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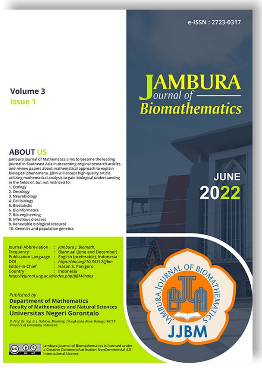

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Research Article

Factors causing Dengue Hemorrhagic Fever (DHF) in Sikka District, East Nusa Tenggara Province

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ABSTRACT. *Dengue Hemorrhagic Fever (DHF) is a disease caused by infection of the Dengue virus. The incidence of Dengue Fever in Sikka District is the highest in East Nusa Tenggara Province and even in Indonesia at the beginning of 2020. The condition of DHF occurrence in Sikka District is designated as an Extraordinary Event (EE). This study aims to identify some factors including the home environment, biological environment, and social environment that might lead to the occurrence of DHF in Sikka Regency and to determine the risk of a person getting DHF based on the factors. There were 170 respondents from the community of Sikka Regency, where 85 of them have suffered from DHF while the other 85 have never had DHF. The instrument used was a questionnaire containing 22 questions that have been tested for validity and reliability. This is a quantitative study, where the analytical method used is the logistic regression analysis. The results of the analysis showed that the factors that affect a person suffering from DHF are the size of the house, the color of the walls of the house, the habit of draining water reservoirs, the habit of using mosquito repellent, and the participation in cleaning mosquito nests. Based on the value of the odds ratio, it is known that a person with a house area of* $< 36m^2$*is more at risk of contracting dengue fever than someone with a house area of* $> 36m^2$*. Likewise, households that did not participate in cleaning mosquito nests were compared to those who did participate. It is also found that house members who have light wall colors, have a habit of draining water reservoirs, and have a habit of using mosquito repellent are more at risk of contracting DHF than family members whose walls are dark in color, do not have the habit of draining water reservoirs, and do not participate in cleaning mosquito nests.*

1. Introduction

Dengue is a vector-borne disease which is mainly found in tropical and sub-tropical regions. The dengue hemorrhagic fever is an acute disease with clinical manifestations of bleeding that causes shock which might lead to death. It is estimated that the number of dengue cases has increased from 2.2 million cases in 2010 to 3.2 million cases in 2015 [1] and dengue mostly attacks children under 15 years of age [2]. WHO further emphasized that in 2010 Indonesia had the second-highest dengue cases among 30 endemic countries in the world [3].

The number of dengue cases in Indonesia has been increasing in the last few years. Data from the Indonesian Health Profile showed that in 2014, the number of DHF cases in Indonesia is 100,347 people with 907 deaths and has increased a year later to reach 129,650 cases with 1,071 deaths and has further increased to be 204,171 cases with 1,598 deaths. The case fatality rate (CFR) values of DHF in 2014, 2015, 2016, 2017, and 2018 were 0.9, 0.83, 0.78, 0.72, and 0.6, respectively [4].

East Nusa Tenggara (ENT) is an archipelagic province with a tropical climate. This province has 22 regencies and one city. As a tropical climate region, many tropical diseases are present in this region, such as Malaria and Dengue hemorrhagic Fever. Regarding Malaria, East Nusa Tenggara Province ranks 19th of the provinces in Indonesia with the highest number of malaria patients, which is 36,039 cases with Annual Parasite Incidance (API) of 7.04 per 1000 population. In Indonesia, many diseases are caused by mosquito bites[5, 6]. In addition to Malaria, Dengue Hemorrhagic Fever is also one of the diseases suffered by many people in East Nusa Tenggara Province (ENT). In the period of 2015 to 2018, the incidence of DHF in the province has been quite alarming. This is because of the Extraordinary Events (EE) of DHF have been announced in several regencies/cities. In 2015, there were 625 cases with the highest number of cases in Kupang City as many as 239. In 2016 it increased to 1,213 cases, West Manggarai Regency was the district with the highest incidence (383). In the following year, dengue cases decreased to 681, with West Manggarai Regency still occupies the highest position. Likewise, in 2018, there were 539 cases of DHF in West Manggarai Regency out of 1,599 cases in East Nusa Tenggara Province [7].

A number of efforts have been made by both the government and private institutions to prevent people from being infected with dengue fever. The efforts include fogging, mobilising the community responsibility to clean the environment, and improving health facilities. However, until now there are still many areas that experience an increase in dengue incidence. One al-

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ternative offered is to vaccinate seronegative individuals. This is done to reduce the risk of developing a more dangerous form of dengue fever[8].

In January 2020, the East Nusa Tenggara Provincial Health Office reported that three districts which are Lembata Regency, Sikka District and Alor Regency had announced the status of an extraordinary event (EE). This is because the number of victims of the impact of dengue hemorrhagic fever (DHF) who died has increased dramatically [9]. Dengue Extraordinary Events (EE) usually occur in endemic areas and are associated with the arrival of the rainy season, resulting in an increase in dengue vector activity. This DHF case occurred in 20 districts and cities in this province. Sikka District was recorded as the district with the highest number of dengue cases. Sikka District occupies the top position with 433 cases of DHF.

The Head of Disease Prevention and Control at the East Nusa Tenggara Provincial Health Office said that as many as 32 people died from dengue and 2,697 residents were treated for dengue [10]. The highest number of DHF sufferers is in Sikka District, which is 1,145 people, with 13 people dying. The Sikka District Health Office reported that DHF in Sikka District had become an Extraordinary Event.

Several factors which can cause dengue infections are the home environment, biological environment, and social environment [11]. The home environment includes the distance between houses, the layout of the house, the type of shelter, the height of the house and the climate. Sikka District is one of the districts that lacks clean water. To solve this problem, almost all houses have water reservoirs of various sizes. Water reservoirs that are rarely cleaned are breeding grounds for mosquitoes.

The biological environment in question is the number of ornamental plants and garden plants. This condition affects the humidity of the surrounding environment. High humidity is a place for the Aedes agyptus mosquito to breed. Social environment in this study includes people's habits that are detrimental to health and pay less attention to environmental hygiene. People's behavior that does not pay attention to health has an impact on the development of disease. People's habits such as hanging clothes, taking naps, not cleaning water reservoirs, using abate, cleaning the yard, and participating in cleaning mosquito nests, using lotion/mosquito repellent, and using mosquito nets while sleeping might contribute to the increase in the dengue infections.

The high number of dengue hemorrhagic fever sufferers in Sikka District is thought to be due to poor environmental conditions, such as clogged sewage drains, inadequate waste disposal facilities, and the number of puddles on the roads. This condition has the potential to breed the Aedes agypti mosquito. In addition, it is also supported by unhealthy community behaviors such as not cleaning water reservoirs for a certain period of time, house planning that causes high humidity, not using lotion, and not using mosquito nets while sleeping. Another factor that is suspected to be the cause of the occurrence of DHF is that the activities of eradicating mosquito nests in the community have not been maximized.

Therefore, an analysis to investigate the underlying factors causing dengue hemorrhagic fever above is needed so the government can take appropriate actions to reduce dengue transmission. In this paper, we focuses on analysing the factors causing dengue in Sikka District. There needs to be an intervention based on the results of the analysis of the causes of DHF in Sikka District. For this reason, an in-depth study was carried out on the factors causing the occurrence of DHF in Sikka District.

2. Environmental-Based Factors Causing Dengue Fever

Dengue cases are caused by various factors. However, in general, it can be claimed that the environment is one of the most important factors causing DHF. This is in line with [11] who emphasized that environmental factors are the trigger for an increase in dengue cases. [11] and [12] explained that risk factors that can influence the occurrence of dengue fever include: home environment, biological environment, and social environment. Environmental management, which includes any activity that involves environmental modification, environmental manipulation and changes in human behavior has been used to reduce the risk of dengue transmission [13].

The home environment is the main indicator of basic sanitation facilities. Basic sanitation includes latrine facilities and a liquid Wastewater Disposal System and household waste. The house environment includes the distance of the house, the layout of the house, the type of container, the altitude and the climate. Houses that are close enough will make it easier for the Aedes aegypti mosquito to transmit the dengue virus to someone. The flight distance of the Aedes aegypti mosquito is 100 m. The distance between houses that are too close can result in high humidity so that it becomes a breeding ground for mosquitoes.

The arrangement of the items in the house, the materials of the house, the construction of the house, the color of the walls of the house can also affect the life of mosquitoes. A house that is not neatly arranged has the opportunity to breed mosquitoes. Various infectious disease studies have proven that crowded and slum housing conditions have a greater likelihood of contracting disease [14].

Ornamental plants and garden plants are biological environments that affect the transmission of DHF. The number of ornamental plants and garden plants has an impact on the level of humidity and lighting in the house. Mosquitoes like places that lack light and high humidity. Therefore, if the conditions in the house are high in humidity and lack of lighting due to the large number of ornamental plants and garden plants, mosquitoes are likely to be found in the house. In addition to water reservoirs that are used daily, there are also natural water reservoirs such as tree holes, banana leaves, taro leaf midribs, stone holes, and others [15].

Some people's habits such as not cleaning the water reservoir, hanging clothes in the room, taking naps, not cleaning the yard and often going out at night are habits that are detrimental to their health. In addition, the lack of community participation in cleaning mosquito nests will pose a risk of transmission of dengue disease transmission in the community. This behavior has a very bad impact on people who have difficulty in getting clean water. They tend to store water in open water tanks and outside the house and are not cleaned regularly, which eventually becomes a potential breeding ground for the Aedes aegypti mosquitos.

3. Logistics Regression

Logistic regression aims to test whether the probability of the occurrence of the dependent variable can be predicted with the independent variable.

The observed data has p explanatory variables indicated by the vector $x' = (X_1, X_2, ..., X_p)$ paired with the response variable Y which is worth 1 and 0. $Y = 1$ indicates that the response has the specified criteria and $y = 0$ does not have specified criteria. This means that the response variable Y follows the Bernoulli distribution with the parameter $\pi(\mathbf{x})$ satisfying the probability distribution function

$$f(y_i) = \pi(\mathbf{x})^{y_i}[1 - \pi(\mathbf{x}_i)]^{1-y_i}. \tag{1}$$

The logistic regression function between $\pi(\mathbf{x})$ and x is

$$\pi(\mathbf{x}) = \frac{\exp[\mathbf{g}(\mathbf{x})]}{1 - \exp[\mathbf{g}(\mathbf{x})]} \tag{2}$$

The regression function above is curvilinear, so to make it a linear function, the logit transformation is carried out as follows [16]

$$logit[\pi(\mathbf{x})] = \ln\left[\frac{\pi(\mathbf{x})}{1 - \pi(\mathbf{x})}\right] = g(\mathbf{x}), \tag{3}$$

where,

$$g(\mathbf{x}) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p \tag{4}$$

is a logit [17]. Furthermore, the parameter estimation is carried out using the Maximum Likelihood method by assuming that y_i is independent, then

$$\begin{aligned} L(\beta) &= \ln[l(\beta)] \\ &= \ln[\prod_{i=1}^{n} \pi_i^{y_i}(1 - \pi_i)^{1-y_i}]; y_i = 0, 1; i = 1, 2, ..., n \end{aligned} \tag{5}$$

The function $L(\beta)$ above is then derived to $\beta_0 + \beta_1 + \beta_2 + ... + \beta_p$. Furthermore, the solution of this differential equation can be obtained by iteration [18]. After obtaining the estimated value of i where $i = 0, 1, ..., p$, it can be seen that the estimator of $\pi(\mathbf{x})$ is

$$\hat{\pi}(\mathbf{x}) = \frac{\exp[\hat{\mathbf{g}}(\mathbf{x})]}{1 - \exp[\hat{\mathbf{g}}(\mathbf{x})]}, \tag{6}$$

where

$$\hat{\mathbf{g}}(\mathbf{x}) = \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + ... + \hat{\beta}_p X_p, \tag{7}$$

is a logit estimator as a linear function of the explanatory variable [17]. By obtaining the estimated parameter values, it is possible to test the model.

The model suitability test was conducted to examine the role of the explanatory variables on the response variables in the model. The test is carried out simultaneously and partially. In this case it is important to interpret the model results in terms of the adjusted odds ratios of the independent variables as risk or protective factors for the outcome. It is also important to assess the suitability of the model with the observed data [19]. According to [17], simultaneous testing is carried out using the likelihood ratio test, which is a test of parameter β_i with the following hypothesis.

$$H_0 : \beta_1 = ... = \beta_p = 0$$

$$H_i : \text{there exist } \beta_i \neq 0; i = 1, ..., p$$

The test statistic used is the G statistic, that is

$$G = -2\ln\left[\frac{L_0}{L_1}\right], \tag{8}$$

L_0 : likelihood without explanatory variable

L_1 : likelihood with explanatory variable

The G statistic will follow χ^2 distribution with degrees of freedom p. The decision criteria taken are rejecting H_0 if $G_{value} \geq \chi^2_{\alpha(p)}$ [17].

Meanwhile, the partial test of parameter β_i was carried out using the Wald test by ratifying the estimated β_i with its standard error. W test statistics are

$$W_i = \frac{\hat{\beta}_i}{\hat{S}E(\hat{\beta}_i)} \tag{9}$$

Hypotheses to be tested are

$$H_0 : \beta_i = 0 \qquad H_1 = \beta_i \neq 0 \qquad i = 1, ..., p$$

H_0 is rejected if the value of the test statistic $|W| \geq Z_{\alpha/2}$ or p-value $\leq \alpha$.

After testing, sometimes there are explanatory variables that are not real so they must be removed from the model. Stepwise logistic regression analysis builds the model step by step by adding or removing explanatory variables one by one from the model until variables that have a significant effect on the model are obtained [17].

Stepwise logistic regression consists of forward selection and backward elimination methods which are a gradual test of the variables to be included in the model. Both methods use the Chi-square test as a test of the significance of the variables to determine the variables that enter or will be lost from the model.

In the forward selection method, the model begins only with the intercept, no explanatory variables are entered, then the explanatory variables are entered one by one into the model and tested using the chi-square test. If the tested variable is not significant or not significant at the specified value of , then the variable is removed from the model and otherwise the real variable will be included in the model. Whereas in the backward elimination method, the procedure begins with all explanatory variables entered into the model and then the variables will be tested one by one. If a variable is found that is not real at the α specified value of, then that variable is removed from the model and if the variable being tested is real, it will remain in the model [20].

The interpretation of the coefficients in the logistic regression model can be done by looking at the value of the odds ratio or the confidence interval for the odds ratio [17].

The odds ratio (ψ) is defined as the ratio of the odds for $x = 1$ to $x = 0$ such that

$$\psi = \frac{[\pi(1)/\{1 - \pi(1)\}]}{[\pi(0)/\{1 - \pi(0)\}]} \tag{10}$$

$$\begin{aligned} \ln\psi &= \ln\frac{[\pi(1)/\{1 - \pi(1)\}]}{[\pi(0)/\{1 - \pi(0)\}]} \\ &= g(1) - g(0) = \beta_1 = \textit{logit difference} \end{aligned} \tag{11}$$

Table 1. Coding of categorical explanatory variables

Variable Name	Description	Dummy	Comparison
Number of household members	≤ 4	1	
	> 4	0	✓
Size of the house	$< 36\ m^2$	1	
	$\geq 36\ m^2$	0	✓
Types of roofs	Wood, Straw (grass), coconut leaves	1	
	Zinc, Concrete, Tile, Asbestos	0	✓
The widest type of wall	Board/bamboo/halar	1	
	Wall	0	✓
House wall color	Dark	1	
	Bright	0	✓
Neat home arrangement	Yes	0	✓
	No	1	
The distance between houses is less than 5 meters	Yes	1	
	No	0	✓
Has a water reservoir such as an open bucket/tub	Yes	1	
	No	0	✓
Have a habit of draining water reservoirs every 3 days	Yes	0	✓
	No	1	
Habit of hanging clothes in the room	Yes	1	
	No	0	✓
Habit of using mosquito nets when sleeping	Yes	0	✓
	No	1	
Participate with the community in the context of cleaning mosquito nests	Yes	0	✓
	No	1	
The house is surrounded by shade plants	Yes	1	
	No	0	✓
Have lots of ornamental plants in the yard	Yes	1	
	No	0	✓
Habit of using mosquito repellent/repellent/lotion	Yes	0	✓
	No	1	
Nap habit	Yes	1	
	No	0	✓
The widest type of floor	Land	1	
	Non land	0	✓

Thus, in a logistic model with one dichotomous explanatory variable, the coefficient 1 is the logit difference, while exp β_1 is the value of the odds ratio [17].
The odds ratio has a confidence interval of $(1-\alpha)100\%$ as follows

$$\exp[\hat{\beta}_i \pm Z_{1-\alpha/2}\hat{S}E(\hat{\beta}_i)] \tag{12}$$

4. Data And Its Analysis

This research was conducted in Sikka District, East Nusa Tenggara Province. The population of this research is the people of Sikka District spread over 21 sub-districts. Meanwhile, the research sample is the people of Sikka District totaling 170 people consisting of 85 people who have experienced DHF and 85 people who are not affected by DHF. Respondents are spread across all districts. Sampling used quota sampling technique after a survey was conducted to determine the population of people suffering from DHF.

In this study, the instrument used was a questionnaire using the Guttman scale, which is a scale that requires firm answers such as yes or no answers. The answer yes was given a score of 1, while no was given a score of 0. The questionnaire contains 19 questions and is a research variable (attribute).

The response variable (Y) observed was patients with DHF ($y = 1$) and those who were not ($y = 0$), and the independent/explaining/predictor (X) variables are presented in Table 1.

The steps involved in the current study include collecting and selecting/screening data, exploring/describing data, compiling logistic regression models, estimating parameters, testing model suitability, reducing variables and interpreting the coefficients.

In this study, the sensitivity value indicates the level of accuracy in classifying people who have actually experienced DHF into the category of having experienced DHF as well. Meanwhile, the specificity value describes the accuracy of classifying people who are not actually affected by DHF to the category not affected by DHF as well.

5. Results and Discussion

5.1. Descriptive Analysis

People who experienced dengue fever were mostly those with an elementary education level (17.06%), followed by a high school education level (15.27%), and an undergraduate education level (10%). These data clearly indicate that the higher the education level of the respondents, the less the number of respondents experiencing dengue fever. Conversely, if the respondent's education level is lower, the number of respondents experiencing dengue fever is increasing. This is in line with [21] who said that someone who has a high level of education will be able to encourage awareness and willingness to maintain and create/modify home environment to be free from the breeding of Aegypti. Aegypti is a vector DHF disease so the risk of transmission of DHF can be pressed. The higher the diploma owned by

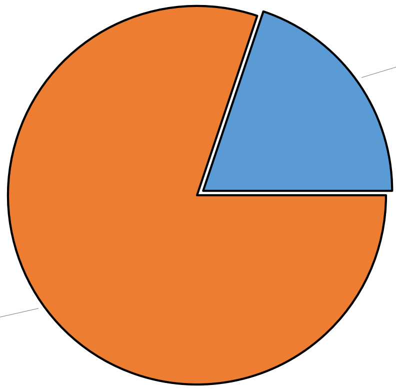

Figure 1. Profession of respondents

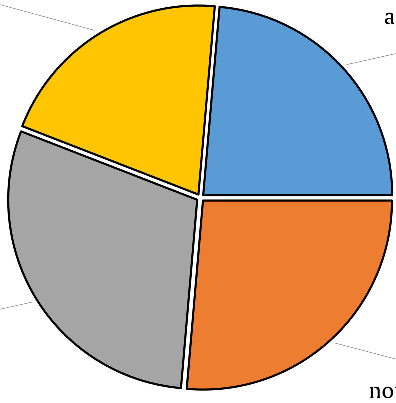

Figure 2. Condition around the house

the average residents of an area reflects the intellectual level of the population of that area. Proffesional specilization of respondents is presented in Figure 1.

Based on Figure 1, respondents who suffer from dengue fever are mostly housewives (19.84%) followed by farmers and students. Based on age, the most respondents suffered from dengue fever are 41-50 years old (14.12%), followed by 31-40 years old respondents, 21-30 years old and 1-20 years old respondents. This is in line with research conducted by [22] that was based on the Odds Ratio (OR), suggesting that students aged over 25 years are at risk of 3,076 times of developing DHF compared to the age group of 15-20 years. Based on these results, it can be inferred that the lower the age level, the less the number of respondents affected by dengue fever. Vice versa, the higher the age, the higher the incidence of dengue fever. [23] that the variable age under 15 years does not have a positive correlation with the incidence of DHF confirms this.

From a total of 170 respondents, as many as 74 people with the female sex experienced dengue fever. Meanwhile, only 11 men had dengue fever. Based on marital status, respondents who were married had the highest percentage of 32.55% out of a total of 170 respondents, but respondents who were not married had the highest percentage not affected by DHF.

The percentage of respondents whose house has the widest floor type is not land affected by DHF as much as 38.82%. The widest floor, the widest type of roof, the type of wall, the color of the walls of the house, the house is neatly arranged are not the highest percentage of the causes of DHF. Meanwhile, the distance between houses is less than 5 meters, having a water reservoir in the form of an open bucket/tub, and the number of family members in the same household are the highest factors causing the incidence of dengue fever. Condition around the houses of the respondents is visualized in Figure 2.

Based on Figure 2, respondents who have lots of ornamental plants and have been exposed to dengue fever are 23.53%, while those who do not have ornamental plants are 26.27%. Respondents whose houses are surrounded by shade plants and have experienced DHF have a percentage of 29.41% and those who do not experience DHF get a percentage of 20.41. Based on this data, it can be assumed that the house surrounded by shade plants is one of the factors causing the incidence of dengue fever in terms of biological factors.

The social environmental factors are presented in Figure 3, where it can be seen that based on the social environmental factors, respondents who have the habit of cleaning water reservoirs every 3 days as much as 22.94% are affected by DHF. Meanwhile, as many as 27.06% of respondents who do not have the habit of draining water reservoirs are affected by dengue. As many as 65

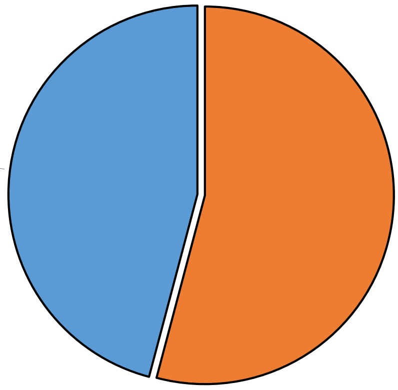

Figure 3. Social environmental factors

respondents who have the habit of hanging clothes in their rooms have dengue fever, while only 20 respondents who do not have the habit of hanging clothes in their rooms have dengue fever. Likewise, respondents who have a habit of using mosquito repellent/repellent/lotion (23.53%) while those who do not experience DHF are 26.47%. Based on this data, it is suspected that the habit of draining water reservoirs, the habit of hanging clothes in the room, the habit of using mosquito repellent/repellent/lotion are factors that can cause the incidence of dengue fever.

5.2. Logistics Regression Method

The first step in determining the logistic regression model is model reduction. Simultaneous testing shows that the model is real at = 5%. Based on the Wald test, it can be seen that the variables are the widest type of floor, the type of roof of the house, the widest type of wall, the house which is neatly arranged, the distance between the houses being less than 5 meters, having a water reservoir in the form of an open bucket / tub, the habit of hanging clothes in the room, the habit of taking a nap, having a lot of ornamental plants in the yard, the house surrounded by shade plants, participating with the community in cleaning mosquito nests, the habit of using mosquito nets when sleeping, and the number of family members in the house are not real in the model. For this reason, the reduction of these variables is carried out. Model reduction is done by removing the variable that has the largest p-value gradually through a backward elimination procedure. This stage is carried out until the best reduction model is obtained.

The reduction was carried out in twelve stages. In the first stage, the nap habit variable which has the largest p-value was eliminated. Next, the variable number of family members at home was removed. In the third stage, the house variable which is neatly arranged was eliminated. Furthermore, the variable type of roof of the house was eliminated. The variable having a water reservoir in the form of an open bucket/tub was then removed. Furthermore, the variables having a lot of ornamental plants in the yard, the widest type of wall, the distance between houses being less than 5 meters, the widest type of floor were removed in the sixth to ninth stages, respectively. The tenth to the twelfth stages successively eliminated the widest type of floor variable, the habit of using mosquito nets when sleeping, and the variable of the habit of hanging clothes in the room. The twelfth stage was the last stage which is the best model obtained from the reduction results. The best reduction model is in the twelfth stage with a G-statistic of 235.670 at a p-value of 0.000.

The results of the Wald test showed that at = 5%, DHF was influenced by house area, wall color, the habit of draining water reservoirs, the habit of using mosquito repellent, and participating in cleaning mosquito nests. The five variables included in the model have positive and negative parameter values. The variable of house area and participating in mosquito nest cleaning resulted in positive parameter estimates. This means that a house area that is smaller than 36 m2 will increase the risk that someone in the house would be affected by dengue fever. Likewise, if you don't participate in cleaning mosquito nests, it will increase the risk that someone in your house will get dengue fever.

The other three variables have negative parameters: the color of the walls, the habit of draining water reservoirs, and the habit of using mosquito repellent. This means that dark wall colors, not cleaning water reservoirs, and not using mosquito repellent will reduce the risk that someone in the house will get dengue fever. This is because even though the house has a dark wall color, the house has sufficient lighting so it does not become a nesting place for mosquitoes. In general, in Sikka district, the distance between houses is more than 5 meters and the houses have a large yard. This condition causes sufficient sunlight. Even though the walls are dark, the sunlight is enough to illuminate the house so that the house does not become a nesting place for mosquitoes.

The habit of using mosquito repellent has a negative parameter estimate. In general, people in Sikka Regency use mosquito nets when sleeping to replace mosquito repellent. In addition, there is a belief in the community that burning garbage in the yard every afternoon can repel mosquitoes. In some areas in Sikka Regency, smoking is carried out by burning peanut shells. Peanut shells when burned can produce quite a lot of smoke which is believed to be able to repel mosquitoes in and around the house.

Most of the residents do not have the habit of draining the water reservoir in 3 days and most of them do not have a big reservoir. They store just enough water for their needs for 3 or 4 days. In addition, some people have wells so that there are not too many shelters. Water is stored sufficiently, after it is used up again. Storage of water is not too long in the reservoir.

Based on the value of the odds ratio if the area of the house

Table 2. Classification Results

Observation			Estimation: You or a member of your family has suffered from DHF in the last years		Percentage
			Yes	No	Correct
	You or a member of your family has suffered from DHF in the last years	Yes	56	29	65.9
		No	21	64	75.3
	Overall Percentage				70.6

is $< 36\ m^2$, then the members in the house are at risk of contracting dengue fever by 2,138 times compared to those with a house area of $> 36\ m^2$. Houses that have dark wall colors have a 0.399 times risk for members in their homes to get dengue fever compared to those with non-dark wall colors. Residents who do not clean water reservoirs have a 0.231 times risk for members in their homes to get dengue fever compared to residents who clean water reservoirs. Likewise, if they do not make a habit of using mosquito repellent at home, then members in the house are at risk of contracting dengue by 0.387 times compared to those who practice using mosquito repellent. Households that do not participate in cleaning mosquito nests will have a risk of 3,366 times for members in their homes affected by DHF compared to households that participate in cleaning mosquito nests.

These results indicate that the non-involvement of family members in cleaning the surrounding environment has the highest risk of developing dengue. The habit that occurs in the community is that when there are members of the community who are not usually involved in social activities like this, the rest of the community does not care about the family concerned. This means that when residents do cleaning in their surroundings, usually the house is passed or not cleaned. This will cause the house to become a breeding ground for mosquitoes because the rest of the environment is clean. The results of this study indicate that population density and poverty have a significant correlation to DHF. Table 2 shows that by using a cutpoint value of 0.5, the sensitivity value is 65.9% and the specificity value is 75.3%, while the total correct classification value is 70.6%.

6. Conclusion

Based on the results obtained from the logistic regression method, it can be concluded that the factors that affect a person suffering from dengue fever include the size of the house, the color of the walls, the habit of draining water reservoirs, the habit of using mosquito repellent, and participation in cleaning mosquito nests. Furthermore, based on the value of the odds ratio, it is known that a person whose house area is $< 36\ m^2$ is more at risk of contracting DHF than those who have a house area of $> 36\ m^2$. Similarly, households that do not participate in cleaning mosquito nests are more vulnerable to catching DHF than those who do participate. Furthermore, houses that have walls that are not dark in color, have a habit of draining water reservoirs, and the habit of using mosquito repellent are more at risk of contracting dengue fever than house members whose walls are dark in color, do not have the habit of draining water reservoirs, and do not have the habit of using mosquito repellent.

Although a house has a dark wall, if the house has sufficient lighting, it will not be a nesting place for mosquitoes. In general, in Sikka district, the distance between the houses is larger than 5 meters and the houses have a large yard so that the solar lighting is quite adequate. In addition, the existing plants do not block sunlight so that the house does not become a place for mosquitoes to live. The habit of using mosquito repellent has a suspected negative value parameter. In general, people in Sikka District use mosquito nets during sleep to replace mosquito repellent. Moreover, there is a culture in the community that burns garbage in the yard every afternoon to repel mosquitoes. This means that this traditional smoking indirectly repels mosquitoes from the house.

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