The Correlation between Community Behavior in Mosquito Habitat Control and the Existence of Larva *Aedes aegypti* in Dwikora, Medan Helvetia District

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Abstract

Background: The number of larva free index in Dwikora in 2016 was >43.5% which is still far below national standard, i.e., 95% with some dengue hemorrhagic fever (DHF) case obtained over the last two years was 16 cases. The study objective was to determine the relationship of community behavior in controlling the mosquito habitat with the presence of *Aedes aegypti* larvae in Dwikora. Methods: This research was an analytical survey with a cross-sectional design. The population in the present study was the patriarch or head of household residing at Dwikora sub-district, the total number of households was 452. By employing purposive sampling technique, 82 households were selected as samples. The data was collected by using the observation sheet and standardized questionnaire. Univariate and bivariate tests were performed for data analysis. Results: The results showed that there were 44 households which had less practice in mosquito habitat control, 48 households had a positive attitude, and 38 households had good knowledge. Bivariate analysis using chi-square test showed that there was a significant correlation between the household practice (p-value = 0.01) with the presence of *Aedes aegypti* larvae in Dwikora. Conclusion: It may indicate that the communities in Dwikora carry out less control over the existence of *Aedes aegypti* larvae at their houses. Therefore, it is suggested for the households to pay more attention to house cleanliness, to always use a closed bucket, apply abate to stagnant water and eradicate mosquito habitats periodically to avoid the occurrence of transmission of dengue hemorrhagic fever (DHF).

Keywords: behavior, mosquito habitat control, larva *Aedes aegypti*.

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Introduction

Vector-based infectious diseases become one of the health problems for tropical countries. Indonesia is one of the archipelago countries located on the equator of tropical climates. With these characteristics, Indonesia has the potential of vector-based infectious diseases such as dengue hemorrhagic fever (DHF) (Sumantri, 2010). Dengue fever is one of the most dangerous infectious diseases with rapid spread and can attack any age and can cause bleeding to cause death for the sufferer (Putri, 2015). Existence of dengue mosquito - larva also could cause Dengue fever Chikungunya outbreaks (Tarigan, 2016)

According to the World Health Organization (WHO), the world's estimated human population is at risk of dengue disease reaching 2.5-3 billion people, especially those living in urban areas both in tropical and subtropical countries. It is also estimated that there are 50-100 million dengue virus infections that occur worldwide each year. It is estimated that for Southeast Asia there are 100 million cases of dengue fever (DD) and 500,000 cases of Dengue Hemorrhagic Fever (DHF) requiring hospitalization and 90% of the sufferers are children aged less than 15 years and the number of deaths by DHF disease reaches 5% with an estimated 25,000 deaths every year. WHO records that Indonesia as the country with the highest case in Southeast Asia (WHO, 2012).

Indonesia experienced an increase in the number of dengue cases in 2013 compared to 2012 from 90,245 cases to 112,511 cases with Incidence Rate (IR) for 2012-2013 approximately 37.27-45.85 (per 100,000). In 2011, there were 65,725 people suffering from dengue fever in Indonesia and the number increased in 2012 approximately 90,245 people. The number of districts/cities affected by dengue fever in 2012 also increased, from 374 districts/cities (75.26%) to 417 (83.9%), this increase shows the extent of the spread of dengue (Azlina, 2016).

Based on health profile data of Medan city of North Sumatera, the number of cases in 2015 was 1,359 cases, and 11 people died. In 2016 the number increases to 1,786 cases, and 11 people died (Medan Public Health Office, 2016). Medan Helvetia District is one of the districts in Medan which are endemic to DHF, i.e., 2015-2016 cases of dengue fever reach 127 cases. The data showed that larvae free index (LFI) in Medan Helvetia District $\geq$ 43.5%. This proved that the larva free index (LFI) was very low. One of Medan Helvetia District that endemic of DHF in

this two years is Dwikora village with some cases were 16 cases and every year DHF is always a health problem (Medan Public Health Office, 2016).

Dengue Hemorrhagic Fever (DHF) incidence is influenced by the density of larvae Aedes aegypti. The presence of dengue larvae depends on the existence of Aedes aegypti breeding places as the main factor of dengue disease. The more breeding place it will be denser of dengue vectors. The number of breeding places cannot be separated from the habits or community behavior which can be the potential to spawn Aedes aegypti mosquitoes (Sari and Darnoto, 2012).

The government has issued a policy to eradicate mosquito to cope with dengue fever. This is considered an effective, efficient and economical way to eradicate the dengue transmitter vector. The mosquito eradication program (MEP) needs to be balanced with the increase of community knowledge about DHF. Community's knowledge is needed as the initial capital changes the behavior of the community. Good knowledge is believed to affect the increase of community action to prevent the emergence of dengue disease in the surrounding environment (Indonesia Ministry of Health, 2010). Based on the described background, it is important to research to evaluate the correlation of community behavior in mosquito habitat control with the presence of larva Aedes aegypti in Dwikora sub-district.

Methods

This research was observational (survey) analytic by using cross-sectional research design. The dependent variable in this research was the presence of larva Aedes aegypti while independent variable was behavior. The domain factors from behavior were knowledge, attitude, and practice of society to control mosquito habitat of vector dengue disease. The study was conducted from February to August 2017 in Dwikora sub-district in Medan Helvetia District because based on Medan Health Profile, Dwikora sub-district was the highest case of dengue disease in North Sumatra and the number of dengue fever deaths increasing every year. Dwikora also the endemic area in North Sumatera due to it is in an urban area. The population in this study was peopling whose residence in Dwikora sub-district of Medan Helvetia in 2017 a total of 451 households. The sampling technique in this research was a purposive sampling method where the sampling was based on a particular consideration made by the researcher, based on previously known characteristics or traits of the population. The samples in this study were houses located in

Dwikora for a total of samples were 82 households. We used Slovin formula to calculate the number of samples. Standardized questionnaires and observation sheets from the ministry of health guidance were used for data collection. To find out the existences of larva was done by observing the presence or absence of larvae in water reservoirs located inside and outside the house, such as bathtubs, jars, drums and other water reservoirs. The density of larvae was measured by House Index, Container index and Breteau Index. We informed the headman of the district before sampling. Households were randomly selected, and household heads were invited to participate in the study after obtaining their informed consent. If the household head was not present or refused to participate, the head of the next household was included until reaching the sample size required. Interviewers were trained before surveying to ensure that the questionnaires were well understood by the surveyors, avoiding the difference in the definitions and interpretations of concepts used.

The questionnaire included closed-ended questions about socio-demographic data, knowledge of the symptoms, transmission, and vector of dengue fever, attitudes and practices of the respondents towards dengue fever. To know the community's knowledge of the mosquito control; 7 questions were asking with Yes and No option. If the respondent answer “Yes” the value was 1, and "No" value was 0. Then the highest score was 7, and the lowest score was 0. Therefore, we classified the knowledge to be “good if the score was 5-7, moderate if the score was 3-4 and deficient if the score was 0-2. To know the attitude of society about vector control, we asked seven statements with alternative answer Strongly Agree, Agree, Disagree and Strongly Disagree. If the respondent answered "Strongly Agree" value was 4, "Agree" value was 3, "Disagree" value was 2, and "Strongly Disagree" value was 1. Then the highest score were 28 and lowest score 7, respectively. We classified the attitude to be “positive if the score was 16-28 and negative if the score was 4-15”. To find out the community practices regarding the action of vector control of DHF disease; 8 questions were asking with Yes and No answer options. If the respondent answered "Yes" was given a score of 1, and if the respondent answered "No" given score 0. Then, the highest score 8 and the lowest score 0. Therefore, DHF prevention measures could be categorized as “good if the score was 6-8, moderate if the score was 3-5 and deficient if the score was 0-2”. Univariate analysis was used to calculate the distribution of dependent and independent variables, and bivariate analysis was done by chi-square test to evaluate the relationship between community behavior in mosquito habitat control and the existence of larvae

Aedes aegypti in Dwikora with p-value is ≤ 0.05 (CI =95%)**.** We used SPPS version 20 to perform the data analysis.

Results

Overview of Research Sites

Medan Helvetia district is one of 21 districts in Medan City, North Sumatera, Indonesia. Medan Helvetia district borders with Medan Sunggal in the West, Medan Barat in the East, Medan Petisah in the South, and Medan Marelan in the North. One of the sub-districts in this district is Dwikora consisting of 12 Line. The year of Dwikora sub-district was formed in 1991 with a population of 29,024 people and an area of 175 Ha. Based on the results of the survey, we found that at Dwikora still a lot of garbage scattered around the houses of residents, and there were also some families who are burning garbage around the house. Also, the environment almost all the ditches were always inundated with water, as for the bad habits of residents here were throwing garbage around the home. The communities in this environment never hold cooperation and healthcare personnel in Dwikora has never received training on waste processing by health cadres.

Univariate Analysis

Table 1 Frequency Distribution of Respondent Characteristics in Dwikora Sub-district, Medan Helvetia District (n = 82)

Characteristic	**Category**	**F**	**%**
Year	23-31	16	19.5
	32-40	39	47.6
	41-50	27	32.9
Gender	Male	6	7.3
	Female	76	92.7
Education	Primary	12	14.6
	Elementary	17	20.7
	High school	32	39.0
	College	15	18.3
	Non-educated	6	7.3

Occupation	unemployment	31	37.8
	Sales	27	32.9
	Farmer	12	14.6
	Government employees	3	3.7
	Private employees	9	11.0

Table 1 showed that the majority of homeowners in the age range 32-40 years was 47.6%, the female was 92.7%, high school education was 39.0%, and unemployment was 37.8%.

Table 2 Frequency Distribution Based on Respondent's Behavior Dwikora Sub-district, Medan Helvetia District (n = 82)

Knowledge	**F**	**%**
Deficient	17	20.7
Moderate	27	32.9
Good	38	46.3
	82	**100.0**
Attitude	**F**	**%**
Negative	34	41.5
Positive	48	58.5
	82	**100.0**
Control measures	**F**	**%**
Deficient	44	53.7
Moderate	26	31.7
Good	12	14.6
	82	**100.0**

Table 2 showed that 46.3% of homeowners have good knowledge about the eradication of mosquito breeding, 58.5% of homeowners have a positive attitude about the eradication of mosquito breeding, and 53.7% of homeowners have fewer control measures for the eradication of mosquito breeding.

Table 3 *Aedes aegypti* larvae index

Larva Index	Positive	Negative	Density Figure	Total
Number of houses checked	59	23	-	82
Number of container checked	98	121	-	219
Free larva index	-	-	-	28.0
House Index (HI)	-	-	8	71.9
Container Index (CI)	-	-	9	44.7
Breteau Index (BI)	-	-	8	119.5

Based on table 3 it could be seen that from 219 containers were examined there were 98 container larvae positive (CI = 44.7%). While the calculation obtained, Breteau Index was 119. From the three larvae indexes could be made density figure parameters (population density). The value of DF for (HI) lied at number 8, the value of DF for (CI) lied at number 9 while the DF for (BI) was located at number 8 which means larvae population density of the three larval indices in Dwikora Sub-district Medan Helvetia was high.

Bivariate Analysis

Table 4 Correlation between Community Behavior in Mosquito Habitat Control and the Existence of Larva *Aedes aegypti*

	The existence of Larva *Aedes aegypti*		
Knowledge	**F**	**%**	p-value
Deficient	17	20.7	
Moderate	27	32.9	0.365
Good	38	46.3	
Attitude			
Negative	34	41.5	0.078

Positive	48	58.5	
Action			
Deficient	44	53.7	**0.010**
Moderate	26	31.7	
Good	12	14.6	

Table 4 showed that there was no correlation among knowledge (p-value = 0.365) and attitude (p-value = 0.078) with the presence of larval Aedes aegypti and there was a correlation between community practice (p-value = 0.010) with the presence of larval Aedes aegypti in Dwikora.

Discussion

The authors found that the homeowners have a good level of knowledge (46.3%) but there was no correlation between the level of knowledge with the presence of larval Aedes aegypti (p-value = 0.365), this could be seen by the high number of houses that have larva Aedes aegypti (72.0%). The result of this study was not in line with the research of Yudhastuti (2008), the research found that there was a correlation between knowledge level of the respondent with the presence of larva aegypti with p-value = 0.001<0.05. When somebody has a high knowledge level. Hence larva density in his house will be low, and who has a low level of knowledge, then he has a high density of larvae in his house. Research conducted by Nasir, Ibrahim and Manyulley (2014) found that there was no relationship between the level of knowledge with the density of Aedes aegypti larvae in dengue hemorrhagic endemic areas (DHF) in Makassar.

The result of this study was indicated that the knowledge held did not guarantee that the action will do to prevent and eradicate mosquito habitat the knowledge possessed. This was inconsistent with the theory proposed by Green (1980, in Nasir, 2014) who said that knowledge influences as an initial motivation for a person in behaving and acting. Similarly, the theory Notoatmodjo (2012) said that someone who has a good knowledge about disease, in this case, DHF will appear the right attitude and action. When someone has a higher knowledge means they have good attitude and actions. The results of this study, the theories put forward by the experts are contradictory, this is because the good knowledge possessed by society is not implemented in concrete actions to eradicate the dengue mosquito's habitat, this can be caused by various things such as the duty at work and intention of people who do not want to take action to eradicate mosquito breeding. Research conducted by Alyousefi found that independent predictor of poor

preventive practices of the community was the poor knowledge of the vector even though they know about dengue fever disease (Alyousefi, et al, 2016).

The results of this study found that there was no correlation of attitude with the presence of larva Aedes aegypti (p-value = 0.078 (P>0.05)) in Dwikora sub-district. Research conducted by Damayanti (2011) showed that there was a statistically significant relationship between attitude with the presence of Aedes aegypti larvae in Kepolorejo Magetan District, Magetan Regency (p-value=0.008). Unlike an research (Efruan, et al, 2015) found that there was no relationship of attitude with the presence of dengue larvae in Semarang City (p-value = 0.075). His study found larva from the examined house. Factors that strongly influence the level of density of larvae were the practice to implement eradication of mosquito breeding. Although, in essence, human always acts on his knowledge and belief in something, yet, according to psychoanalysis studies that human behavior is largely determined by the concept of consciousness (conscious and unconscious) of something (Achmadi, 2013). This indicates that if people have been aware of hygiene issues that strongly support the improvement of health status, then they will tend to do it as a routine that must always be done which include the habit of draining the tub and container that holds water, so unconsciously they have done the eradication of mosquito breeding action.

This study indicated that there was a correlation of practice with the presence of larva Aedes aegypti in Dwikora sub-district. The presence of the relationship between the practice with the presence of larvae Aedes caused by the lack of action carried out in the control of the mosquito habitat, so it allows the occurrence of Aedes aegypti larvae to breed. This can be caused by various things such as duty at the workplace or community work in the environment that the majority occupation as sales and farmers so that they prefer the job rather than take action to eradicate mosquito breeding. The result of this research was in line with Azlina (2016) about the relationship of mosquito habitat eradication practice with the presence of dengue larva in Lubuk Buaya Village. The result found that there was a significant relation of practice with the existence of dengue vector larvae (p-value = 0,001). The result of HI was 35.45%, CI 13.41%, BI 50% and DF=5. The study of Nahumarury (2014) found that there was a relationship of knowledge, attitudes, and eradication of Aedes aegypti mosquitoes with the presence of larvae in Kassi-Kassi urban village of Makassar.

The number of larvae free index obtained in this environment was 28.0%. Approximately 82 houses were examined (72.0%) found larva Aedes aegypti. This indicated that larvae free index

in Dwikora sub-district was still far below the national standard (95%). The high number of mosquito population density will affect the distribution of DHF spread. It is feared that the high population of larva Aedes aegypti in Dwikora sub-district will increase the risk of DHF transmission. Based on Shah (2012) found that there was a relationship between the numbers of cases of dengue fever with the presence of larva Aedes aegypti (22.3%). The larva species found during the study were Aedes aegypti larvae. Aedes aegypti larvae contain 98 containers from 219 containers examined both inside and outside the house such as bucket container, bathtub, refrigerator gutter, used goods and dispenser. The most dominant containers found larvae are buckets and bathtubs. The number of larvae Aedes aegypti found in the bucket as the dominant container because the bucket is very cheap and practical storage of water. Based on Soegijanto's research (2003 in Zubaidah 2014) said that the container of water in the house more found larva Aedes aegypti. This was because inside the house was not exposed to light so that the potential of breeding Aedes aegypti.

Breteau Index (BI) figures obtained in this study were 119, BI distribution according to the type of container found larva was a bucket, bathtub, dispenser, and used goods as well as refrigerator gutter. Containers that were not often cleaned every day were containers with Aedes aegypti larvae. This indicated that these places were a potential breeding place for dengue mosquito in Dwikora Sub-district of Medan Helvetia District. Attention to mosquito control needs to be focused on those places. Based on research conducted by Fatimah (in Nani, 2017) said that the existence of water shelter inside and outside the house was very influential on the presence of larva Aedes aegypti and water reservoir can be a breeding ground Aedes aegypti mosquito so it can be a source DHF transmission.

This study was in line with the research Soewasti in Zubaidah, 2014, which found that the availability of mosquito breeding vectors of dengue fever as well as the behavior of the community in supporting the availability of breeding places will increase the density of larvae Aedes aegypti. Similarly, research conducted by Nadifah (2016) said that Aedes aegypti mosquitoes were found in containers inside the house. This was due to the habit of accommodating the water for daily needs in the house that was not closed, so that made Aedes aegypti mosquitoes interested in laying the eggs.

This study showed that there was an increase in CI and BI figures. This indicates a decrease in a community effort in controlling larvae population Aedes aegypti. Based on the results of this

study, there was not a significant correlation between knowledge and attitude with the presence of larval Aedes aegypti. It showed good knowledge and positive attitude that respondents have not done in real action. It showed the need to encourage or motivate people in Dwikora to conduct mosquito habitat eradication activities by doing 3M plus through counseling and dissemination of information about DHF so that awareness is rising for the community to do eradication of mosquito breeding.

Conclusion

In conclusion, there was a significant correlation between the household practices with the presence of *Aedes aegypti* larvae in Dwikora. It may indicate that the communities in Dwikora village carry out less control over the existence of *Aedes aegypti* larvae at their houses. Therefore, it is suggested for the households to pay more attention to house cleanliness, to always use a closed bucket, apply abate to stagnant water and eradicate mosquito habitats periodically to avoid the occurrence of transmission of dengue hemorrhagic fever (DHF).

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