

Original Article

**Investigation of The Presence of *Aedes aegypti* Larvae and Its Related Factors
in Air Putih Community Health Center, Samarinda**

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) is a public health problem in Indonesia until now because there are still many morbidity and mortality rates every year. DHF cases in the working area of the Air Putih Health Center fluctuate every year, in 2019 there were 109 cases, in 2020 there were 29 cases and in 2021 there were 44 cases. The purpose of this study was to determine the relationship between breeding places and PSN behavior with the presence of *Aedes aegypti* mosquito larvae in the working area of the Air Putih Public Health Center, Samarinda City. This study used quantitative, analytic survey methods with a cross-sectional approach where the subjects in this study were houses within the working area of the Air Putih Community Health Center with a sample of 59 houses, a sampling technique set by WHO. Collecting data with a questionnaire, check list and analyzed using the fisher's exact test. As for the bivariate test results, it was found that there was a relationship between TPA for daily needs (p-value = 0.00), TPA not for daily needs (p-value = 0.00) and PSN behavior (p-value = 0.05) with the presence of *Aedes aegypti* mosquito larvae in the working area of the Air Putih Public Health Center, Samarinda City. Suggestions in this study, the people in the working area of the Air Putih Health Center can reduce mosquito breeding places, drain the TPA regularly and bury used items that are not used. It is also hoped that the Puskesmas can improve coordination with the community and cadres in checking mosquito larvae regularly so that they can eradicate the DHF vector.

Key words : *Breeding Places, PSN Behavior, Presence of Larvae*

INTRODUCTION

The prevalence of dengue hemorrhagic fever (DHF), which continues to produce high rates of morbidity and mortality each year, is one of Indonesia's current public health issues. The first case of dengue fever was documented in Indonesia in 1968. DHF is transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes which have the virus in their bodies. The dengue virus is transferred from one person to another with the mosquito's saliva when the mosquito sucks blood. The virus will be in the blood circulation for 4-7 days of incubation period, DHF can attack all age groups, this disease is also related to the environment and people's behavior (Ministry of Health of the Republic of Indonesia, 2017).

According to WHO data, Asia Pacific bore 75 percent of the world's dengue burden between 2004 and 2010, while Indonesia was reported as the 2nd country with the largest DHF cases among 30 other endemic countries (Ministry of Health RI, 2018). Based on the Indonesian Health Profile, DHF sufferers were reported in 2018 Incidence Rate (IR) of 24.75 per 100,000 population and Case Fatality Rate (CFR) of 0.71%, then in 2019 IR 51.53 per 100,000 population and a CFR of 0.67% and then in

2020 the number of IR is 40 per 100,000 population with a CFR of 0.7% of these data fluctuating (Indonesian Health Profile, 2020).

Samarinda City has 26 health centers, one of which is the Air Putih Health Center. The DHF morbidity rate is quite high every year at the Air Putih Health Center. Based on data from the Samarinda City Health Office (2021), in 2017 there were 41 cases with a CFR of 4.9%, then in 2018 there were 101 cases and no deaths, then in 2019 there was an increase of 109 cases but no deaths. In 2020 there has been a decrease in the number of cases, namely 29 cases and no deaths, but has increased in 2021 from January to October there have been 44 cases and no deaths.

METHODS

This study uses a quantitative research design, analytic survey method with a cross sectional approach. Cross Sectional is a study to study the dynamics of the correlation between risk factors by means of an observation or data collection approach. This means that each research subject was observed only once and measurements were made on the character status or subject variables at the time of examination to determine the relationship between breeding places and mosquito nest eradication (PSN) behavior with the presence of *Aedes aegypti* mosquito larvae. This research was carried out from 1 to 20 June 2022. Sampling was carried out in the Air Putih Village and identification of larvae was carried out at the Public Health Laboratory, Widya Gama Mahakam University, Samarinda.

The research sample was adjusted to the conditions that had been set, namely an examination was carried out on 59 houses that were taken randomly in the village which is in the working area of the Air Putih Health Center, Samarinda City. The sampling technique in this study was carried out using Proportional Random Sampling, which is a method of taking samples from members of the population using random methods without regard to strata in the

population. Sampling is based on a certain consideration made by the researchers themselves. Based on the characteristics and characteristics of the known population (Notoatmodjo, 2010). The number of samples taken from the Air Putih subdistrict was 45 and the Bukit Pinang subdistrict was 14 samples. The research instruments used in this study were observation sheets to record the presence of larvae, questionnaires and tools for examining larvae.

RESULTS

Respondents in this study were people who are in the Working Area of the Air Putih Public Health Center, Samarinda City. Respondent characteristics are shown in Table 1.

Of the 59 respondents in the working area of the Air Putih Public Health Center, the highest age group distribution was at the age of 20-23 years as many as 24 respondents (40.7%) while the age group with the lowest distribution was at the age of 40-43 years (1.7%). The highest distribution of education levels was tertiary education level with 35 respondents (59.3%) while the lowest education level was junior high school/equivalent with 2 respondents (3.4%). the highest distribution of occupaton is students with 20 respondents (33.9%) while the lowest distribution of work is for civil servants with 5 respondents (8.5%).

Univariate analysis was carried out for the presence of larvae, number of container for household use, number of container for non house hold use and practice of dengue prevention (Table 2). The number of houses with the presence of *Aedes aegypti* larvae in the category of 20 houses (33.9%) and the category of no *Aedes aegypti* larvae was 39 houses (66.1%). There were 42 houses (71.2%) that did not have larvae in the water reservoir, while 17 houses (28.8%) had larvae in the water reservoir. It was found that there were 53 houses (89.8%) that did not have larvae in the water reservoir, while 6 houses (10.2%) had larvae in the water reservoir. 50 respondents (84.7%) had good dengue prevention practice and 9 respondents (15.3%) had poor

dengue prevention practice. The distribution of the types of containers found in the study is shown in Table 3.

The number of containers used for daily needs was 138 and 25 were positive for larvae, while the number of landfills not for daily needs was 89 and 8 were positive for larvae. From the results of observations in the study, it was shown that the most common type of water reservoir used for daily needs by respondents and the most commonly found larvae were drums, while the type of water reservoir that was not used for daily use was the most commonly found. Larvae are other used items such as used bottles/cans, used chairs/broken buckets and other unused items that can hold water as breeding grounds for mosquitoes. The survey

results from the 227 containers inspected contained 33 containers of *Aedes aegypti* larvae, resulting in a Container Index (CI) = 14.54%.

We also conduct the bivariate analysis to analyse variables which correlated with the presence of larvae in the location of study (Table 4). Based in Table 4, containers for household use, containers for non-household use and practice of dengue prevention showed correlation to the presence of *Aedes* larvae.

Tabel 1. Characteristics of respondents

Characteristics	number (n)	Percentage (%)
Age groups		
20-23	24	40,7
24-27	24	40,7
28-31	4	6,8
32-35	3	5
36-39	1	1,7
40-43	1	1,7
44-47	2	3,4
Gender		
Male	30	50,8
Female	29	49,2
Level of education		
Junior High School	2	3,4
Senior High School	22	37,3
University/Higher education	35	59,3
Occupation		
Unemployment	13	22
civil servant	5	8,5
Private employees	6	10,2
Self-employed	15	25,4
students	20	33,9

Table 2. Category of variables

Variables	n	Percentage (%)
The presence of larvae		
present	20	33,9
not present	39	66,1
Total	59	100
Number of containers for household use		
Positive larvae	17	28,8
Negative larvae	42	71,2
Numbers of containers for non-household use		
Positive larvae	6	10,2
Negative larvae	53	89,8
Practice of dengue prevention		
Good	50	84,7
Poor	9	15,3

Table 3. Distribution of Larvae Presence by Type of TPA in the Working Area of the Air Putih Public Health Center, Samarinda City

<i>Breeding Places</i>	number of container	positive larvae	Container index (%)
Container for household use			
a. Bath-tub	51	2	3,9
b. Barrel	29	8	27,6
c. Drum	34	11	32,4
d. Bucket	20	2	10
e. Basin	4	2	50
	138	25	18,12
Container for non household use			
a. Animal drinking place	7	0	0
b. Used tires	3	0	0
c. Used tins	6	2	33,3
d. Flower pot	24	1	4,17
e. Dispenser	37	1	2,7
f. Used bucket	12	4	33,3
	89	8	9

Table 4. Bivariate analysis

Variables	p-value	interpretation
Containers for household use	0.00	correlated
Containers for non-household use	0.00	correlated
Practice of dengue prevention	0.05	correlated

DISCUSSION

Based on the research results, many mosquito breeding places were found in the respondents' homes with the presence of *Aedes aegypti* mosquito larvae. The existence of mosquito breeding sites plays an important role in the existence of *Aedes aegypti* mosquito larvae, because the more breeding places, the denser the vector population will be. For the TPA used, many of the respondents used bathtubs and drums for MCK purposes (bathing, washing, toilet) which in their daily use these drums and tubs were left open so as to allow female *Aedes aegypti* mosquitoes to lay their eggs in the TPA. In addition, at the time the research was conducted in the working area of the Air Putih Health Center, there were many landfills used to store water due to the lack of PDAM water supply to local residents' homes.

The existence of containers will play a very important role in the breeding of *Aedes aegypti* mosquitoes, because the more adequate containers there will be more breeding places and the denser the *Aedes aegypti* mosquito larvae will be in these containers (Wati, 2009). The presence of a landfill inside or outside the home greatly influences the presence or absence of *Aedes aegypti* mosquito larvae. The landfill can even become a breeding ground for adult mosquitoes (Fatimah, 2006). The most commonly found water reservoirs for non-daily use are unused plastic chairs, broken buckets and other used items around the respondent's house that are not buried or thrown in the trash so that they become breeding grounds for mosquitoes. The many and varied types of water reservoirs for respondents have the

potential for *Aedes aegypti* mosquitoes to lay eggs and become their breeding grounds.

Water containers that are not for daily use also need to be considered to reduce the risk of finding larvae such as changing water in flower vases, cleaning dispensers, cleaning the animal's watering can once a week because it can affect the presence or absence of *Aedes aegypti* mosquito larvae. Unused used goods also have the potential to become breeding grounds for mosquitoes and there are still some found in the respondent's house, the community can reduce the risk of the existence of *Aedes aegypti* mosquito larvae by controlling places that have the potential to become breeding grounds for *Aedes aegypti* larvae such as increasing the implementation of PSN, so that no *Aedes aegypti* mosquito larvae could later be found.

The Indonesian Ministry of Health (2016), explains PHBS or clean and healthy living behavior are all health behaviors that are carried out because of personal awareness so that families and all of their members are able to help themselves in the health sector and have an active role in community activities. One good behavior is the behavior of eradicating mosquito nests (PSN) in reducing the population of mosquito larvae at home and the surrounding environment. Many respondents carried out draining activities for more than one week, this was because the respondent's bathtub was large so that respondents would drain it when it looked cloudy and dirty. Apart from not having drained and closed the water reservoirs, some respondents also placed water reservoirs

outside the house. This behavior also provides an opportunity for *Aedes aegypti* mosquitoes to lay eggs. The condition of the respondent's house which is damp and lacks lighting is also a potential place for *Aedes aegypti* mosquitoes to breed, because *Aedes aegypti* mosquitoes like to rest and breed in dark and damp places.

Draining water reservoirs is one way to prevent *Aedes aegypti* mosquitoes from laying eggs and breeding. Draining bathtubs, jars/barrels, drums, buckets and others needs to be done regularly once a week by brushing in the drain so that *Aedes aegypti* mosquitoes cannot breed in these places, because in general mosquitoes lay their eggs on the walls of water reservoirs, because it is recommended that at the time of draining the water, scrub or brush the walls. Although some respondents in the working area of the Air Putih Public Health Center have carried out the cleaning once a week, there are still *Aedes aegypti* mosquito larvae found in the TPA. The implementation of draining some respondents was still not good, such as simply throwing away the water in the TPA which was considered dirty and then immediately replacing the TPA water without brushing the TPA, so that *Aedes aegypti* mosquito larvae were still found.

Closing water storage containers is important in PSN behavior, such as closing jars/barrels, drums, buckets and others. The importance of the availability of lids at landfills is needed to reduce the number of mosquitoes that land on water reservoirs, where these containers become a breeding medium for *Aedes aegypti* mosquitoes. If all the people have realized the importance of covering the TPA, it is hoped that the existence of mosquito larvae can be eradicated, but based on interviews with respondents in the working area of the Air Putih Health Center this has not been implemented optimally. Therefore, efforts are needed to eradicate *Aedes aegypti* mosquito larvae through controlling potential breeding sites, namely by closing the TPA.

Burying used goods is a practice of PSN behavior

by burying used goods that have the potential to hold water and contain *Aedes aegypti* mosquito larvae and are no longer used, such as used cans, bottles, tires and others (Desniawati, 2014). Based on the results of interviews and observations it is known that some respondents did not bury used goods. This is because there are still respondents who store used goods in their home environment with the excuse that they will be reused and there is no vacant land to burn them. Tires, bottles, cans, plastic and other items that can hold water are all possible breeding grounds for mosquitoes. The more used goods that can hold water, the more places for *Aedes aegypti* mosquitoes to lay eggs and breed so that the risk of finding larvae increases (Widodo, 2012). Therefore, it is better to urge the public if there are used items around the house, it is better to bury them so that there is no risk of the *Aedes aegypti* mosquito laying eggs and breeding.

Based on the results of the study there were many respondents who had not done chemical and biological PSN. This method has not been widely used by respondents. Chemically, PSN is usually done by sprinkling abate powder on water reservoirs which are difficult to drain, but respondents still lack awareness about using abate powder. Of course, this can also increase the risk for *Aedes aegypti* mosquito larvae to live and breed in water reservoirs. Biological PSN that can be done is by raising larvae-eating fish in water reservoirs which have not been carried out by the respondents. Actually, this method is a natural and quite effective way to eradicate *Aedes aegypti* larvae, but respondents are reluctant to do it because the fish they keep will cause a fishy smell in the respondent's water reservoir.

Installing netting is an effort to prevent mosquitoes from breeding, homes with ventilation conditions without mosquito netting installed, will make it easier for mosquitoes to enter the house to bite humans and to rest. In the absence of mosquitoes entering the house, the possibility of mosquitoes breeding in the TPA inside the house is getting

smaller. Based on the results of observations, it can be seen that there are still many respondent's houses that do not use wire netting. According to the Ministry of Health of the Republic of Indonesia (2005), the most appropriate way to eradicate the DHF vector is to carry out the DHF PSN. If the DHF PSN is carried out continuously and continuously by the community, the *Aedes aegypti* mosquito population can be reduced to as low as possible.

CONCLUSION AND RECCOMENDATION

There is a relationship between breeding places and dengue prevention practice with the presence of *Aedes aegypti* Mosquito Larvae in the Work Area of the Air Putih Public Health Center, Samarinda City in 2022. It is recommended to further increase PSN or 3M plus behavioral activities in daily life such as draining, brushing, closing TPA meetings, bury used goods, install wire netting, replace water in flower vases and animal drinking containers and use abate powder and maintain larvae-eating fish in landfills, so that there are no *Aedes aegypti* mosquito larvae in places that can hold water and become a breeding ground for mosquitoes breed.

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