



## Container Characteristics and The Presence Of *Aedes aegypti* Larvae At Islamic Boarding School

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### Article History

Received: 25/01/2023

Accepted: 30/01/2023

Published: 31/01/2023

Vol – 2 Issue – 1

PP: - 38-42

### Abstract

**Background:** Dengue Hemorrhagic Fever (DHF) is a disease transmitted by the *Aedes aegypti* mosquito vector. The main breeding ground for the *Aedes aegypti* mosquito is the container in or around the house. The presence or absence of *Aedes aegypti* mosquito larva in a container is influenced by several factors such as the type of container, the location of the container, the condition of the container lid, and the activity of draining the container.

**Purpose:** This study aims to determine the characteristics of containers and the presence of *Aedes aegypti* larva in Islamic boarding schools.

**Methods:** The type of research used is descriptive observational. Sampling was done by total sampling with population of all basic sanitation facilities and containers in Islamic boarding schools. The number of samples studied were 35 water reservoirs, 32 latrines, 6 sewerages, 12 waste management areas, and 42 containers. This research was conducted at the Darul Arqam Muhammadiyah Gombara Islamic Boarding School from June to July 2022. The research data were processed by univariate analysis.

**Results:** The results showed that the presence of *Aedes aegypti* larva were found in the supply of clean water, type containers, namely bath tubs, and as well as in containers located indoors.

**Conclusion:** The presence of larva is found in the supply of clean water, positive in water reservoir-type containers, and located indoors. It is recommended to cover the landfill, drain the landfill at least once a week, clean toilets and latrines closed sewerages, and use a watertight trash can with a lid.

**Keywords:** Container, *Aedes aegypti*, larvae

### Introduction

DHF is an infectious disease caused by *Aedes* mosquito bites that carry dengue virus and enter human blood circulation. Countries in the tropical region infected with dengue virus are recorded more than 100 countries and attacks all ages, which are at risk for being infected with 2.5 billion and estimated to be 50 million infected. Indonesia occupies the 2nd position as the country with the largest DHF case in the Asia Pacific according to the World Health Organization (WHO) data. Cases and number of deaths due to DHF are 747 deaths. This number decreased compared to 2019 which was 138,127 cases and 919 deaths. (1,2)

The DHF case in South Sulawesi Province in 2020 based on data from the South Sulawesi Provincial Health Office was 2,714 cases, in 2019 of 3,745 cases. DHF cases in Makassar City in 2020 are 175 cases, while in 2019, 268 cases. One of

the DHF Endemic Subdistricts in Makassar City is Biringkanaya, where in 2015 and 2016 became the sub-district with the highest number of DHF cases in Makassar City, namely 26 cases and 37 cases. The number of cases in 2017 - 2020 in a row is 12 cases, 26 cases, 39 cases, and 4 cases. (3)

Environmental sanitation is one of the factors related to the increasing case of dengue, such as solid waste management, quality or cleanliness of clean water reservoirs, the existence of breeding places outside the home, and the existence of *Aedes* sp. (4) Community home environment with poor environmental sanitation conditions Many mosquito larvae will be found so that DHF cases are also getting higher. DHF vector mosquitoes breed well in water reservoirs, especially those that are rarely cleaned and monitored. (5)

The main breeding site for *Aedes aegypti* mosquitoes is containers inside or around the house or public places, such as schools. Containers can be divided into water reservoirs such as buckets, drums, bathtubs, and non-water reservoirs such as used cans, used bottles. The presence or absence of *Aedes aegypti* mosquito larvae in a container is influenced by several factors such as container type, container location, container color, container cover conditions, larvae-eating fish, container volume, container drainage activities, and abatement activities. (6)

Islamic boarding school is one of the places of education in Indonesia where students live together. Almost all cities can be found Islamic boarding schools with various problems. In Indonesia there are currently approximately 40,000 boarding schools and 80% of them are still vulnerable in the supply of clean water and environmental sanitation. (7) One disease that is closely related to the environment of the boarding school is dengue fever. (8)

Based on the background above, this research aims to determine the characteristics of containers and the presence of *Aedes aegypti* larvae at the Darul Arqam Muhammadiyah Islamic Boarding School in Makassar City in 2022.

## Method

### Subjects

The population in this study were all basic sanitation facilities and containers which potential as breeding ground for the *Aedes aegypti* mosquitoes. The sampling method in this study is by total sampling where the number of samples studied are 35 water reservoirs/WATER RESERVOIRS, 32 latrines, 6 sewerages, 12 waste management areas, and 42 containers. This research was conducted at the Darul Arqam Muhammadiyah Gombara Islamic Boarding School from June to July 2022.

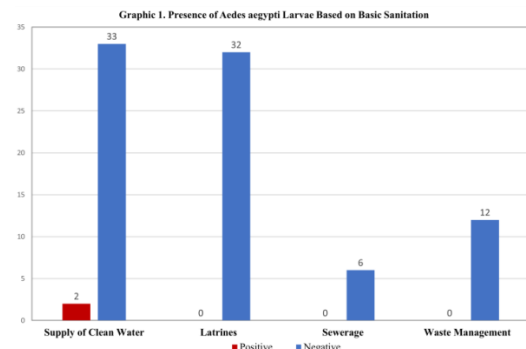
### Research design

The type of research used is descriptive observational to determine the characteristics of container and the presence of *Aedes aegypti* larvae at Darul Arqam Muhammadiyah Gombara Islamic Boarding School.

### Data collection

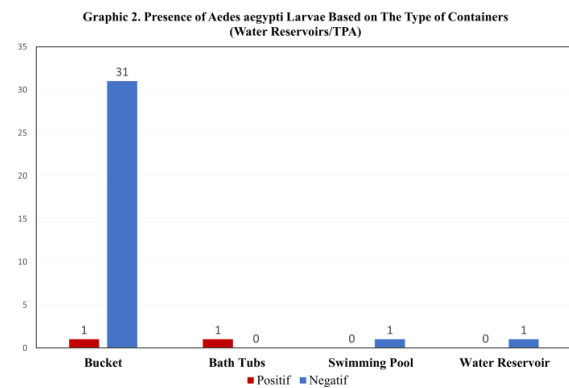
The research instruments used were observation sheets and flashlights as tools to see the presence of larvae. Data collection is carried out directly with health protocols. Data analysis was performed using the Statistical Product and Service Solutions (SPSS) program. The data analysis used is univariate analysis by presenting the data in the form of graphics.

## Result



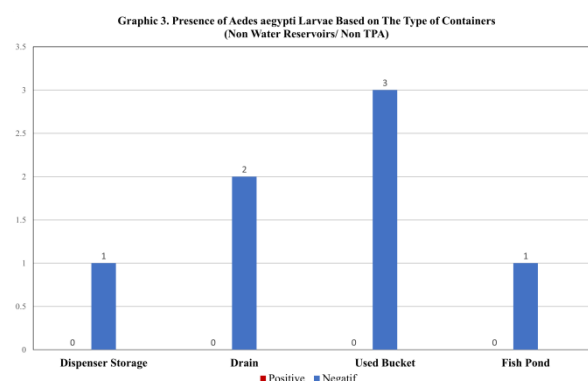
Source: Primary Data, 2022

Based on Graphic 1, the presence of *Aedes aegypti* larvae based on basic sanitation contained larvae, namely in the supply of clean water as many as 2 water reservoirs out of a total of 35 water reservoirs examined, negative for larvae in 6 sewerages examined, and 12 waste management areas examined.



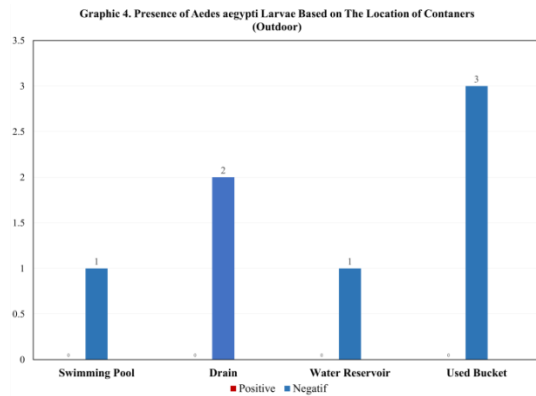
Source: Primary Data, 2022

Graphic 2 shows that the presence of *Aedes aegypti* larvae based on the type of container, namely water reservoirs positive larvae as many as 2 water reservoirs from a total of 35 water reservoirs examined, and 33 water reservoirs negative larvae.



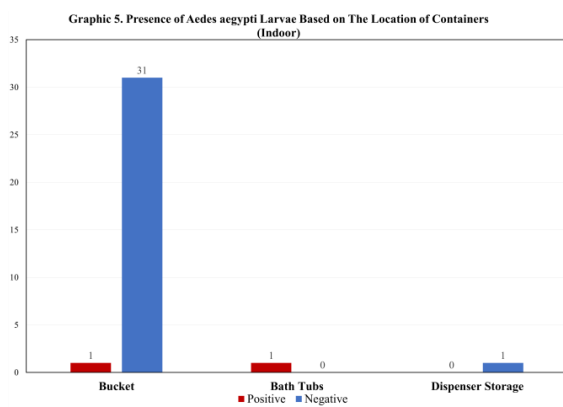
Source: Primary Data, 2022

Graphic 3 shows that the presence of *Aedes aegypti* larvae based on the type of container, namely non-water reservoirs were negative for *Aedes aegypti* larvae from a total of 7 non-water reservoirs inspected.



Source: Primary Data, 2022

Based on Graphic 4, the presence of *Aedes aegypti* larvae based on the location of container is located outdoors negative for *Aedes aegypti* larvae as many as 8 containers examined.



Source: Primary Data, 2022

Based on Graphic 5, the presence of *Aedes aegypti* larvae based on the location of container is located indoors positive larvae as many as 2 containers out of a total of 34 containers examined and 32 containers negative for larvae.

## Discussion

The results obtained indicate that the positive basic sanitation of *Aedes aegypti* larvae is the supply of clean water that is there are 2 positive landfill larvae from 35 water reservoirs examined (8.6%), whereas in other basic sanitation, there are no larvae. This research is in line with research conducted by Herdianti et al. (2019) ie found larvae in the availability of 8 containers clean water. (9)

The existence of larvae is influenced by the existence of a breeding site that is preferred by *Aedes aegypti* mosquitoes, namely puddles contained in containers or containers of artificial water reservoirs, such as buckets, drums, bathtubs, and barrels. *Aedes aegypti* mosquitoes prefer puddles that are clean and do not come in direct contact with the ground. *Aedes aegypti* mosquitoes are found in large water reservoirs, such as drums and bathtubs. (10) Therefore, to reduce the number of mosquitoes that land on containers and lay eggs, the water reservoirs must always be tightly closed and carry out the Mosquito Nest Eradication Program 3M Plus like draining the water reservoirs and giving larvasida powder. (11)

The types of containers that are positive for *Aedes aegypti* larvae are water reservoirs, namely buckets, and baths. The presence of larvae is caused by an open landfill and rarely cleaned so that it becomes a breeding ground for mosquitoes. Open containers allow mosquitoes to freely enter and breed. (12)

*Aedes aegypti* mosquitoes prefer open containers, darker in color and large in size so that the water surface becomes darker. The presence of larvae in water reservoirs containers is in accordance with the behavior of female *Aedes aegypti* mosquitoes which prefer clean water and breeding places in artificial containers. (13) This study is in line with research conducted by Tomia (2022) which showed that the most positive types of larval containers were is the water reservoirs as many as 322 containers, where the bath and toilet tubs are the water reservoirs with the most larvae found. This is because the size of the bath and toilet tub are large and open so that it is easier for mosquitoes to get in and out to lay eggs. (14)

The location of the container that is positive for *Aedes aegypti* larvae is the container that is located in the room as many as 2 containers out of a total of 42 containers inspected. The containers that are positive for larvae and are located in the room are buckets and bathtubs. Containers located indoors, in open conditions, and rarely cleaned can be a breeding ground for mosquitoes. (12) This study is in line with research conducted by Prasetyowati (2017), which showed that the results of a larva survey conducted in 300 houses found 93 houses positive for larvae. The total number of containers that were positive for larvae was 105 containers and most of the containers were located inside houses. (15)

Based on the results of the study, it was found that from a total of 42 containers inspected, 2 containers were found positive for *Aedes aegypti* larvae (4,8%). *Aedes aegypti* larvae are characterized by having a short, large, and black siphon. *Aedes aegypti* larvae also have an air funnel in the last segment, in the abdominal segment there are no fan-shaped hairs (Palmatous hairs). (16) The characteristic feature of the comb scale shape in *Aedes aegypti* larvae is its serrated shape with 3 lateral denticle spines (tridents). (13)

*Aedes aegypti* larvae were found in indoor containers, namely buckets in offices and dormitory baths. The condition of the container is open and the bath is large, making it easier for *Aedes aegypti* mosquitoes to enter and lay eggs. Containers that are open, rarely drained, and cleaned can become breeding grounds for mosquitoes and are tightly closed or if they are large they can be cleaned and drained at least once a week because the mosquito life cycle from eggs to adult mosquitoes can occur within one week (17).

Related research was conducted by Ariyanto et al. (2020) at the Makassar City Power Market. The results showed that as many as 34 positive containers contained *Aedes aegypti* larvae in Daya Market and as many as 48 positive containers contained *Aedes aegypti* larvae in respondents' homes. The dominant *Aedes aegypti* larvae were found in water tanks, drums, and buckets. (18)

The preferred breeding place for *Aedes aegypti* mosquitoes is puddles of water contained in artificial water storage containers or containers, such as buckets, drums, bathtubs, and barrels. The *Aedes aegypti* mosquito prefers clean standing water and does not come into direct contact with the ground. *Aedes aegypti* mosquitoes are commonly found in large water reservoirs, such as drums and bathtubs. (10)

The presence of *Aedes aegypti* larvae in a place is closely related to the incidence of DHF, so it is necessary to eradicate mosquito nests to prevent transmission of DHF. Some things that can be done are draining and closing the landfill, reducing the habit of hanging clothes, monitoring the presence of larvae. Using abate powder on the container and also fogging (11).

## Conclusion

The presence of *Aedes aegypti* larvae based on basic sanitation obtained positive larvae in the supply of clean water as much as 2 water reservoirs (3.5%). The presence of *Aedes aegypti* larvae based on the type and location of the container was found to be positive for larvae in the water reservoirs type containers, namely bathtubs and buckets, and positive for containers located indoors. It is recommended that sanitation conditions be improved by covering the landfill, draining the landfill at least once a week, cleaning toilets and latrines, providing infiltration for SPAL equipped with a lid so as not to cause odor, and using a watertight trash can, and having a cover.

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