respondents (43.9%), while respondents with poor water reservoir conditions with ever dengue fever incidents are 19 respondents (95.5%). The results of the statistical test obtained a p-value = 0.000, it can be concluded that there is a significant relationship between water reservoir conditions and dengue fever incidents. Respondents who have a good waste disposal system with never dengue fever incidents are 33 respondents (50.0%), while respondents with a poor waste disposal system with ever dengue fever incidents are 19 respondents (95.0%). The results of the statistical test obtained a p-value = 0.000, so it can be concluded that there is a relationship between the waste disposal system and dengue fever incidents.

## Discussion

### **The relationship between housing conditions and the incidence of Dengue Hemorrhagic Fever in Lhok Bengkuang Village**

Based on the results of the study, it shows that respondents who have experienced dengue fever with poor home conditions were 19 respondents, this is because most respondents are still less concerned about the condition of the house, especially those who do not install wire mesh on the ventilation and windows of the house, do not use mosquito nets or anti-mosquito lotion, and the home environment is still flooded. Meanwhile, respondents who have experienced dengue fever with good home conditions were 1 respondent, this is because respondents have implemented good home conditions such as using wire mesh on ventilation and windows, as well as using mosquito nets on beds and using anti-mosquito lotion

Respondents who have never experienced dengue fever with poor house conditions are 36 respondents, this is because the condition of the house is good, but there are still some respondents' houses do not have wire mesh on the house ventilation and there are puddles of water in the house environment. Meanwhile, respondents who have never experienced dengue fever with good house conditions are 30 respondents, this is because some respondents care about good house conditions such as using wire mesh on ventilation and windows, using mosquito nets and anti-mosquito lotion, and avoiding puddles of water.

This research aligns with research conducted by Hadiyanti et al., 2025, which showed a significant relationship between home conditions and the incidence of Dengue Fever (p-value = 0.000).

Ventilation and windows in a home are used not only for lighting but also for air circulation. The presence and daily opening of windows allows for air exchange, thus improving home health. Houses without mosquito netting/stirrin ventilation make it easier for mosquitoes to enter and bite people, while ventilation with cloth/wire netting can prevent mosquitoes from entering and reduce the likelihood of being bitten (Sari et al., 2017).

### **The relationship between the condition of water reservoirs and the incidence of dengue fever in Lhok Bengkuang village**

The research results showed that 19 respondents had experienced dengue fever cases in water reservoirs in poor condition. This was due to the majority of respondents' water reservoirs being cloudy, lacking covers, and cleaning only

once a month. Meanwhile, one respondent had experienced dengue fever in water reservoirs in good condition. This was due to some respondents rarely cleaning their water reservoirs once a week, which causes cloudy water and attracts mosquito larvae.

37 respondents had never experienced dengue fever in water reservoirs in poor condition. This was due to the fact that some respondents rarely drained their water reservoirs, due to laziness and a lack of concern for cleanliness. Meanwhile, 29 respondents had never experienced dengue fever in water reservoirs in good condition. This was due to the majority of respondents' concern for cleanliness, such as draining their water reservoirs once a week and having covered water reservoirs.

This research aligns with research conducted by (Mawaddah et al., 2022) which showed a significant relationship between the condition of water reservoirs and the incidence of Dengue Hemorrhagic Fever ( $p$ -value = 0.002). This research is also strengthened by research conducted by (Pebrianti, 2024), regarding the relationship between the condition of water reservoirs and the incidence of Dengue Fever ( $p$ -value = 0.000). This research is also in line with research by (Rosalina, 2021) regarding the relationship between the condition of water reservoirs and the incidence of Dengue Fever ( $p$ -value = 0.032).

The vector for dengue transmission is the *Aedes aegypti* mosquito, which breeds in water reservoirs in the form of stagnant water collected in a place or vessel inside or around homes or public places (Mulyani, 2022). *Aedes aegypti* larvae breed in water reservoirs such as jars, drums, or buckets located around the house with calm/stagnant, relatively clear water, rather than in puddles directly on the ground. Therefore, water reservoirs must always be tightly closed and not left open to prevent mosquitoes from entering and laying eggs (Putra & Miko, 2021).

### **The relationship between the waste disposal system and the incidence of Dengue Hemorrhagic Fever in Lhok Bengkuang Village**

The research results showed that 19 respondents had experienced dengue fever cases in areas with poor waste disposal systems. This was because some respondents had not implemented the 3M plus program and rarely disposed of their waste once a day. Meanwhile, one respondent had experienced dengue fever in areas with good waste disposal systems. This was because the respondent understood and understood proper waste disposal, such as separating organic and inorganic waste.

33 respondents had never experienced dengue fever in areas with poor waste disposal systems. This was because the respondents had not separated organic and inorganic waste. Meanwhile, 33 respondents had never experienced dengue fever in areas with good waste disposal systems. This was because the majority of respondents had implemented the 3M plus program, sorted organic and inorganic waste, and disposed of their waste once a day.

This research aligns with research conducted by Kurniasari (2022), which showed a significant relationship between waste disposal systems and dengue fever incidence, with a  $p$ -value of 0.008.

Waste management is a physical environment that influences the cause of dengue fever. Poor waste management creates new habitats for the *Aedes aegypti* mosquito, as waste such as cans, buckets, bottles, and used tires, which can hold water, become breeding grounds for mosquitoes. Poor waste management is caused by a lack of awareness regarding household waste management practices, such as sorting waste before disposal and collecting used items (Desta Dwi et al., 2024).

## Conclusion

The conclusion of the study is that poor housing conditions are related to the incidence of Dengue Hemorrhagic Fever, then poor water storage conditions are related to the incidence of Dengue Hemorrhagic Fever, and poor waste disposal systems are also related to the incidence of Dengue Hemorrhagic Fever.

## Acknowledgment

The researcher would like to express his deepest gratitude to the South Aceh Health Office for their assistance with permits, to the Lhok Bengkuang Community Health Center for providing access to the data the researcher needed, to all respondents who were willing to take the time and help, and to the article supervisor who provided suggestions and input to the researcher.

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