

The Role of Environmental And Behavior Factors to dengue Fever Incidents

Hariyono^{1*}, Suyadi², Luchman Hakim³, Bagyo Yanuwidi³

- 1) Graduate Program of Environmental Science, University of Brawijaya, Jl. Veteran, Malang 65145, INDONESIA
- 2) Faculty of Animal Husbandry, University of Brawijaya, Jl. Veteran, Malang 65145, INDONESIA
- 3) Department of Biology, Faculty of Mathematics and Natural Sciences, University of Brawijaya, Jl. Veteran, Malang 65145, INDONESIA

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) is one of the important public health problems in Indonesia and often causes an outbreak of extraordinary events. The increasing cases of dengue are closely linked to the poor environmental sanitation. Transmission of dengue disease is influenced by environmental conditions, mobility of the population, population density, the presence of natural or artificial water containers at the landfill or other waste on-site, as well as lack of education factor, response and behavior play a role in inhibiting disease prevention and eradication of dengue. Eradication of dengue can be done with community empowerment that leads to positive behavior among others make the effort to drain, close container and bury. People's behavior in mosquito eradication of dengue hemorrhagic fever is generally not realized optimally, hence the need role of environmental and behavior factors to preventive dengue fever incidents.

KEYWORD: Dengue Hemorrhagic Fever (DHF), Environmental, Behavior

INTRODUCTION

Dengue hemorrhagic fever (DHF) is one of the important public health problems in Indonesia and often causes an outbreak of extraordinary events. In Indonesia, dengue was first discovered in 1968 in Surabaya and Jakarta. However, in 1994 it spread to 27 provinces in Indonesia, and 12 provinces of which the status of extraordinary events [1].

Based on data from the Health Department of Kediri in 2013, the incidence of dengue from the last 3 years has increased significantly. In 2009 there were 272 cases and two people who died. In 2010 there were 637 cases and 8 deaths, while in 2011 there were 67 cases and 2 people who died. In 2012 there were 105 cases and one person who died, and in 2013 there were 269 cases and one person died.

Dengue Hemorrhagic Fever (DHF) is a disease caused by the dengue virus from *Aedes aegypti* mosquito, which have an impact on blood vessel disorders capillaries and blood clotting system causing bleeding, which can lead to death. WHO surveillance in the region of Southeast Asia, showed that Indonesia is in the second rank of DHF incidents. Since 1980 the numbers of cases have been reported more than 10,000 annually [2].

The incidence of dengue continue to increase due to human mobility rapid, uncontrolled urbanization, public services and good hygiene practices less, waste tires and hard plastic crushed, industrialization disposable packs, the number and capacity of *Aedes* increased [3]. The increasing cases of dengue are closely linked to poor environmental sanitation [4]. On the measurement of population density of *Aedes aegypti* larvae measured by the density and number of containers is very real effect on the transmission of dengue fever cases [5]. Along with the ever-increasing incidence, it is because of no optimal community participation in prevention and control of dengue. The efforts to increase community participation in dengue prevention require a model of community empowerment more effective and efficient and produce satisfactory results. One community empowerment model was developed by Green in 1980 for the eradication of dengue was the model Precede-PROCEED. Based on the description above, it is necessary to study and model the behavior and development of community participation in the prevention of Dengue Hemorrhagic Fever (DHF) in the area of Kediri. The aims of the research is analysis role of environmental and behavior factors to dengue fever incidents.

*Corresponding author: Hariyono, Graduate Program of Environmental Science, University of Brawijaya, Jl. Veteran, Malang 65145, INDONESIA. hariyonoklh@gmail.com

METHODS

This study uses a quantitative method with cross sectional approach. A quantitative approach is carried out by using quantitative descriptive analysis and Structural Equation Modeling (SEM). Quantitative descriptive analysis is used test the incidence of dengue. SEM analysis is used to examine the factors supporting and linkage to the variable behavior of PSN and environmental conditions. The study population is all the heads of family / wife / mother / child in the study site. The research subjects are part of the population that is composed hereinafter referred to as respondents using random sampling techniques. The number of samples from the research that each - each village have taken 30 samples for each village, so that the overall sample size is 180 households. Step research work is as follows: 1. Assessment the condition of Dengue Hemorrhagic Fever (DHF) in the city of Kediri, 2. Analyze the attitudes and behavior toward prevention of Dengue Hemorrhagic Fever (DHF) in the city of Kediri, 3. Evaluation dominant factors that influence people's behavior in the prevention of Dengue Hemorrhagic Fever (DHF) in the city of Kediri, 4. Analysis role of environmental and behavior factors to dengue fever incidents.

RESULTS

The population data of 2014 showed that the population of the town of Kediri in 2014 as many as 312,331 people or increased compared to the total population of 2011 as many as 302,671. The composition of the population consisted of 157,043 men and 155,288 women, with a population density of 4,926 people per square kilometer.

ANALYSIS MODEL

Conceptual Structural equation modeling analysis results to a standardized estimation can be seen in the image below:

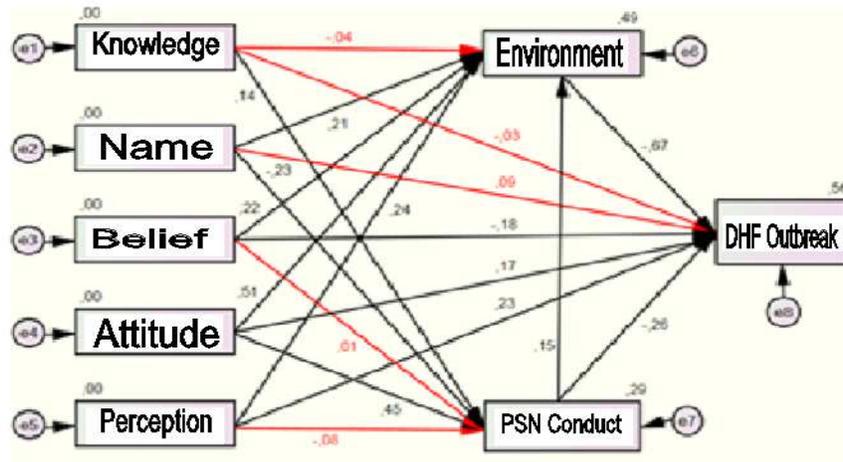


Figure 1. Results of Analysis of Value Estimation Standards

Based on the above figure 1 it can be seen and the estimated value of that-value is generated, the estimated value of red illustrates that that-value generated less than t table(1.96) at the significance level of 5%, which means that the variable is not significant. To see more clearly which variables were significant and in significant shown in the table 1 below:

Table 1
Value-t and the coefficient on the Structural Model

No	No Path/Line	Estimates	t-value	Conclusion
1	Knowledge→Environment	-0.05	-0.83	Not significant
2	Knowledge→ Behavior	0.14	2.18	Significant
3	Knowledge→DHF Outbreak	-0.03	-0.50	Not significant
4	Norms→Environment	0.21	3.83	Significant
5	Norms→Behavior	-0.23	-3.70	Significant
6	Norms→DHF Outbreak	0.09	1.76	Not significant
7	Belief→Environment	0.22	4.12	Significant
8	Belief→Behavior	0.01	0.20	Not significant
9	Belief→DHF Outbreak	-0.18	-3.48	Significant
10	Attitude→ Environment	0.51	8.46	Significant
11	Attitude→Behavior	0.45	7.15	Significant
12	Attitude→DHF Outbreak	0.17	2.57	Significant
13	Perception→ Environment	0.24	4.45	Significant
14	Perception→Behavior	-0.08	-1.34	Not significant
15	Perception→DHF Outbreak	0.23	4.44	Significant
16	Behavior→ Environment	0.15	2.39	Significant
17	Behavior→DHF Outbreak	-0.26	-4.29	Significant
18	Environment→DHF Outbreak	-0.67	-9.63	Significant

Note: Significance for the level 5% (with a t Value-value <1.96 or> 1.96)

Testing the direct influence of knowledge on environmental conditions obtained inner weight coefficient of -0.05 with a t value from 4 to 0.83. Because t value <1.96 then there is no significant direct effect between the knowledge of the environmental conditions. Testing the influence of knowledge on the environmental conditions are significant with t- value 0,05.

Environmental management methods are to control *Ae. aegypti* and *Ae. albopictus* and reduce human-vector contact, including improvement of water supply and storage, solid waste management and modification of man-made larval habitats. The management of the environment should be focused on the destruction, alteration, and disposal or recycling of containers and natural larval habitats that produce the largest number of adult *Aedes* mosquitoes in each community [6].

Testing the direct influence of knowledge on the behavior of PSN obtained inner weight coefficient of 0.14 with a T value of 2.18. Because the T value> 1.96 then there is a significant direct effect between the knowledge of the behavior of PSN. Testing the influence of knowledge on the behavior of significant with t- value 0,14.

The act consists of various aspects, i.e. knowledge, identify and select a variety of objects in relation to the action to be taken, in this case how communities choose appropriate actions for the prevention of dengue disease, guided response (response guided), do something with the correct sequence and in accordance with the example, in this case the community is able to take steps to prevent dengue in accordance with existing guidelines, mechanism (mechanism), there has been a mechanism and do something automatically and will become a habit [7]. Participation in the activities of PSN, including factors related to the presence of *Aedes aegypti* mosquito larvae. The lack of education of medical personnel to the community may lead to public ignorance about the dangers posed by dengue disease so that the attitudes and actions of the people remained poor in preventing the occurrence of DHF [8].

Testing the direct influence of knowledge on the incidence of dengue inner weight coefficient values obtained at -0.03 with T value -0.50. Because the T value <1.96 then there is no significant direct effect between the knowledge of the behavior of PSN. Testing the influence of knowledge on the behavior of PSN isnot significant with t value -0,50.

Knowledge about the disease dengue and its prevention have become important factors known to the community. Family level, parents, especially mothers, who does have a role to manage the household at home, have enough knowledge about the disease dengue and its prevention. Lack of knowledge is certainly consistent

with the emergence of the risk of dengue. Thus, if the family especially the mother has enough knowledge about the prevention of dengue, it can prevent infection of their family members [9].

Testing the direct influence of norms on environmental conditions obtained inner weight coefficient of 0.21 with a T value of 3.83. Because the T value > 1.96 then there is a significant direct effect between the norms of the environmental conditions. Testing the influence of norms on the environment is significant with t- value 0,21.:

Since the first humans have tried to design the house with their ideas each by itself based on the culture of local communities and build their homes with existing materials of local (local material) anyway. After the man entered the modern age, even though their homes are built with local materials not but sometimes the design is still inherited the next generation of culture [10].

Environmental conditions that favor the development of DHF vector due to the norms that are believed by the public to support these conditions, for example, collect water in an open tub and collect used items [7,8]. Testing the direct influence of norms on behavior PSN inner gained weight coefficient of -0.23 with T value -3.70. Because the T value > 1.96 then there is a significant direct effect between the norms on behavior PSN. Testing the influence of norms on behavior PSN is significant with t-value -0,23.

People's behavior in carrying out dengue prevention is strongly influenced by the norms prevailing in society. In areas that used to collect water in a pickup with a dry climate can hardly be expected to be able to drain the tub regularly reservoirs [11,12].

Testing the direct influence of norms on the incidence of dengue acquired inner weight coefficient of 0.09 with a T value of 1.76. Because the T value < 1.96 then there is no significant direct effect on the incidence of dengue fever between norm. Testing the influence of norms on the incidence of DHF are not significant with t- value 0,09.

The results showed no influence of norms directly affects the incidence of dengue. This is because the norm is unwritten rules to regulate people's behavior, so norms directly affects people's behavior and are not directly related to the incidence of dengue. Norma is a form of unwritten rules that form the basis for a society to act, in developing countries, the norm is adapted from a culture that has existed since the first so sometimes its application are not relevant [1, 13].

Norma in community, who are not supportive of efforts to combat dengue fever including custom flatbed hold water, does not control the mosquito larvae and hoard junk outside the home [7].

Testing the direct influence of environmental conditions gained confidence in the inner weight coefficient of 0.22 with a T value of 4.21. Because the T value > 1.96 then there is a significant direct effect between confidences in the environmental conditions. Assessment of the effect of confidence in the environmental conditions insignificant with t- value 0,22.

Based on the survey results revealed that the trust does not have a direct influence on the environmental conditions. Trust is the belief held by the public against something, the results of studies showing no effect is because trust is the basis for behavior that directly influence the environmental conditions do not exist depending on each individual in applying the belief into behavior. Conditions to the contrary which the trust of local communities affect the way society in modifying the environment, it affects the health status of local communities [11].

Testing the direct influence of trust in the behavior of PSN obtained inner weight coefficient of 0.01 with a T value of 0.20. Because the T value < 1.96 then there is no significant direct effect between trust in the behavior of PSN. Assessment of the effect of Beliefs on the behavior of PSN is not significant with t-value 0,20.

The belief is based on the results of the analysis do not have a direct influence on the behavior of the community in implementing PSN. People's behavior is influenced by many factors that are divided into three major groups, namely predisposing factor, enabling factor and reinforcing factor in the concept of trust is part of the predisposing factors so that its presence can still be defeated by other factors more powerful. In this study, the effect shown is not significant and tends to be negative. This means that public confidence tends to make people's behavior more distant emergency mosquito eradication efforts. For example the belief that dengue is transmitted by mosquitoes, while the assumed communities of mosquitoes usually live in sewers so the focus by the community in conducting mosquito eradication is in the drain rather than on sir silent eg bath tub or water reservoirs more, this condition lead in implementing the PSN community are not on target.

Testing the direct influence of trust in the incidence of dengue acquired inner weight coefficient of -0.18 with T value -3.48. Because the T value > 1.96 then there is a significant direct effect between Beliefs in the incidence of dengue. Assessment of the effect of confidence in the incidence of dengue is significant with t- value -0,18.

Directly affect the public confidence DHF significantly and has a T-Value negative value which means there is some belief that there is a tendency in society can lead to dengue. Until now, dengue fever is still not found drugs and an effective vaccine for dengue disease. Mosquito nest eradication (PSN) is a way of vector control as one of the efforts being made to prevent the occurrence of DHF. PSN campaign had encouraged the government in this case the Ministry of Health with the slogan 3M, which drain the water reservoirs regularly, closing shelters and bury water used goods which can become mosquito breeding. The activity is now developing into 3M plus is an activity 3M expanded by replacing the water vase, birdbath or a similar once a week, repairing channels and gutters are not smooth, close the vent holes on the bamboo pieces / tree, dusted larvicides, maintaining the larvae-eating fish, put a wire gauze, striving for room lighting and ventilation is adequate. 3M plus activities also extended to efforts to improve the habits of the people to use the nets during a nap, take medications to prevent mosquito bites and avoid the habit of hanging clothes in the room of the house. Testing the direct influence of attitudes towards environmental conditions obtained inner weight coefficient of 0.51 with a T value of 8.46. Because the T value > 1.96 then there is a direct and significant influence between attitudes towards the environment. Testing the Effect of attitudes towards environmental conditions insignificant with t-value 0,51.

The attitude of society has a direct influence on the environmental conditions. The attitude of society will be the impetus for people to modify their environments in order not to cause dengue. The cause of dengue poorly understood properly by the public. Value orientation towards the prevention of dengue fever from the public has not fully based on the cleanliness of the environment, especially in places that supposedly would be a breeding ground for mosquito-borne diseases, but still in the orientation towards environmental hygiene in general, e.g. cleanliness yard, cleaning the gutter in order not clogged and so forth.

Testing the direct influence of attitudes toward behavior PSN inner values obtained weight coefficient was 0.45 with a T value of 7.15. Because the T value > 1.96 then there is a direct and significant influence between attitudes toward the behavior of PSN. Testing the effect of attitudes on behavior PSN is significant with t- value 0,45.

Influence attitudes toward behavior very closely because of the attitude itself are one of the components of behavior. Behavior has three components, namely components of cognitive, affective and psychomotor. Affective component can be interpreted as an attitude, so the attitude of society towards the implementation of PSN is an integral part of people's behavior in implementing PSN (6). The impact that is positive which means the better the attitude of the community, the better the behavior is formed. This is consistent with the concept of the formation of behavior in the concept of Theory of Planned Behavior (TPB) which states that the planned action is influenced by factors affect, cognition and intentions. This situation shows that the planned behavior in PSN is influenced by the knowledge, attitudes and interests of the community in implementing PSN. These conditions demonstrate that the PSN in the implementation of the higher people's attitudes will improve behavior [9,10].

Many factors can influence the success of the eradication of the dengue kind of characteristics, knowledge and attitude of the mother. Therefore, it can be a problem as formulated i.e. how much education can influence knowledge of the dengue disease, the relationship between level of education and knowledge, and attitudes toward, DHF, the attitude expected of the dengue disease, the role of education and knowledge that can affect a person's attitude [12].

Testing the direct influence of attitudes toward the incidence of dengue inner values obtained weight coefficient of 0.17 with a T value of 2.57. Because the T value < 1.96 then there is no significant direct influence between attitudes toward the incidence of dengue. Testing the Effect of attitude on the incidence of DHF are significant with t- value 0,17.

Attitude does not have a direct influence on the incidence of dengue because attitudes affect the behavior, it is strongly influenced by the willingness of society to realize his gesture in the form of action or behavior. A direct relationship does not occur because of the attitude before becoming behavior is influenced by many other factors. Behavior is influenced by three main factors, which are summarized in the acronym Precede: predisposing, Enabling and Reinforcing Causes in Educational Diagnosis and Evaluation [9].

This situation shows that to be a behavior that can affect the behavior of dengue, attitude must collaborate with a variety of other factors. These prevention efforts are not fully able to run smoothly. There are several factors that impede these efforts include public behavior that are not based on sufficient knowledge. Improving the quality of health of a person's behavior is influenced by his knowledge of health, the adoption process of a person's behavior through the stages of acquiring knowledge, accept this knowledge as an attitude and the latter use that knowledge as a basis for action [15].

Testing direct influence between perceptions of environmental conditions obtained inner weight coefficient of 0.24 with a T value of 4.45. Because the T value > 1.96 then there is a direct and significant

influence between perceptions of environmental conditions. Testing the Effect of perceptions of environmental conditions insignificant with t- value 0,24.

One of the factors that cause morbidity and mortality due to DHF is the public perception in implementing and maintaining the cleanliness of the environment. The public perception that can accurately depict the life cycle of the mosquito *Aedes aegypti* encourage people to carry out modifications to the environment properly, for instance if it is perceived that the mosquito *Aedes aegypti* like to live in an environment of clear water with a water wall that hard, would encourage people to not let no mosquito larvae that live in a tub or other clean water reservoirs by periodically draining.

The public perception of the issues posed by dengue is certainly not always the same, and will be different from one another. Of stimulus and information that is known to affect the behavior and the actions they should take when faced with the problem of dengue, especially in handling such as what was done. Someone is already carrying out a clean life in the neighborhood, but what if the person is outside the house while doing the activity, given the threat of dengue fever can occur anywhere in an environment that is quite dense.

This situation shows that the dengue prevention efforts must be implemented simultaneously by all the people who live in the environment that are necessary for the harmonization efforts of each member of society.

Testing the direct influence of the perception of the behavior of PSN obtained inner weight coefficient of -0.08 with T value -1.34. Because the T value > 1.96 then there is a direct and significant influence between perceptions of behavior PSN the Effect of perception on the behavior of PSN are not significant with p value -0,08.:

According to the concept of adoption behavior of perception plays an important role in the formation of behavior. One's perception of PSN will determine whether a person will carry out the PSN or not. This is because the perception is a picture of one's faith in something. Perception will give a boost or obstacle to the formation of behavior because the perception is a form of belief in the truth of a perceived object [3, 14].

Testing direct influence between perceptions of the incidence of dengue acquired inner weight coefficient of 0.23 with a T value -4.44. Because the T value > 1.96 then there is a direct and significant influence between perceptions of the incidence of dengue. Testing the Effect of perception on the incidence of DHF insignificant with t- value 0,23.

Knowledge can shape the perception of the experience. People who use perception without knowledge may produce normal perception, but it does not define clearly what they perceive. Public perception of dengue accompanied by the abundant flow of information about the PSN will provide positive towards the prevention of dengue. Knowledge helps identify various stimuli that appears and then becomes perception. In general, knowledge complements perception each other. However, under certain conditions can lead senses a person's knowledge. Knowledge becomes more involved when the sensor information is weak and unclear, however, if the sensor is strong and clear information, knowledge remain in effect [10].

Testing the direct influence of the PSN behavior to environmental conditions obtained inner weight coefficient of 0.15 with a T value of 2.39. Because the T value > 1.96 then there is a significant direct effect between PSN behaviors to environmental conditions. Testing the Effect of PSN's behavior to environmental conditions insignificant with t-value 0,15.

Behavior in PSN is manifested in the form of efforts to eradicate mosquito larvae by 3M, as breeding places (breeding place) favored by *Aedes aegypti* is a puddle of water contained in a container / container not puddle on top of that deplete shelters water regularly at least once a week or abate powder sprinkled into it, shut water tanks and bury / get rid of second-hand goods that can hold rainwater such as: cans, plastic and others. If the 3M activities is known as the control of mosquito nest(PSN) can be carried out regularly by the family and the environment respectively, then the disease can be eradicated. Forms of these behaviors can lead to changes in the environment such as the condition around a house full of cans will soon be clean for tin cans buried.

Testing the direct influence of behavior on the incidence of dengue PSN obtained inner weight coefficient of -0.26 with T value -4.29. Because the T value > 1.96 then there is a significant direct effect between the behavior of PSN on the incidence of dengue. Testing the Effect of the PSN behavior on DHF Outbreak is significant with t- value -0,26.

However, during the larvae are still left alive, then there will be another new mosquito that can transmit the disease further back. Activity 3 M is known as the control of mosquito nest (PSN) can be carried out regularly by the family at home and the environment, respectively, then the disease can be eradicated.

Testing the direct influence of environmental conditions on the incidence of dengue acquired inner weight coefficient of -0.67 with T value -9.63. Because the T value > 1.96 then there is a significant direct effect of environmental conditions on the incidence of dengue. Assessment of the effect of environmental conditions on the incidence of DHF insignificant with t- value -0,67.

The life cycle of the mosquito *Aedes aegypti* in the aquatic environment began after the mosquito *Aedes aegypti* females lay. Eggs produced 10-100 grains whenever spawn. *Aedes aegypti* egg shape is elliptical like a cigar, color is blackish and are drought resistant. The eggs are placed in a spread or in groups on a wall of water on the surface of the water or at the water's edge. In general, the eggs will hatch into larvae within approximately two days after the eggs submerged in water. This mosquito breeding places in the form of puddles of water being stored in a container which is commonly called the container and not in puddles of water on the ground [9]. This situation shows that the environmental conditions are very influential on the development of DHF vector so that the environment is a key factor for the occurrence of dengue.

To determine the effect or influence of exogenous variables on the endogenous variables can be seen from the direct effects, indirect effects and total effect.

Table 2. Indirect effects

Exogenous variables	Endogenous variables		
	Environment	Behavior	DHF
Knowledge	0.021	-	-0.019
Norma	-0.035	-	-0.058
Belief	0.002	-	-0.152
Attitude	0.068	-	-0.505
Perception	-0.013	-	-0.13

Based on the above table it can be seen how much influence indirectly between exogenous variables on endogenous variables. The smallest are indirect influence on the pattern of the relationship between confidences in the environmental conditions (0.002), while the largest indirect influence is on the pattern of relationship between the attitude of the incidence of dengue (-0.505).

Testing the indirect influence of knowledge on the incidence of dengue through environmental conditions obtained inner weight coefficient of -0.019. Since both the direct influence that the knowledge of the incidence of dengue is not significant and the environmental conditions on the incidence of dengue is significant then the indirect effect of knowledge on the incidence of dengue through the intermediary of environmental conditions is not significant.

CONCLUSIONS:

1. Pattern incidence of dengue fever in the Kediri city has increased from year 2000 till now.
2. Environment plays a role in the incidence of dengue in the Kediri city.
3. Behavior plays a role in the incidence of dengue in the Kediri city.
4. The dominant factor that contributes to the environment is norms, beliefs, attitudes and perceptions.
5. The dominant factors that also influence the behavior of prevention is knowledge , norms and attitudes
6. The behavior of the public in environmental management is crucial to the success of dengue prevention and mitigation, the results showed that the test direct influence of environmental conditions on the incidence of dengue.
7. Prevention and eradication of diseases such as dengue fever are also other infectious diseases based on the termination of the chain of transmission.

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