Distribution on Mosquito Larvae at Various Breeding Sites in Village Tanjung Sari Medan Selayang Subdistrict Medan

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Abstract: Mosquitoes are small insects that act as vectors of disease in humans. Vector infectious diseases due to mosquitoes are dengue fever, chikungunya, yellow fever, encephalitis, filariasis, and malaria. This research was conducted to determine the distribution of mosquito breeding sites in residential homes in Tanjung Sari Village, Medan Selayang District. A total of 100 residents' homes were visited and inspected for breeding places for mosquito larvae inside and outside the house from October 2017 to November 2017. Mosquito larvae encountered were examined using the single larva method and identified. The results of this study found 40 houses there are mosquito breeding places. Mosquito breeding sites are found, namely: water dispenser reservoirs, buckets, puddles, bathtubs, barrels, flower vases, water reservoirs, drums, and used cans. The most mosquito breeding sites are in the reservoir of water dispenser by 19%, followed by buckets and puddles of 5% each, bathtub 4%, barrels and flower vases respectively 2%, water reservoirs 2%, and used cans respectively 1%. The most frequently encountered species *are Aedes aegypti* 33 breeding sites, followed by *Culex sp* 5 breeding sites, only in standing water outside the house and 2 *Aedes albopictus* breeding sites, in the flower vase outside the house. Mosquito breeding sites are found distributed inside and out side the house.

1 INTRODUCTION

Mosquitoes have an important role in human health because mosquitoes have the ability to transfer (vector) diseases. A mosquito as vector borne diseases such as dengue fever, chikungunya, yellow fever, encephalitis, filariasis, and malaria. Mosquitoes that play a vector role are from genera: Aedes, Culex, Anopheles and Mansonia (Li *et al*., 2013). Mosquitoes are spread throughout the world and can be found at an altitude of 5000 meters above sea level (Susanto, *et a.l*, 2009). Mosquitoes are more common in the tropics than in the subtropical regions. The only place with no mosquitoes is Antarctica (Mike, 2003).

All types of female mosquitoes need water for survival. The water is used for laying eggs, where larvae and pupae live, while adult mosquitoes do not need water anymore. Female mosquitoes choose certain types of water for their eggs, such as clean water, dirty water, and brackish water (Komariah *et al.*, 2010). *Anopheles sp* mosquitoes lay their eggs in clean water, water in mangrove forests, water in rice fields. *Culex sp* mosquitoes always lay their eggs in dirty water. *Aedes sp* mosquitoes lay their eggs in clean water, while *Mansonia sp* mosquitoes lay their eggs in the roots of aquatic plants (Mosquito World, 2015). Many species lay their eggs on the surface of the water, and there are those that either lay their eggs (*Anopheles, sp*) or those that lay their eggs (*Culex sp*). *Aedes sp* places his eggs on the surface of calm water or damp places. Generally, mosquito eggs will hatch in 2-3 days. *Aedes sp* mosquito eggs can last up to 6 months if they are in a dry place and will hatch if placed on a moist or wet surface (WHO, 2007).

Temperature is an important environmental parameter in increasing vector breeding, mosquito gonotropic cycles, bite rates, shortening the pathogen incubation period and extending the life of adult mosquitoes. In addition, the optimum temperature also increases the level of larval development. In adult mosquitoes, the optimum temperature can increase the level of mosquito bite (biting rate) and reduce the time it takes for parasites to replicate in the mosquito's body, known as the extrinsic incubation period. The extrinsic incubation period of parasites in the body of mosquitoes which

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is more quickly offset by the level of mosquito bites becomes more frequent will result in increased risk of parasite transmission as well (Gama and Nakagoshi, 2013).

The optimum temperature for mosquito breeding is 25-27ºC. Mosquito growth will stop completely at temperatures less than 10°C or more than 40°C (Oktaviani, 2011). The higher the air temperature, the more water vapor it can contain. This means air become more humid. Humidity affects the mosquito's habit of laying eggs and their survival. The body of a mosquito has holes called a spiracle to regulate evaporation in the body of a mosquito. If the humidity is low, it will cause evaporation of water in the body of the mosquito, so it will die quickly. At humidity less than 60% the age of mosquitoes will be short, cannot be a vector because there is not enough time for the transfer of the virus from the stomach to the salivary glands. The average optimum humidity for mosquito growth is 65%-90% (Regariana, 2004). Optimum humidity not only supports the breed speed and age of mosquitoes, it also affects flying distance and biting habits (Cahyati and Suharyo, 2006).

Appropriate habitat for mosquito breeding is not only formed from nature itself, but humans can indirectly provide a breeding ground for mosquitoes. This can be seen as unplanned urbanization, inadequate management of solid waste, water in the bathroom tub that is not drained regularly, water in sewers that do not flow due to the garbage dumped by the community into the gutter, water submerged in containers left for long periods of time. These things will increase the mosquito population accidentally (Mosquito World, 2015). The existence of containers is significant in increasing vector density. This will facilitate the vector to breed so that the mosquito population continues to grow. The results of Nicholas Duma's research stated that the presence of containers has a positive correlation with the incidence of vector-borne diseases (Duma et al, 2007).

One of the infectious vector diseases that often occur in the city of Medan is Dengue Hemorrhagic Fever (DHF). Medan City is categorized as an endemic area in North Sumatra. In 2014 there were 121 cases in Medan Selayang District with 66 cases in men and 55 cases in women (North Sumatra Province Health Service, 2015). In 2016 the prevalence of DHF cases was 3010 cases with 17 deaths (Medan City Health Office, 2017). Medan City has a dense population, high mobility and has 40 containers at 40 houses are inside (32 houses) and outdoors (8 houses). It can be seen in Table 1.

great potential for the occurrence of extraordinary events of DHF (Susanti, 2015).

2 METHODS

This research has descriptive observational in which the researcher only makes observations without giving treatment to respondents. The research design used was study cross sectional survey and interview methods for sociodemography.

The study was conducted in Tanjung Sari Village, Medan Selayang District, Medan. The study was conducted from October to November 2017. The determination of the sample in this study was carried out using cluster random sampling techniques for 100 houses visited.

The sample in this study were mosquito larvae that were inside and outside the house (around the house) visited. All containers containing water in or around the house are recorded and seen if there are mosquito larvae in it. Mosquito larvae were found put in a bottle, labelled, recorded the location, and pH of the water where the larvae were found. Other data were collected for the temperature and humidity of the air. Mosquito larvae were taken to the Parasitology Laboratory of the Faculty of Medicine, Universitas Sumatra Utara, Medan, Indonesia to be identified using journals for identifying larvae of mosquitoes.

All larvae were killed by giving hot water with a temperature of 60^0C were identified by looking at the morphology of the head and segments of the 8 mosquito larvae under a microscope. The morphology observed was adjusted to the morphology in the identification journal (Rueda, 2004; Rattanarithikul and Harrison, 2005).

3 RESULTS AND DISCUSSION

Tanjung Sari sub-district in Medan Selayang sub-district with an area of 510 ha and has 1265 houses. A total of 100 houses were visited as samples to determine the distribution of mosquito larvae in various breeding sites. A container containing water which is likely the place of mosquito-breeding are inside and outside the house as much as 264 and that contains mosquito larva as many as

Table 1. Type of container and existence of mosquito larvae inside and outside the house

Place containers	Containers	Number of Containers	(+) larva
Inside the house	Buckets	74	5
	Bathubs	56	4
	Water reservoir dispenser	38	19
	Water reservoirs	21	2
	Drums	4	0
	Barrels	11	2
	Total		32
Outside the house	Puddles	35	5
	Flower Vases	5	2
	Used cans	11	1
	Used bottles	6	0
	Pet drinking	3	0
			8
	Total	264	40

From table 1, it can be seen that the community at the site of this research to accommodate water in a variety of containers and encountered mosquito larva. Most of breeding mosquito larva inside the houses. In the results of this research, it is necessary to emphasize the community to make attention to the control of mosquito breeding places in the house. In this study, the water reservoir dispenser is a key container. Generally, people's houses use buckets (74 houses) to collect water for bathing purposes followed by bathtubs (56 houses). The water in the bucket that is used often runs out when bathing and the bathtub is generally small, the bathtub almost always changes the water. Previous research in East Java conducted by Joharina and Widiarti in 2014 found a bathtub as a key container. The community also needs to make attention to mosquito larvae breeding places outside the house by keeping the environment clean, especially after the rainy season in the presence of standing water on used goods (used cans), flower vases and puddles where the water does not flow.

The pH water of containers influence .found mosquito larvaes, it can be seen at Table 2.

Table 2: The pH water of containers found mosquito larvaes

	Containers	%	Total (%)
pH 6	Bathups	10.26	
	Water reservoirs	10.60	27.88
	Puddles	7.02	
pH 7	Dispenser	23.69	
	Bathups	21.11	
	Buckets	11.05	
	Puddles	5.26	72.12
	Vase	2.63	
	Used cans	2.12	
	Barrels	1	
	Total	100	100

Table 2. Shows that the pH of the water in the container with mosquito larvae ranged from 6-7. Research by Salit (1996) and Saleeza (2011) said that the optimum pH for breeding mosquito larvae is 6.27-9.78.

Table 3: Temperature and humidity of the air in the house visited

Variable	%
Temperature	
Optimum (25-270C)	22
Not Optimum (> 270C)	78
Humidity	
Optimum (> 65%)	65
Not optimum (<65%)	35

Table 3 shows the optimum temperature was 22%, and the optimum humidity was 65%. Regariana (2004), said that the higher air temperature can the more water vapor it can contain. This means that the air becomes more humid. The condition of the humidity is in the comfort zone for mosquitoes to breed. It turns out that not only supports breeding speed, humid environmental conditions can also affect the age of mosquitoes, flight distance, and biting habits. Then (Cahyati and Suharyo, 2006), said low environmental humidity can cause evaporation to increase which is the main enemy of mosquitoes.

In this study, mosquito larvae found were *Aedes aegypti, Aedes albopictus* and *Culex sp.* Table 4 shows the breeding sites for mosquito larvae found in Tanjung Sari Village, Medan Selayang District, Medan.

Table 4. Types of breeding sites containers larva mosquito

Location Breeding sites	Breeding sites	*Aedes aegypti* (%)	*Aedes Albopictus* (%)	*Culex sp* (%)
Inside the house	Water Reservoirs			
	dispenser	19	-	-
	Buckets	5	-	-
	Bathubs	4	-	-
	Barrels	2	-	-
	Water reservoir	2	-	-
Outside the house	Puddles	-	-	5
	Flower Vases	-	2	-
	Used cans	1	-	-
	Total	33	2	5

Mosquito larvae are found in various containers that contain water inside and outside the home. *Aedes aegypti* mosquito larvae were found in 33 containers (32 containers containing water inside the house and 1 containers outside the house), *Aedes albopictus* were found at outside the house in 2 containers, and *Culex sp* is also found outside the home in 5 containers. The results of this research are also supported by the study by Ririh and Anny (2005), who found a significant relationship between the type of container with the presence of *Aedes aegypti* mosquito larvae in Wonokusumo Village.

The development of the vector pre-adult phase is mostly determined by the availability of water, water reservoirs (containers), and the environment (rainfall and seasons). Mosquitoes as vectors have excellent adaptability to various environmental conditions (Aditya, et al 2006n and Adeleke et al, 2010).

4 CONCLUSIONS

Breeding sites are found as water dispenser reservoirs, buckets, puddles, bathtubs, barrels, flower vases, water reservoirs, drums, and used cans. The most frequently encountered species are *Aedes aegypti at* 33 breeding sites inside the houses, followed by *Culex sp* 5 breeding sites, only in standing water outside the house and 2 *Aedes albopictus* breeding sites in the flower vase outside the house. Mosquitoes as vector borne diseases in this research are most found distributed inside and outside house.

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