**Original Article**

# DENGUE FEVER RISK ASSESSMENT BASED ON BEHAVIOUR PREVENTION ON FOUR SUB DISTRICTS IN JEMBER DISTRICT

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## ABSTRACT

Dengue fever is one of the main problems of public health in the world. Dengue Fever has reached a hundred countries from Afrika up to Western Pacific. Indonesia was the first rank of dengue cases for the Asia Region in 2010. Jember District is one of the highest bestower dengue cases with changes risk areas. A surveillance system can be applied as a new solution tool that is used to monitor area conditions for dengue cases based on prevention as a factor that influenced dengue fever accidents. The purpose of this study is to assess dengue fever risk based on behaviour prevention. This research method is quantitative research, with a crossectional design. Four sub-districts that become research area. This research population is all of the householder on 4 sub-districts in Jember District, and the sample is 100 householders in 4 sub-district. The research tool are documentation, questioner, and observation sheet. The data analysis are univariate analysis to multivariate analysis. Based on research results, only environmental factor which not influence dengue case. The most influential factor for dengue incidences in Jember District is the health behavior for the prevention. The Risk assessment showed that Pakusari subdistrict with score 44 and Mumbulsari subdistrict with score 42 are in the medium risk, meanwhile Panti subdistrict with score 56 and Arjasa subdistrict with score 48 are in the low risk.

**KEYWORD:** dengue fever, risk assesment, health behavior prevention, surveillance.

## INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is one of the main public health problems in the world. This disease is a major disease that affects morbidity and mortality, especially on children.[1] There were only nine countries that experienced dengue outbreaks before 1970. The development of this disease vector *Aedes species mosquitoes* now have reached 100 countries from Africa, America, the eastern part of Mediaterania, Southeast Asia, to the western Pacific with 390 million cases in the year of 2013.[2]

Southeast Asia is an optimum location for breeding of Aedes Aegypti mosquitoes and also a DHF endemic area. Where there is a surge in cases of dengue outbreaks in Southeast Asia and the West Pacific.[3] Western part of the Pacific and Southeast Asia accounted for the largest number of dengue outbreak cases with a total of 60 cases in 2010 (53.57%) from a total of 112 outbreak cases throughout the world.[4] Southeast Asia has also become a region with the largest DHF incidence above 50-100

million in the last ten years.[5] The countries in Southeast Asian regions with dengue endemic categories are Cambodia, Malaysia, Philippines, Singapore, Vietnam, and Indonesia with a growing number of cases over the past 10 years. Indonesia was the first rank of dengue cases for the Asia Region in 2010.[6] The DHF cases in Indonesia continue to experience fluctuations until now.

Based on the Ministry of Health data for the 2016[7], it is known that the number of dengue cases in 2015 in Indonesia reached 126,675 cases. Dengue incidences increased to 204,171 cases in 2016, and it decreased to 68,407 cases in 2017. *Case Fatality Rate* (CFR) of dengue fever cases was 0.97% in 2015, this figure indicates a decrease in CFR since the beginning of the disease spread by 41.4%.[8] CFR refers to the percentage of people who die from a particular disease. East Java Province is one of the biggest contributors to dengue incidence in.[9] The East Java's DHF *Incidence Rates* (IR) has reached 64.8 (or 15.3 above the national target of <49.5) in 2016. The high number of IR will affect the increment of the number for dengue cases, and it

happens with the increase of 4,246 IR cases (20%) in 2016. Jember District was determined as one of the districts with the largest number of dengue cases for East Java in 2015.

Based on preliminary study results to the Health office of Jember District, it can be noted that the rural areas in Jember district are now significantly increased dengue cases in 2019. Panti sub-district was the tenth rank district for the most dengue fever incidence in Jember district with 42 cases in 2019 and Pakusari sub-district which has an increment dengue fever case about 3 times from the previous year. Arjasa sub-district still has fluctuations dengue fever cases and Mumbulsari sub-district became the sub-district with the highest increased dengue case about 6 times increased dengue case more than the previous year in 2019. The three sub-districts (Pakusari, Arjasa, Panti) are rural areas, while Mumbulsari sub-district is a semi-urban area.

The new pattern for the spread of dengue cases in Jember District is influenced by various factors. Factors that can influence this change as population growth, urbanization, behavior changes, ineffective vector control, and bad water management.[10] Where human behavior is influenced by age, level of education, and geographical factors.

As for several ways that can be used to prevent the spreading of vectors, namely through healthy behavior in the form of not providing stagnant water, closing septic tanks, using insecticides, using pants and clothes.[11] This effort is a form of preventing the distribution of vectors, so it is expected to minimize new cases of dengue. Aside from promoting healthy behavior, four other methods that can be carried out, namely diagnosis and case management, *surveillance* integrated and preparedness for epidemics, development of disease vaccines, and implementation of results.[5]

The preparation of a surveillance system is a form of early detection effort in its implementation can also be used to know the problem management of DHF disease. It is one of the methods of prevention and control of Disease DHF.[5] The output data from surveillance is recommendation for policy maker to make solution program. Based on these problems and findings, researchers feel the need to examine the DHF surveillance system disease based on the shift in distribution of DHF disease and the concept of disease prevention behavior. The benefit for this research can give actual data about DHF condition in Jember District. Researchers will conduct research on "Dengue fever risk assessment based on behaviour prevention on four sub districts in Jember district".

## MATERIAL AND METHOD

This research type is quantitative research. While this research approach is analytic observational. When viewed based on time, the design of this study is

*crossectional.* Based on the results of *clustering,* there are 4 Sub-districts in Jember district which become research areas. The population in this study is all household heads in four sub-districts Jember district in 2020 about 64,132 households. The sample used by researchers is individuals as constituent groups in several areas about 100 people. The sample criteria for this study are as follows.

a. Head family or other family members (preferably mother or wife).
b. Living in the research area for at least one year
c. More than 17 years old
d. Willing to be a research respondent.

The sampling technique in this study is using a *multistage random sampling technique*. This method is a combination of several sampling techniques as *cluster sampling*, *simple random sampling*, and *proportionate random sampling*. The techniques used to collect data in this research are interviews, observations, and documentation. Research instruments are the form of questionnaires and observation sheets. The collected data will be processed and then analyzed (univariate, bivariate, and multivariate) using the SPSS computer program.

The risk assessment analysis is a total score that showed sub-district DHF risk status. The total score is divided by a quartile cut of points as controlled risk, low risk, moderate risk, and high risk levels. The category and interval results are as 1) high risk when the range of total score between 18-31, 2) medium risk when the total score between 32-45, 3) low risk when the total score between 46-59, and 4) controlled risk when the total score between 60-72.

## RESULT AND DISCUSSION

The sample in this study is people from 4 Districts in Jember District (Arjasa Sub District, Kaliwates Sub District, Mumbulsari Sub District, and Pakusari Sub District. The selection of sub-districts is based on the results of *clustering* for each category *cluster* with several assessment indicators. Indicators for determining *cluster* values are rainfall, population density, altitude, urban or rural status of an area. The total respondents in this study are 100 respondents which 70 people are women with the majority aged 31-45 years around 54.3%. Male respondents are about 30 people with the majority aged 46-60 years around 43.3%. Respondents with more than 60 years of age have the lowest percentage of participation as respondents, about 3 people (3%).

Respondents characteristics can be categorized based on occupation, as the results there are no male respondents who do not work. Male respondents generally work as farmers and entrepreneurs around 36.67% and 40%. The majority of female respondents work as housewives as many as 34 people (49%), and 8 people (11.4%) do not work.

Eight peoples (8%) who did not work have education exactly not graduating from junior high school. There are no respondents (0%) did not work or work as farmers who have graduated from a high school and university level. The majority of respondents work as entrepreneurs 26% and farmers 23%.

**Table 1: Respondent demographic characteristics.**

| No | Characteristics | Category | N | |
|---|---|---|---|---|
| | | | n | % |
| 1 | Sex | a.   Male | 30 | 30 |
| | | b.   Female | 70 | 70 |
| 2 | Age | a.   18-30 years | 24 | 24 |
| | | b.   31-45 years | 45 | 45 |
| | | c.   46-60 years | 28 | 28 |
| | | d.   >60 years | 3 | 3 |
| 3 | Occupation | a.   Unemployment | 8 | 8 |
| | | b.   Worker | 6 | 6 |
| | | c.   Entrepreuner | 26 | 26 |
| | | d.   Farmer | 23 | 23 |
| | | e.   Others | 37 | 37 |
| 4 | Education | a.   No Education | 17 | 17 |
| | | b.   Primary | 37 | 37 |
| | | c.   Secondary | 27 | 27 |
| | | d.   Higher Secondary | 12 | 12 |
| | | e.   University | 7 | 7 |

The bivariate test is using Chi-square test, the results showed that the health promotion strategy has a relationship to predisposing factors related to dengue fever prevention behavior (DHF) as shown in table 2.

Where the determination All variables are related to other variables, if the calculated P<P-*value* (0.05) or Ho is rejected.

**Table 2: Correlation between health education with predisposition, reinforcing and enabling factors.**

| No | Category | p-value | p-score | Conclusion |
|---|---|---|---|---|
| 1 | Predisposition | 0,000 | 0,05 | H0 rejected |
| 2 | Reinforcing | 0,000 | 0,05 | H0 rejected |
| 3 | Enabling | 0,012 | 0,05 | H0 rejected |

The results of table 2 showed that the predisposing factor is knowledge that has a relationship with the existence of health education related to the prevention of DHF. Other predisposing factors, attitudes, and *self-efficacy* are also related to the presence of health education related to dengue prevention. The p-value of the three indicators is $p = 0,000$ or <0.05, which indicates that the existence of health education is related to the knowledge, attitudes and *self-efficacy* related to the behavior prevention of DHF.

The relationship test between the two variables uses the *Chi-Square* tet as shown in table 2 as an example. The relationship between the existence of health education with reinforcing factors such as the role of families dan community leaders in supporting dengue prevention behaviors. Where the *p-value* of the indicator is 0,000 or <0.05 which indicates that the existence of health education is related to the role of family and community leaders in supporting dengue prevention behavior.

The *odds ratio* value of these two factors amplifier (the role of family and community leaders to support dengue prevention behaviors) are 56.4 and 37.6. This score showed that the existence of routine health education to the community regarding the dengue prevention behavior has a potential of 56.4 times for respondents to increase the role of families in supporting dengue prevention behavior.

Table 2 showed that the *p-value* = 0.012 or <0.05 which indicates that the existence of health education is related to the availability of facilities and infrastructure to support DHF prevention behaviors. While the *odds ratio* value is 3.64, which means that the existence of routine health education for the community regarding the dengue prevention has a potential of 3.64 times for residents to obtain and provide facilities and infrastructure related to dengue prevention behavior. Infrastructure means in question is the provision of abate, routine fogging, health promotion media, and other information facilities that can increase public understanding.

Predisposing factors in this research were assessed based on three indicators (knowledge, attitudes, and *self-efficacy).* The test result showed that there is a

relationship between predisposing factors with dengue fever prevention behavior. Here is a test result relations between the two variables, as shown in Table 3.

**Table 3: Correlation between predisposition, reinforcing, and enabling factor with health behavior prevention.**

| No | Category | p-value | p-score | Conclusion |
|----|----------|---------|---------|------------|
| 1 | Predisposition | 0,000 | 0,05 | H0 rejected |
| 2 | Reinforcing | 0,000 | 0,05 | H0 rejected |
| 3 | Enabling | 0,000 | 0,05 | H0 rejected |

The relationship of dengue prevention behavior with the dengue incidence showed that there is a relationship between the two variables with a value of $p = 0,000$ or <0.05. The *p-value <0.05*, results in the meaning that H0 is rejected as shown in table 4. Whereas the *odds ratio* value is 35.48. This result indicates that mosquito nests worker is a variable that can affect the dengue fever incidence directly with that value.

**Table 4: Correlation between mosquito eradication practices with DHF incidences.**

| Category | DHF Incidences | | | | Total |
|----------|------|------|------|------|-------|
| | N | % | N | % | |
| Less | 21 | 95,5 | 29 | 37,2 | 50 |
| Good | 1 | 4,5 | 49 | 62,8 | 50 |
| Total | 22 | 100 | 78 | 100 | 100 |

The environmental variables have no relationship with the dengue fever incidence. The environment variable itself is the condition of the environment around the community which includes social, economic, physical, and biological aspects. The result is shown in table 5 for example, an indicator for the number of families has p-value = 0.878.

**Table 5: Correlation between environtmental conditions with DHF incidences.**

| Amount of Family | DHF Incidences | | | | Total |
|------------------|--------|------|------|------|-------|
| | Amount | % | None | % | |
| >4 peoples | 6 | 27,3 | 20 | 25,6 | 26 |
| 1-4 peoples | 16 | 72,7 | 58 | 74,4 | 74 |
| Total | 22 | 100 | 78 | 100 | 100 |

The several variables that have been described, only environmental variables that have no relationship with the dengue fever. The most influential factor for the dengue fever incidence is the eradication practice of mosquito nets variables. Where the value of $p = 0.005$ or <0.05. The *p-value* for eradication practices of mosquito nests variable is the smallest or the only one whose value is <0.05.

Risk assesment will create risk status against dengue disease whcih obtained from the calculation results of several proposed research variables. Where the total sub-variables used to perform the mapping are 9 sub-variables. The status of the four sub-district risk assessment is as follows.

**Table 6: The DHF Risk status of four sub-districts.**

| No | Category | Total score | Conclusion |
|----|----------|-------------|------------|
| 1 | Panti | 56 | Low dengue risk status |
| 2 | Arjasa | 48 | Low dengue risk status |
| 3 | Mumbulsari | 44 | Medium dengue risk status |
| 4 | Pakusari | 42 | Medium dengue risk status |

The health promotion strategy is assessed based on the presence or absence of periodic counseling to the community, while the predisposing factor is assessed by three aspects namely knowledge, attitudes and *self efficacy*. Health education is a means to change people's behavior through providing information.[12] Health education is also a form of health promotion strategy as a form of independent intervention that plays a role in helping individuals, families, groups and the community in dealing with their health problems. In the case of dengue fever, the incidence of the disease is generally caused by human health behavioral factors. Providing health information is important, one of which is through counseling.[13]

The existence of health promotion is related to the level

of knowledge of citizens, attitudes, and *self-efficacy.* Other research also states the same thing, that the lack of public knowledge is caused by the lack of community development activities or health promotion carried out on society.[14] In addition to influencing knowledge, community development activities also affect people's attitudes towards dengue fever.

Attitude is a collection of symptoms in response to stimuli, so attitudes involve thoughts, feelings, attention, and psychiatric symptoms.[15] The existence of health promotion interventions as a stimulus can be responded well by respondents, increasing attitudes towards behavior.[16] The results of other studies that are in line, states there are changes in attitude before and after the provision of health promotion interventions. The attitude value after the majority of health education provision increased due to respondents being able to understand health intervention material.[17]

The third indicator which also relates to the existence of community development activities is *self-efficacy.* An individual's belief that can do a behavior, can be improved by conducting health education. The aim is to form an interest in healthy behavior to prevent disease and add to it as a source of literacy, to adopt the behavior.[18]

The family has many roles in influencing the behavior of family members, including biological functions, economic functions, educational functions, social functions, protection functions, recreational functions, and religious functions.[19] In carrying out its function in the form of providing education related to behavior, family members need a source of health information. Information exposure has an important role in influencing disease prevention behavior, information facilities such as radio TV, and social media can reach various.[20] Health information can also be provided through health education methods with the target being community leaders and families who play a role in preventive behavior.[21] Families with adequate information sources can guide other family members to conduct dengue prevention behaviors. The higher the insight, will have an impact on attitudes.[22]

The second indicator of the reinforcement variable is related to the role of community leaders. Health promotion strategies through community development have a relationship with the positive role of community leaders. This relationship can arise if community leaders understand the importance of implementing healthy behaviors. The community leaders have to understand the importance of the application of dengue prevention behavior or it cannot work. Thus efforts are needed to provide health information to community leaders. Where a character has a big influence in moving the wider community because the general public is more easily accept what is explained by the prominent figure.[23]

The facilities and infrastructure in this research are related to the completeness or readiness of the community in providing media to prevent the occurrence of dengue fever. The facilities and infrastructure are the availability of abate, information media, and *fogging* programs. Community readiness for providing health information is important. Health education is also a form of health promotion strategy as a form of independent intervention that plays a role in helping individuals, families, groups, and the community in dealing with their health problems. People can adopt healthy behaviors such as *fogging* with good information.

Fumigation is very effective in breaking the chain of mosquitoes transmission, including those that are active, die instantly when in contact with the particles. *The existence of* a routine *fogging* can help the community carry out prevention efforts. The efforts to make people aware of the importance of *routine fogging* is to provide information about disease prevention behavior, through media such as radio TV, and social media to reach various.[20] Besides, it can also be done by holding regular health education.

Knowledge and attitude can influence behavior, according to previous research. Where knowledge and positive attitudes will gain positive behaviors towards preventive behavior. Not always this relationship is directly proportional, there is still the potential that this relationship is missing. There are three components of behavior change knowledge, attitudes, and behavior. It is difficult to say that knowledge is a major factor in shaping human behavior.

Self-efficacy as a belief in one's own ability to deal with and solve problems effectively. Self-efficacy also means self-confidence themselves able to succeed and succeed. Individuals with high self-efficacy are committed to solving the problem and will not give up when finding that the strategy being used is not successful. *Efficacy* also helps determine the extent of the effort to be deployed by people in an activity, how long they will persevere when face obstacles, and how tenacious they will face that situation no *Self-efficacy* can also be used as a tool or indicator to limit a good health behavior or not.

Someone has a family with a positive attitude towards behavior prevention, it will show good disease prevention behavior as well. These results are also like previous research, which states that a positive family attitude can help other family members to behave positively towards a behavior. Environmental support especially family and community leaders can be the main variable influencing health behavior compared to knowledge and attitude.[24]

Community leaders as role models or *role persons* play a role in changing public health behaviors to be more positive. Community leaders also play a role in early

detection of dengue fever based on the results of health education, so that immediately gets the appropriate treatment.[25] This indicates that the handling of dengue fever is not only based on the health department but also requires an active role.[23]

Strengthening factors (facilities and targets) have an important role in the behavior of DHF reinforcement in Jember Regency. Although *fogging and the* use of abate are not the main factors that make individuals to form healthy behaviors, both can still be used to break the chain of disease transmission. Information exposure has an important role in influencing disease prevention behavior, information facilities such as radio TV, and social media can reach various.[20]

Health information can also be provided through health education methods with the target being community leaders and families who play a role in preventive behavior.[21] Health information is inseparable from health education media. Media education or health information acts as a tool for the health education process that aims to facilitate the reception of health messages. With adequate facilities and infrastructure, it can help the community to form healthy behaviors.

The eradication practice of mosquito nests through the movement of draining, closing, and burying has a role in reducing the number of dengue incidence. Previous research also stated that there was a significant influence between 3M Plus behavior on the occurrence of Dengue Hemorrhagic Fever in Purwoharjo District, Banyuwangi Regency.[26] This prevention and control effort is one form of action to break the chain of transmission by eradicating the transmission of mosquito larvae. The lack of public attention about this draining, closing, and burying behavior so that from year to year increases the incidence of dengue fever increasingly.[27]

The findings of the relationship for the environment to the dengue fever incidence, differ from previous studies. Where the more the number of family members, the better the dengue behavior prevention that the family has. More and more families can play a role in maintaining house hygiene and sharing information related to behavior.[28]

These results are consistent with the findings of previous studies which also stated that dengue behavior prevention through mosquito nests worker practices has an important role to prevent the dengue incidence. Human behavior plays an important role in eradicating mosquito breeding grounds or in preventing mosquitoes from spreading, one way is to close the shelter.[29] This is due to the lack of vaccines or specific drugs for dengue disease so that the activities of supervision and eradication of mosquito nests have an important role in preventing events.[30]

Table 6 showed that the four sub-districts are in two risk categories (low dengue risk and medium dengue risk). Panti and Arjasa sub-district are in low dengue risk, Mumblsari and Pakusari sub-district are in medium risk. Based on the results of clustering determination for all sub-districts in Jember Regency, it can be known that Panti sub-district is in cluster 1 and Arjasa sub-district is in cluster 2. While Pakusari sub-district is in cluster 3 and Mumbulsari sub-district is in cluster 4. The higher the cluster level, indicating the higher level of regional risk against dengue disease.

Where the higher the level of clustering districts, the higher the risk of dengue disease. This is derived from the results of the study, which shows things are in line. Panti sub-district has the highest final score, which is 58 which belongs to the category of low risk areas. Mumbulsari sub-district, which is included in cluster 4, has the lowest value of 42.

## CONCLUSION

Based on the results of this study, it can be concluded that the most influential factor in the dengue hemorrhagic fever (DHF) incidence on Jember Regency is dengue prevention behavior through the practice of eradicating mosquito nests. The dengue risk status for four sub-districts are in low risk and medium risk. Where the higher the level of clustering a sub-districts, the higher dengue disease risk in that sub-district. The dengue prevention behavior itself is influenced by the level of knowledge, attitudes, *self-efficacy, the* role of families, community leaders, the presence of facilities, and infrastructure which are all related to health promotion through health education activities or community development.

## ACKNOWLEDGMENT

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