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Dengue Hemorrhagic Fever Vector in the Paring Sungai Martapura Indonesia

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Abstract. Dengue Hemorrhagic Fever (DHF) is one of the public health problems that is still found in Indonesia. This disease always occurs repeatedly due to failure of vector control. Indonesia is the second largest country among 30 countries endemic to DHF. This disease can cause death especially in children. In Sungai Paring Village, January-December 2017, 2 cases of DHF were found. The purpose of this study was to find out the House Index (HI), Countainer Index (CI), Breteau Index (BI), larva free numbers (LFN) , Density Figure (DF) and larvae positive container types. This research is a type of descriptive survey research with total sampling technique. The population in this study were households and containers in the Paring Sungai Martapura Sub-District. The sample in this study was all water reservoirs in 100 respondent's houses. Of the 100 houses surveyed there were 40 positive larvae (HI 40%), 60% ABJ, 41 larvae positive containers from 356 examined containers (CI 11.52%) and positive larvae containers namely, ceramic bath 3 (0.84%), 1 cement bath (0.28%), 18 used paint buckets (5.06%), 4 large bucket buckets (1.12%), 3 ablutions (0.84%) and 6 plastic drums (1.70%). Based on this research, it is expected that respondents and the community take precautionary measures and control of dengue hemorrhagic fever (DHF) vectors by 3M. For researchers to conduct further research to determine vector density fluctuations
Keywords: dengue haemorrhagic fever; Aedes sp; larvae survey.

INTRODUCTION

Infectious diseases are a major health problem for people in developing countries like Indonesia. One of the infectious diseases via vector is dengue hemorrhagic fever[1]. Cases of dengue hemorrhagic fever (DHF) in the world in 2004 - 2010 more than 70% were in the Asia Pacific region (WHO). The case of DHF in Indonesia is reported as the second largest country among 30 countries endemic to DHF[2].

In Indonesia in 2016 there were 204,171 cases of dengue hemorrhagic fever (DHF) with 1,598 deaths. This number increased compared to the number of cases in 2015 (129,650 cases). The number of deaths due to DHF in 2016 also increased from 2015 (1,071 deaths). The number of cases of dengue haemorrhagic fever (DHF) in 2016 in

South Kalimantan was ranked 22nd in Indonesia, namely 4,098 cases with the number of deaths of 28 people[3]. Banjar Regency ranks first, which is 549 cases with 5 deaths. The Martapura 1 Health Center area ranks the largest number of cases, namely 23 cases with the number of deaths of 1 person[4].

Dengue is characterized by four main symptoms, namely high fever, bleeding, swelling of the liver, and in some severe cases leads to failure of blood circulation. This disease can cause death especially in children.

According to the data from the 2017 Banjar District Health Office, Sungai Paring Village is one of the Martapura 1 Community Health Center service areas, where in January-December 2017 there were 2 cases of DHF. While there is no known description of the Dengue Hemorrhagic Fever (DHF) Vector in Sungai Paring Subdistrict, even though this data is needed for prevention and control of the vector of dengue hemorrhagic fever (DHF) in the Martapura area. This study aims to determine the description of Dengue Hemorrhagic Fever (DHF) vector in the Kelurahan Sungai Paring Martapura.

MATERIALS AND METHODS

This research is a descriptive survey research. The research location was in Sungai Paring Martapura Sub-District from May to April 2018. The sample was all water reservoirs in 100 respondent's houses in Rukun Tetangga 05 with DHF cases. Sampling using purposive sampling technique with the criteria of Neighborhood Pillars with the highest DHF cases in Sungai Paring Sub-District.

Data collection is through a survey of single larvae larvae methods, namely by looking at all water containers inside and outside the house, in Sungai Paring Village. The larvae were taken and taken to the laboratory to be examined and identified by their characteristics having a fat, short chiffon, with the number of hairs in one pair and comb teeth at the end of the abdomen with only one line. The shape of a tooth comb is like a trident (Aedes aegypti) and a simple tooth (Aedes albopictus).

Data were analyzed and calculated based on Pant and self (1993), namely by calculating the range of values of the House Index (HI), Container Index (CI), and Breteau Index (BI) and larva free numbers using the following formula[5]:

1) *House Index* (HI) = $\frac{\sum \text{house has larva}}{\sum \text{home examined}}$ x 100 %
2) *Container Index* (CI) = $\frac{\sum \text{Container has larva}}{\sum \text{Container examined}}$ x 100 %
3) *Breteau Index* (BI) = $\frac{\sum \text{Container has larva}}{\sum 100 \text{ house}}$ x 100 %
4) *Larva Free Numbers of Larva* (LFN) = $\frac{\sum \text{house without larva}}{\sum 100 \text{ house}}$ x 100 %

Table 1. Larva Index

Density figure (DF)	***House Index* (HI)**	***Container index* (CI)**	***Breteau index* (BI)**
1	1– 3	1 - 2	1 - 4
2	4 – 7	3 - 5	5 - 9
3	8 – 17	6 - 9	10 – 19
4	18 – 28	10 - 14	20 – 34
5	29 – 37	15 - 20	35 - 49
6	38 – 49	21 - 27	50 - 74
7	50 – 59	28 - 31	75 – 99
8	60 – 76	32 – 40	100 - 199
9	> 77	> 41	> 200

(Sumber; WHO (1972)

Based on the index larvae table (Table 1) Density Figure (DF) can be determined after calculating HI, CI and BI. HI value must be <5% while ABJ> 95%. If the number of DF is less than 1 indicates the risk of low transmission, 1-5 the risk of moderate transmission and above the 5 risk of high transmission (Purnama, 2010). Positive larvae types of containers are also seen based on the larvae found in water containers both inside and outside the house.

RESULTS AND DISCUSSION

From the results of the survey of mosquito larvae in 100 respondents' houses, results were obtained as in table 2. From table 2. it can be seen that the 41 containers (11.54%) outside the house were 315 (88.46%) fruits, so the total number of containers examined was 356. Positive containers are larvae, namely ceramic bath 3 (0.84%), cement bath 1 (0.28%), used paint bucket 18 (5.06%), large bucket with 4 caps (1.12%), ablution place 3 (0.84%) and plastic drum 6 (1.70%). From the data calculated using the formula according to Pant and Self (1993) found the Larva Index as follows as in table3.

From the larva survey in 100 respondent's houses in the Paring River Village, Aedes sp mosquito larvae were found as shown in table 4. From table 4. it can be seen that the larvae of Aedes sp mosquitoes are mostly found in containers that are in the house, which are 32 containers found in the larva of Aedes aegypti and 1 container of Aedes albopictus mosquito larvae. Whereas the containers outside the larva house of Aedes aegypti are in 2 containers and Aedes albopictus is 6 containers.

Table 2. Distribution of larvae of Aedes sp mosquitoes based on the type of container in the Kelurahan Sungai Paring Martapura in the March 2018 survey

No	Type Container	Positive Larva				Negative Larva			
		inside		outside		inside		outside	
		n	%	n	%	n	%	n	%
1	Bathtub cramped	3	0.84			13	3.65		
2.	Fish pond			6	1.70	14	3.93		
3.	Cement bathtub	1	0.28			1	0.28	2	0.56
4.	Used paint bucket	18	5.06			100	28.09	10	2.81
5.	Large bucket covered	4	1.12			36	10.11		
6.	Ablution place	3	0.84						
7.	Aquarium					5	1.40		
8.	Plastic drum	6	1.70			4	1.12		
9.	Iron drum					12	3.37		
10.	Plastic tub					4	1.12	4	1.12
11.	Dispenser					86	24.16		
12.	Flower pot					20	5.62	4	1.12
Total		35	9.84	6	1.70	295	82.85	20	5.61
		41 (11,54%)				315 (88.46%)			

Table 3. Results of the Larva Index in Sungai Paring Martapura Sub-District in March 2018

No	Parameter	Result (%)	*Density Figure* (DF) (WHO 1972)
1.	*House Index* (HI)	40	6
2.	*Container Index* (CI)	11.52	4
3.	*Breteau Index* (BI)	41	5
4.	*Larva Free Numbers* (LFN)	60	-

Based on table 3. of the 100 houses surveyed there were 40 positive larvae (HI 40%), 60% larvae (ABJ), 41 larvae positive containers (41% BI) of the 356 examined containers (CI 11.52%).) The larvae found were taken and put into glass bottles and then taken and identified in the entomology laboratory BBTKLPP Banjarbaru.

After obtaining values from each index, vector density (Density Figure, DF) is obtained from the combined values of HI, CI, and BI which are expressed on a scale of 1-9. DF is divided into 3 categories, DF = 1 low density, DF = 2-5 moderate density and DF 6-9 high density. From the larva index value in table 3. there is DF for HI in category 6, CI in category 4 and BI in category 5. DF numbers are obtained based on table 1. index larvae.

Table 4. Distribution of species of larvae of Aedes sp. in the Kelurahan Sungai Paring Martapura in the March 2018 survey

Letak	Spesies jentik	
	Aedes aegypti (kontainer)	*Aedes albopictus* (kontainer)
Dalam rumah	32	1
Luar rumah	2	6
Total	34	7

Table 5 Questionnaire results of 100 respondents' homes in the Paring River Martapura Sub-district in the March 2018 survey

No	Questionaire	Total	Percentage (%)
1.	Drain the water reservoir once a week	57	57
2.	Close the water reservoir	51	51
3.	The habit of hanging lots of clothes in the room	68	68
4.	There is sufficient ventilation and lighting	54	54
5.	Knowledge about Drain, close and hoard	62	62

The results of the DHF vector survey conducted in the Kelurahan Sungai Paring Martapura in March 2018 (table 1) obtained HI results of 40% and 60% ABJ, this indicates that HI and ABJ numbers did not meet the standards (HI <5% and ABJ> 95%) HI> 5% indicates that the area has a high risk of dengue transmission. The higher the HI number, means the higher the density of mosquitoes, the higher the risk of the community/population in contact with mosquitoes and infected with the dengue virus. Scoot and Morrison research in 2002 stated that the higher the HI number, the higher the density of mosquitoes, the higher the risk of local people contacting mosquitoes and also being infected with the dengue virus[6]. According to Rahim S, et al (2013) research, HI is the most influential factor for DHF7 endemicity. The larva-free number (ABJ) is still less than 95%, this can cause transmission of DHF virus transmission so it needs to eradicate mosquitoes.

Based on table 1. the value of DF for HI is 6 which indicates that the population density of high mosquito larvae means that the risk of transmission

is high, due to the densely populated settlements in Sungai Paring Sub-District, making it easier for mosquitoes to move from one house to another. The DF value for CI is 4 which indicates a moderate density which means the risk of transmission is moderate, the DF value for BI is 5 which indicates moderate density which means the risk of moderate transmission (index larvae table according to WHO, 1972). The Breteau Index (BI) value indicates the level of density and spread of larvae[7]. BI is the best index for estimating vector density because BI combines houses with containers[8].

According to the research conducted by BBTKLPP Banjarbaru in March 2017 in Kapuas DF (Density Figure) Regency, the DF value for HI was 5, the DF value for CI was 4 which showed medium larval density[9]. If compared then the value of DF for HI is higher in Kelurahan Sungai Paring while the value of DF for CI and BI is the same. The density or density of Aedes sp can be a threat to public health. If the Aedes sp larva becomes an adult mosquito bites a DHF sufferer and becomes an infected mosquito, then bites a healthy human, then DHF transmission occurs. This study also obtained higher results compared to the study of Sukesi TW (2012) in the Village Gedongkiwo Yogyakarta Indonesia, HI: 38.67%, CI%: 13.41%, BI: 19.67% [10].

The distribution of larvae of Aedes sp based on the location of containers inside / outside the house (table 3) shows that larvae densities were higher (9.84%) in the house compared to outside the house (1.70%). This shows that the DHF vector in Sungai Paring Village prefers nesting places in the house compared to outdoors due to lack of sanitation and hygiene. The atmosphere of the house is a little dark (ventilation and lighting are less 46%) and the behavior of respondents who like to hang clothes (68%) is the preferred place for Aedes aegypti mosquitoes to rest after sucking and breeding. When compared with the study of Muhammad Arifudin et al in 2016 in Kuranji Village, Padang City, the density of larvae in the house was 28.83% higher than outside the home, which was 5.77%[11]. Although both larvae were found in the house higher than outside the house, the larvae density in Kuranji Village, Padang City was higher when compared to the Paring River Martapura Village due to more breeding places that mosquitoes liked, such as clear water conditions, the atmosphere of the house is a little dark and the nesting place is rarely inspected and cleaned.

The survey results of larvae of Aedes sp (table 3) were found in many containers inside the house, namely 32 containers found in the larva of Aedes aegypti and 1 container of Aedes albopictus mosquito larvae. This study is inversely proportional to the research conducted by Nurul Inayati in 2016 that Aedes sp mosquito larvae are more commonly found in containers outside the house[12]. Whereas the containers outside the larva house of Aedes aegypti are in 2 containers and Aedes albopictus is 6 containers. This shows that the larva of Aedes aegypti in the Paring River Village prefers nesting places in the house while the larvae of Aedes albopictus mosquitoes outside the house are in accordance with their habitat[13].

In this study (table 1) shows that containers are positively larvae namely, ceramic bath 3 (0.84%), cement bath 1 (0.28%), used bucket of paint 18 (5.06%), large bucket with a lid of 4 (1.12%), ablution site 3 (0.84%) and plastic drum 6 (1.70%). Of all the larvae-positive containers, used paint containers made of plastic were the most owned containers of the residents of the Parapura Martapura River Village, namely 18 houses (5.06%) and 6 houses outside (1.70%). Another supportive study found that used buckets also become a potential place for mosquito development. Tampi et al (2013) also found that used buckets have the highest value[14]. Used goods have the potential to become a breeding place, moreover used goods are uncontrollable sites. The key container is a type of water reservoir that acts as the DHF vector mosquito breeding site on the survey site. Knowing the container key can be a reference in making DHF vector control targets, although only for a short period of time can focus on controlling, especially those carried out independently by the community. Priority control in the management of used goods/garbage, for containers inside / outside the home biological control can be carried out, among others, by using larvae and giving abate powder to water reservoirs[15].

From the larva survey conducted on the 4th week of March 2018 in Sungai Paring Village, most positive containers flick inside the house. Used paint buckets are widely used for water reservoirs which are left uncovered to allow mosquitoes to lay eggs and breed in these places[16].

Based on the table of 4 respondents, many respondents (62%) have knowledge about 3M (Drain, close and hoard). Respondents who carried out drainage activities once a week were 57 respondents (57%), while the remaining 43 respondents (43%) drained were carried out once every two weeks to one month giving the Aedes sp mosquito larvae the opportunity to become adult mosquitoes. In addition, there are still many respondents who have not closed water reservoirs (49%), so this behavior is very risky for Aedes sp mosquitoes to lay eggs in respondents' water reservoirs.

Control and prevention can be carried out through integrated control, in collaboration with the community, or through school and puskesmas programs in monitoring larva presence. In the end this vector control cannot only be from one side but leave/ignore the other side. The program, which must be done is from various sides: behavior, environment and vectors simultaneously. Integrated control of cooperation and public awareness of joint responsibility greatly helps control programs so that it can reduce DHF cases which ultimately improve community health status. The Ministry of Health has launched a one-house one-day program that is expected to be carried out simultaneously and evaluated by the local Health Office[3].

CONCLUSION

The results of the study are summarized as follows: House Index (HI) 40%, Container Index (CI) 11.52%, Breteau Index (BI) 41%, Larva Free Number (LFN) 60%, DF for HI is 6 shows population density of high larvae ,

CI is 4 indicating that medium density, DF for BI is 5 which indicates medium density. The types of containers that are positive for larvae of Aedes sp are, ceramic bath 3 (0.84%), cement bath 1 (0.28%), paint bucket 18 (5.06%), large bucket closed 4 (1.12%), ablution place 3 (0.84 %) and plastic drums 6 (1.70%).

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