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Relationship of presence larvaes *aedes aegypti* in the water containers with dengue hemorrhagic fever in the *Sei Kera Hilir 1* village sub-district *Medan Perjuangan* Medan city

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Abstract. The number of dengue hemorrhagic fever (DHF) cases endemic at the village Sei Kera Hilir I Sub-district Medan Perjuangan Medan City since 2017 which was 46 cases. One cause of the spread of dengue fever was a place of water container around the house that became the breeding ground for *Aedes aegypti*. This study aimed to know the relationship of presence of larva *Aedes aegypti* at water container with DHF incidence in the village Sei Kera Hilir 1 Sub-district Medan Perjuangan Medan City. This research was an analytic observational study with cross sectional design. The samples of this study were 100 homes taken by cluster sampling. The data was analyzed using Fisher's Exact Test. The most commonly used water container was the bucket (56%), the most common water container with *Aedes aegypti* was the dispenser (16%), and there were 10 respondents with a history of DHF in the last 1 year. In bivariate analyses, the presence of larvae *Aedes aegypti* in water container significantly related to DHF incidence in the village Sei Kera Hilir 1 Sub-district Medan Perjuangan Medan City. There was a relationship between the presence of larva *Aedes aegypti* at the water container with the incidence of DHF in the village Sei Kera Hilir I Sub-district Medan Perjuangan Medan City.

1. Introduction

Dengue Hemorrhagic Fever (DHF) is an endemic disease affecting tropical and subtropical regions around the world, predominantly in urban and semiurban areas [1]. Dengue virus (DENV) belongs to the genus of Flavivirus and family Flaviviridae [2], and this virus was transmitted to human through the bites of *Aedes sp* mosquitoes [1]. *Aedes aegypti* and *Aedes albopictus* were the two major vectors involved in these infections [3].

DHF was first discovered in 1968 in the city of Surabaya, Indonesia. As many as 58 people were infected and 24 of them died with the mortality rate reaching 41.3%. Since then, DHF has spread to all parts of Indonesia. In 2015, there were 126,675 DHF sufferers in 34 provinces in Indonesia and 1,229 of them died. This number has increased compared to 2014 where there were 100,347 people who suffered from dengue and 907 patients died [4].

DHF has spread in North Sumatra as an extraordinary event. In 2012, dengue cases were recorded at 4,367 with Incident Rate (IR) of 33 per 100,000 population. In 2013, this number increased to 4,732 cases with 35 IRs per 100,000 population. In 2014, the number of cases increased to 7,140 cases with IR 51 per 100,000 inhabitants. Incident Rate of DHF in the last three years was reported by the City of Medan, Deli Serdang, Simalungun, and Binjai [5]. Based on surveillance data from the Medan City



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Health Office, in 2014 there were 1,699 dengue cases with 15 deaths in which 77.5 per IR 100,000 population and Case Fatality Rate (CFR) 0.9% [6].

One of the factors that led to the emergence of dengue cases was the presence of a landfill (water containers) which can be used as a breeding ground for *Aedes aegypti* mosquitoes [7]. *Aedes aegypti* mosquitoes breed in various types of landfill containing clear water such as bathtubs, drums, buckets, and tree holes that contain water. The life cycle of *Aedes aegypti* mosquitoes can take place well through the landfill [8].

The life cycle of mosquitoes starts from eggs, larvae, pupae and adults. Larval stadium is a stadium that is easy to observe and control because it is in the landfill around the house. In addition, the description of the number of larvae can also show the adult population of these mosquitoes [8].

Based on the background above, it was necessary to do research on the relationship of the presence of *Aedes aegypti* larvae in water containers with the incidence of DHF in Medan village Sei Kera Hilir 1, Medan Perjuangan Sub-district Medan City.

2. Methods

This study was an analytic observational study with cross sectional design to determined the relationship of the presence of *Aedes aegypti* larvae in water containers with the incidence of dengue in the village of Sei Kera Hilir 1 Medan Perjuangan Sub-district in Medan city. Sei Kera Hilir Village is located at 3°36'20"N 98°41'11"E with altitude 200m- 300m above sea level with average temperature ranges 27-30°C. This research was conducted in July 2018 by visiting 100 houses to get primary data. Primary data obtained by observation, interviews by questionnaires to obtain specific information about DHF and documentation. Observation outside and inside the house and collected mosquito larvae inside or outside the house in water containers. Mosquito larvae obtained from respondents houses were taken to the Parasitology laboratory Faculty of Medicine Universitas Sumatra Utara to be identified using identification journals [9] [10]. The data from the questionnaires were answered by the respondents, then data processing was carried out. Univariate analysis was done to explain the frequency distribution of each variable and presented in table. Bivariate analysis was done to explain relationship of presence larvae, *Aedes aegypti* in the water containers with DHF.

3. Results and discussions

Research on relationship of presence *Aedes aegypti* larvae in water containers with the occurrence of dengue hemorrhagic fever in the village Sei Kera Hilir 1 sub-district Medan Perjuangan district Medan City has been carried out. The number of 100 respondents for 100 houses was attended for this study. Table 1 presents the characteristics of the respondents.

Table 1. Socio-demographics characteristics of respondents

No	Socio-demographics characteristic	Number of samples (n=100)	Percent(100%)
1.	Age (years old)		
	< 25	13	13
	26-35	17	17
	36-45	25	25
	46-55	20	20
	56-65	15	15
	>65	10	10
2.	Education		
	Elementary school	15	15
	Middle school	24	24
	High school	56	56
	College	5	5

3. Jobs

Housewife	77	77
Entrepreneur	15	15
Government employees	8	8

In this study, it can be seen that the highest age of respondents in the category of 35-45 years, the highest education in the high school category and the work generally housewives (Table 1).

Table 2 showed that 100 houses were visiting for this study, 31 houses (31%) were positive for larvae *Aedes aegypti* and 69 houses (69%) were negative larvae *Aedes aegypti*.

Table 2. The presence of larvae *Aedes aegypti* based on the house visited

The Present of larvae	Number of house (n=100)	Percent (100%)
No found larvae	69	69
Jars	1	1
Bathtub	10	10
Water reservoir	2	2
Bucket	2	2
Dispenser	16	16

Generally, respondents used buckets as water container for daily consume. The number of houses using buckets was 56 houses out of the 100 houses visited, but only 2 houses positive larva *Aedes aegypti*. Bucket as water container were not most commonly found larva because water in bucket used daily and water in bucket changed daily. Therefore dispenser water containers that was most commonly found was larvae with a number of 16 (16%). Based on observations, most of the dispensers found larvae were in water-filled and slightly dusty conditions. This was due to the lack of attention of respondents to the dispenser water reservoir so that they were rarely cleaned regularly and correctly. Most respondents admitted that they often forgot to drain the water dispenser in their house and drained it for more than a week. This result was in accordance with the research of Azlina, et al where the dispenser water container in the house with the most larvae was 17 units (44.74%) [12]. *Aedes aegypti* mosquitoes are dominant in urban areas and live in homes [11]. *Aedes aegypti* mosquitoes like to lay eggs in dark colored containers and the structure of a rough container wall because it can make the water surface dark and make it easier for female *Aedes aegypti* to hold tightly so that it can adjust its position when laying eggs [8].

The results of measurements of temperature inside the house during the study can be seen in Table 3.

Table 3. Relationship between air temperature in the house and the incidence DHF

Air temperature in the house (°C)	Incidence DHF		Total	<i>p</i>
	(+) Larvae	(-) Larvae		
28.8	1	0	1	0.031
28.9	3	2	2	
29	4	29	33	
29.1	7	34	41	
29.2	1	17	18	
29.3	0	2	2	
Total	16	84	100	

The results of this study indicated a relationship between air temperature in the house and the incidence of DHF ($p = 0.031$). Air temperature was closely related to the incidence of DHF (RR =

1.39) [13]. *Aedes aegypti* eggs attached to the surface of the humid water containers can experience a perfect embryonation process at 25-30°C for 72 hours [14].

The relationship between the presence of *Aedes aegypti* larvae in water containers with DHF can be seen in Table 4. The containers no found larvae were 69 houses and found larvae were 31 houses consisting of jars, bathtubs, water tanks, buckets and dispensers.

Table 4. Relationship between larva *Aedes aegypti* in the house and the incidence DHF

Larvae <i>Aedes aegypti</i>	Incidence DHF		Total	<i>p</i>
	Never	Ever		
No found larvae	66	3	69	0.001
Jars	1	0	1	
Bathtub	9	1	10	
Water reservoir	0	2	2	
Bucket	2	0	2	
Dispenser	6	10	16	
Total	84	16	100	

In this study showed that presence of *Aedes aegypti* larvae in water containers has a significant relationship with the incidence of DHF ($p = 0.001$). The results of this study were carried out by Parida et al, at Binjai Village, Medan City [15], and also by Soewarno and Kusumawati in Gajah Mungkur District [16]. They were a relationship between the presence of *Aedes aegypti* larvae in water reservoirs and the occurrence of DHF.

3. Conclusion

The most common larvae found in the village of Sei Kera Hilir 1 were from dispensers. There was a significant relationship between the presence of *Aedes aegypti* mosquito larvae in water containers with dengue hemorrhagic fever.

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