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Risk Factors Associated with the Incidence of Dengue Hemorrhagic Fever (DHF) in the Kenali Besar Health Center Work Area of Jambi City in 2025

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Abstract

The number of DHF cases in the Kenali Besar Besar Health Center, Jambi City continues to increase every year. This study aims to determine the risk factors associated with the incidence of dengue hemorrhagic fever (DHF) in the Kenali Besar Health Center, Jambi City. The design of this study was a Case Control design. The population in this study was the total number of DHF cases in the period January 2024-March 2025. These respondents were divided into two groups, namely the total sample was 93 consisting of 31 cases and 62 controls or 1: 2. Sampling of cases and controls using non-probability sampling or purposive sampling techniques. Analysis was carried out using the Chi-square test. The results of the study showed that the independent variables associated with DHF include; PSN 3M practice (p-value = 0.006 and OR = 3.870) the presence of mosquito larvae (p-value = 0.006 and OR = 3.870), residential density (p-value = 0.015 and OR = 3.385), the habit of hanging clothes (p-*value* = 0.030 and OR = 3.214), Water Reservoirs (p-value = 0.002 and OR = 4.747) are related to the incidence of Dengue Hemorrhagic Fever (DHF). Risk factors related to the incidence of DHF are the Implementation of 3M Practices, the presence of mosquito larvae, residential density, the habit of hanging clothes and water reservoirs with the incidence of DHF. It is hoped that the community can take action to eradicate mosquito nests in the home environment and the surrounding environment so that there is no place for aedes aegypti mosquitoes to breed.

Keywords: DBD, host, environment, Aedes aegypti

INTRODUCTION

According to the World Health Organization (WHO), Dengue Hemorrhagic Fever (DHF) is a viral infectious disease transmitted from mosquito bites to humans. DHF is often found in tropical and subtropical climates. WHO noted a tenfold increase in Dengue cases worldwide, to 5.2 million spread across 129 countries. In 2020-2022, there was a decrease in global Dengue cases, due to the COVID-19 pandemic. In 2023, DHF cases decreased to 114,720 with a prevalence of 4.1% (IR 41.36 per 100,000 population) and 894 deaths (CFR 0.78%).(3) In 2023, there was an increase in DHF cases, namely 1,413 cases with a prevalence of 3.8% (IR 38.05 per 100,000 population) and 14 deaths (CFR = 0.99). Based on the national target set in the previous period, Jambi Province has shown that it has achieved the IR target. However, according to the updated policy, Jambi Province has not achieved the IR target of ≤ 10 per 100,000 population and CFR = 0.7%. In 2024, the number of DHF cases at the Kenali Besar Health Center was 78 cases with a prevalence of 0.1 %.

Various factors cause DHF, namely the first factor is the host (host) which can cause DHF such as the Implementation of Mosquito Nest Eradication (PSN) through the 3M activity (Draining, Closing, and Recycling) including one of the elements or factors that can influence DHF cases to occur. The second factor, namely the Agent, is the Dengue virus, this virus is transmitted from the bite of the Aedes aegypti and Aedes albopictus mosquitoes. The Aedes aegypti mosquito can transmit the Dengue virus to the host by perching or biting it so that it becomes positive for DHF. Environmental factors that can cause DHF include the presence of mosquito larvae, housing density.

Based on an initial survey conducted by interviewing one of the Kenali Besar Health Center officers who handles infectious disease control issues, said that the highest number of Dengue Fever (DHF) cases in the Kenali Besar Health Center work area was due to dense population, large area, and community behavior that still does not pay attention to their environment such as still hanging clothes behind the door and walls of the house, residents also rarely drain the Water Reservoir (TPA) which

can be a breeding ground for mosquitoes to lay eggs. Based on observations made, places were still found that were a source of breeding for Aedes aegypti mosquitoes, namely uncovered trash cans, rainwater reservoirs that were rarely cleaned so that they became a breeding ground for Aedes aegypti mosquitoes.

RESEARCH METHODS

This study is a quantitative study with a case control design. The study was conducted in the Kenali Besar Health Center, Jambi City, in April-May 2025. The population of this study was 78 DHF case groups and all people who had never suffered from DHF in the control group.

RESULTS AND DISCUSSION

Univariate Analysis

Frequency Distribution of Respondent Characteristics

Table 1 Percentage of Respondents Based on Univariate Analysis

Respondent Characteristics	DHF			
	Case		Control	
	n	%	n	%
Age				
Toddlers (0-5)	3	9,7	1	1,6
Children (6-11)	12	38,7	7	11,3
Teenagers (12-25)	9	29,0	3	4,8
Adults (26-45)	5	16,6	26	41,9
Elderly (46-65)	2	6,5	25	40,9
Gender				
Man	18	58,1	33	53,2
Woman	13	41,9	29	46,8
Last education				
Not in School/Not Graduated	15	48,4	9	14,5
Elementary School/Equivalent	3	9,7	4	6,5
Junior High School/Equivalent	0	0,0	4	6,5
High School/Equivalent	9	29,0	28	45,2
College	4	12,9	17	27,4
Pekerjaan				
ASN/Polri/TNI/Pensioners	0	0,0	14	22,6
Private/Trader/Farmer	6	19,4	18	29,0
housewife	2	6,5	19	30,6
Students	16	51,6	7	11,3
Not Working/Not Working Yet	7	22,6	4	6,5

Based on table 1, it can be interpreted that as many as 93 samples of the Children (6-11) group (38.7%) were more dominant in the case group, while in the control the majority of respondents were adults (26-45) (41.9%) most of the respondents were male (58.1%) in the case group and male (53.2%) in the case group. The majority of respondents had a high school education in the control group (45.2%) and in the case group No School/Not Graduated with a total of cases (48.4%). Most of the characteristics of respondents in the control group were Housewives (IRT) as many as (30.6%) and in the case group as Students/College Students as many as (51.6%).

Frequency Distribution of Research Variables

Table 2 Percentage of Respondents Based on Univariate Analysis

Variables	DHF			
	Case		Control	
	n	%	n	%
Implementation Practices of PSN 3M				
Good	12	38,7	44	71,0
Not good	19	61,3	18	29,0
The existence of mosquito larvae				
There isn't any	12	38,7	44	71,0
There isy	19	61,3	18	29,0
Residential Density				
Qualified (Not Dense)	9	29,0	36	58,1
Not Eligible (Solid)	22	71,0	26	41,9
The Habit of Hanging Clothes				
Good	7	22,6	30	48,4
Not good	24	77,4	32	51,6
Water Reservoir (TPA)				
Good	13	41,9	48	77,4
Not good	18	58,1	14	22,6

Table 2 shows that out of 93 samples, there were as many as (61.3%) respondents in the case group who had poor PSN 3M Implementation Practices, while the control group who did not implement PSN 3M Implementation Practices were (29.0%). There were as many as (61.3%) mosquito larvae in the case group and (29.0%) mosquito larvae in the control group. As many as (71.0%) respondents in the case group had dense housing, while in the control group (41.9%). As many as (77.4%) respondents had the habit of hanging clothes in the case group, in the case group (51.6%) this figure was smaller than the case group. In the variable of Poor Water Reservoirs in the case group it was larger (58.1%) and in the case group as many as (22.6%).

Bivariate Analysis

Relationship between PSN 3M Implementation Practices and DHF Incidence

Table 3 Analysis of the Relationship between PSN 3M Implementation Practices and DHF Incidence

Variables	DHF				p-value	OR 95%CI
Implementation Practices of PSN 3M	case		control			
	n	%	n	%		
Good	12	38,7	44	71,0		3,870
Not good	19	61,3	18	29,0	0,006	(1,562-9,588)
Total	31	100	62	100		

From table 3 in the implementation of PSN 3M implementation practices in the case group that are not good is 61.3% and in the control group is 29.0%. The percentage of respondents with good PSN 3M implementation practices is 38.7% in the case group compared to the control group with good PSN 3M practices is 71.0%. Based on the results of the statistical test obtained a p-value of 0.006 which means that there is a relationship between PSN 3M implementation practices and DHF incidents in the Kenali Besar Health Center work area of Jambi City. OR value = 0.006 (95% CI (1.562-9.588)) which means that PSN 3M implementation practices are not a risk factor for DHF cases in the Kenali Besar Health Center work area of Jambi City. Communities with poor PSN 3M implementation practices have a 3.8 risk of contracting DHF compared to those who are good.

Relationship between the Existence of Mosquito Larvae and the Incidence of DHF

Table 4 Analysis of the Relationship between the Existence of Mosquito Larvae and the Incidence of DHF

Variables	DHF				p-value	OR 95%CI
The existence of mosquito larvae	Case		control			
	n	%	n	%		
There isn't any	12	38,7	44	71,0	0,006	3,870 (1,562-9,588)
There is	19	61,3	18	29,0		
Total	31	100	62	100		

Based on table 4 of the research results conducted, it was found that there was the presence of mosquito larvae in the case group 61.3% this value is greater than the control group, while in the control group 29.0%. The percentage of the group without mosquito larvae in the case group was 38.7% this number is smaller than the control group without mosquito larvae which had a percentage of 71.0%. Based on statistical tests, a p-value of 0.006 was obtained, which means that there is a relationship between the presence of mosquito larvae and the incidence of DHF in the working area of the Kenali Besar Health Center, Jambi City. OR value = 3.870 (95% CI (1.562-9.588)), people whose houses have mosquito larvae have a 3.8 times risk of getting DHF compared to those who do not.

Relationship between Residential Density and DHF Incidence

Table 5 Analysis of the Relationship between Residential Density and DHF Incidence

Variables	DHF				p-value	OR 95%CI
Residential Density	case		control			
	n	%	n	%		
Congested	9	29,0	36	58,1	0,015	3,385 (1,342-8,537)
Not dense	22	71,0	26	41,9		
Total	31	100	62	100		

Based on table 5 of the research results that have been conducted, it was found that the consistency of the control group with dense housing was greater, namely 58.1%, while the case group with dense housing had a percentage of 29.0%. The percentage of cases with non-dense housing was 71.0% greater than cases with non-dense housing which had a percentage of 41.9%. Based on statistical tests, a p-value of 0.015 was obtained, which means that there is a relationship between residential density and the incidence of DHF in the working area of the Kenali Besar Health Center, Jambi City. This study produced an OR figure = 3.385 (95% CI: (1.342-8.537)), people with dense housing had a 3.3 risk of contracting DHF compared to non-dense.

Relationship between the habit of hanging clothes and the incidence of DHF

Table 6 Analysis of the relationship between the habit of hanging clothes and the incidence of dengue fever

Variables	DHF				p-value	OR 95%CI
Hanging Habit Clothes	case		control			
	n	%	n	%		
Not good	24	77,4	32	51,6	0,030	3,214 (1,208-8,549)
Good	7	22,6	30	48,4		
Total	31	100	62	100		

Based on table 6, the proportion of cases in poor clothes hanging habits is 77.4% more than the control in poor clothes hanging habits of 51.6%. The percentage of cases in good clothes hanging habits is 22.6% compared to the control in clothes hanging habits of 48.4%. Based on the statistical test obtained, the p-value is 0.030, which means that there is a relationship between clothes hanging habits and the incidence of DHF in the work area of the Kenali Besar Health Center, Jambi City. This study produced an OR value = 3.214 (95% CI: (1.208-8.549)), people who have clothes hanging habits have a 3.2 risk of getting DHF compared to those who do not.

Relationship between Water Reservoirs (TPA) and DHF Incidents

Table 7 Analysis of the Relationship between Water Reservoirs (TPA) and DHF Incidents

Variables	DHF				p-value	OR 95%CI
Water Reservoir (TPA)	case		control			
	n	%	n	%		
Not good	18	58,1	14	22,6		4,747
Good	13	41,9	48	77,4	0.002	(1,875-
Total	31	100	62	100		12,022)

In table 7, poor water reservoirs (TPA) can affect the incidence of DHF. The proportion of DHF cases with poor water reservoirs (TPA) in the case group is 58.1%, this figure is greater than the proportion of poor water reservoirs (TPA) in the control group, which is 22.6%. The percentage of good water reservoirs (TPA) in the case group is 41.9%, this figure is smaller than the control group, which is 77.4%. Based on the results of the statistical test obtained, the p-value = 0.002, which means that there is a relationship between water reservoirs (TPA) and the incidence of DHF in the Kenali Besar Health Center work area, Jambi City. This study produced an OR value = 4.747 (95% CI: (1.875-12.022)), the group of DHF cases with poor water reservoirs (TPA) has a risk 4.7 times greater than the control group with poor water reservoirs (TPA).

Discussion

Risk Factors of 3M Implementation Practices with DHF Incidents

Based on the bivariate analysis, a p-value of 0.006 <0.05 and an OR value of 3.870>1 were obtained. This means that there is a relationship between the 3M Mosquito Nest Eradication (PSN) practice and the incidence of Dengue Hemorrhagic Fever (DHF) in the working area of the Kenali Besar Health Center, Jambi City.

This is in line with research by P. Homer, et al. in 2025 with statistical test results showing a p-value of 0.001 < 0.05, this shows that there is a significant relationship between mosquito nest eradication (PSN) practices and the incidence of dengue fever (DBD). Research conducted by T. Adang, et al. in 2024 also obtained a p-value of 0.001 < 0.05, meaning that there is a relationship between PSN practices and the incidence of DBD.

Dengue fever can be prevented by eradicating mosquito habitats or nests with PSN practices, namely by always draining, covering, and recycling/reusing used goods. Eradicating mosquito nests can also be done by checking water reservoirs for mosquito larvae or not, cleaning if there is stagnant water inside or outside the house.

Risk Factors of Mosquito Larvae and DHF Incidents

Based on the bivariate analysis, a p-value of 0.006 <0.05 and an OR value of 3.870> 1 were obtained, meaning that there is a relationship between the presence of mosquito larvae and the incidence of Dengue Hemorrhagic Fever (DHF) in the working area of the Kenali Besar Health Center, Jambi City.

This is in line with research conducted by N. Elisa, et al., in 2021 which obtained a p-value = 0.010, it can be concluded that there is a relationship between the presence of mosquito larvae and the incidence of DHF. Research conducted by N. Hendayani, et al. in 2022, obtained statistical test results with a p-value = 0.010, namely <0.05 and an OR value = 2.631, it can be concluded that there is a

relationship between the presence of mosquito larvae and the incidence of DHF. (10) Research by A. Wan, et al in 2024 also obtained the same results, as evidenced by the p-value = 0.000 (p < 0.05) and OR value = 2.227, meaning that the presence of mosquito larvae increases the risk of contracting dengue fever.

The presence of aedes aegypti mosquito larvae has a significant influence on increasing the risk of transmission of Dengue Hemorrhagic Fever (DHF), because larvae are the initial stage of the mosquito life cycle which acts as the main vector for the spread of the dengue virus. The more mosquito larvae found in the environment, the greater the potential for the development of adult mosquitoes that can bite humans and transmit the virus. The existence of water reservoirs and rainwater reservoirs can be a breeding ground for aedes aegypti mosquitoes by laying eggs in clean water reservoirs and becoming a breading place. Breading places outside the house are also caused by poor waste management. Waste such as bottles, used tires can become puddles and become a place for mosquitoes to breed.

Residential Density Factors with DHF Incidents

Based on the bivariate analysis, a p-value of 0.015 <0.05 and an OR value of 3.385> 1 were obtained, which means that there is a relationship between residential density and the incidence of Dengue Hemorrhagic Fever (DHF) in the Kenali Besar Health Center work area of Jambi City. The results of a study conducted by I. Buhannudin, et al in 2023 obtained a p-value = 0.017 and an OR of 5.063, which means that residential density has a significant effect because the p-value = 0.017, which means it is smaller than 0.05. The results of a study conducted by F. Muhammad, et al in 2024 with a statistical test result of a p-value of 0.000, which means it is smaller than the p-value = <0.05, meaning that there is a relationship between residential density and the incidence of Dengue Hemorrhagic Fever. Research by E. Presetyo, et al in 2023 also obtained the same results, as evidenced by the p-value = 0.007 (p < 0.05), which means that the presence of mosquito larvae is at risk of contracting DHF.

The high population frequency in an area can accelerate the spread of dengue fever, because the movement of disease agents from vectors can easily move. The large frequency in a population can affect the spread of dengue fever, due to minimal movement in the house. Residential density can be seen based on the number of occupants and the area of the house. The need for space per person is calculated based on basic human activities in the house, the activities of a person include sleeping, eating, sitting, bathing, steaming, washing and cooking and other movement space, namely 9 m^2 with an average ceiling height of 2.80 m. As well as the need for building and land area with a coverage of heads of families (KK) with 3 people, namely 21.6 m^2 to 28.8 m^2 and a coverage of heads of families with 4 people, namely 28.8 m^2 to 35 m^2.(12)

Factors of Hanging Clothes Habits with DHF Incidents

Based on the bivariate analysis, a p-value of 0.030 <0.05 and an OR value of 3.214> 1 were obtained. This means that there is a relationship between the habit of hanging clothes and the incidence of Dengue Hemorrhagic Fever (DHF) in the working area of the Kenali Besar Health Center, Jambi City. The results of a study conducted by M. Ilham, et al. in 2021 also obtained a p-value = 0.027 and OR = 3.519, meaning that there is a relationship between the habit of hanging clothes and the incidence of Dengue Hemorrhagic Fever (DHF). The same is true for research conducted by Y. Tammu, et al. in 2020 with statistical results of p-value = 0.003, smaller than p = 0.05 and OR value = 1.582, which means there is a relationship between the habit of hanging clothes and the incidence of DHF. Research conducted by D. Retroningrum, et al. in 2024 obtained a p-value of 0.000, smaller than the value of p = 0.05 and OR = 5.435, which means there is a significant relationship between the habit of hanging clothes and the incidence of DHF.

Aedes aegypti mosquitoes, as the main vector causing dengue fever. The habit of hanging clothes inside the house can be a resting place for aedes aegypti mosquitoes. Clothes that hang for a long time can be a hiding place for adult mosquitoes during the day. And can increase the possibility of mosquitoes biting humans when they are active around the area. The habit of hanging clothes can

increase the population of aedes aegypti mosquitoes. Changing the habit of hanging clothes can reduce the mosquito population so that the chain of dengue fever transmission can be prevented and reduced. Aedes aegypti mosquitoes have a habit of perching in dark places and on hanging clothes.

Factors of Water Reservoirs (TPA) with DHF Incidents

Based on the bivariate analysis, a p-value of 0.05 <0.05 and an OR value of 4.747> 1 were obtained, meaning that there is a relationship between water reservoirs (TPA) and the incidence of Dengue Hemorrhagic Fever (DHF) in the Kenali Besar Health Center work area in Jambi City.

This is in line with research conducted by A. Sidharta, et al. in 2023, the p-value was 0.002 and the OR value = 4.474, which means that there is a relationship between Water Reservoirs (TPA) and the incidence of Dengue Hemorrhagic Fever (DHF). Research by A. Arriy, et al. in 2022 based on statistical tests, the p-value was 0.000 and OR = 8.179, which means that there is a relationship between Water Reservoirs (TPA) and the incidence of Dengue Hemorrhagic Fever.

Water reservoirs, such as bathtubs, buckets, drums and jars, are one of the breeding places for the aedes aegypti mosquito, the vector that causes Dengue Fever (DBD). Female mosquitoes lay their eggs on the walls of clean and uncovered water reservoirs, so that mosquito larvae appear. Aedes aegypti mosquito eggs can survive in a dry state for months, and hatch if exposed to water. Routine and proper management of water reservoirs is a step to break the mosquito life cycle and prevent the transmission of DHF

CONCLUSION

The results of the study at the Kenali Besar Health Center in Jambi City are that there is a relationship between the implementation of 3M (National Sanitation and Hygiene) practices, the presence of mosquito larvae, housing density, the habit of hanging clothes and water reservoirs (TPA).

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