

SURVEY OF AEDES AEGYPTI LARVAE ON THE PERIMETER OF THE AREA AT THE PORT OF GORONTALO CITY

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Abstract

The port is a meeting point where the ships, goods and people embark and disembark, also a gateway for the transformation of the spread of diseases such as dengue fever. The efforts to prevent dengue transmission at ports are to free the port area from the life of the *Aedes aegypti* mosquito. At the perimeter of the port area of Gorontalo, the HI and CI gures for 2011-2013 have exceeded the predetermined indicator, namely 0 and at the port, there are many buildings and containers for port activities that can become breeding grounds for larvae. The formulation of the problem in this study is how the results of the *Aedes aegypti* larva survey in the Perimeter Area in the Port of Gorontalo City are. The novelty of this study is due to research on surveys of *Aedes Aegypti* larvae around the area in the port . This study aimed to determine the HI and CI numbers and the types of potential breeding sites for *Aedes aegypti* larvae in the perimeter area of the port of Gorontalo city. This research was an observational study with a descriptive study approach. Where the samples studied were 25 buildings and 48 containers. The sampling technique used was total sampling. Based on the results of data analysis, it is known that the HI and CI numbers on the perimeter area in the port of Gorontalo city are HI (16%) and CI (12.5%) and the type of potential breeding place for *Aedes aegypti* larvae are buckets. For this reason, it is hoped that the port of Gorontalo City will close and drain the TPA and the Class III KKP of Gorontalo further to improve the control of *Aedes aegypti* larvae and mosquitoes.

Keywords: Larvae survey; Port; *Aedes aegypti*

INTRODUCTION

Dengue hemorrhagic fever (DHF) is currently a significant public health problem. The number of sufferers and the distribution area increases along with increased mobility and population density. The spread of dengue fever to other countries/regions/regions is caused by several things, including the geographical expansion of the *Aedes aegypti* mosquito,

more effortless human movement, poverty and global climate chaos, and advances in transportation technology (1)(2). According to Steven in his 2011 journal, "The impact of advances in transportation technology will result in the carrying of disease-transmitting vectors from one country to another quickly spreading from the country's entrances, one of which is the port".

The port is a meeting point or activity that embarks and ships, goods and people, and a gateway for the transformation of the spread of disease and is a global threat to public health. Therefore, one disease transmissions can be caused by animals or vectors carrying diseases carried employing transportation or by vectors that already exist in the sea or airports (3)(4).

One of the efforts to prevent the transmission of yellow fever, dengue hemorrhagic fever and other vector-borne diseases is to free the port/airport area from the life of the *Aedes aegypti* mosquito. Following Annex 4 of the International Health Regulation (IHR) in 2015, in Nirwan's research in 2010, "Every port and perimeter area of an airport/port must be kept free of *Aedes aegypti* and *Anopheles* mosquitoes, both larvae and adult mosquitoes which are epidemiologically associated with international cross" (5)(6).

Gorontalo City is one of the cities with three seaports, namely the Gorontalo Seaport of PT Pelindo IV, the Ferry Port and

the Fishery Port. Where the three ports are public places that can be ports of entry for diseases, including dengue fever which is transmitted by the *Aedes aegypti* mosquito. Based on secondary data obtained from the Class III Gorontalo Port Health Office regarding the observation of *Aedes aegypti* larvae during 2011-2013 throughout its working area, that port in the Gorontalo area still has very high HI and CI numbers; namely, in 2011, the HI number was 29, 2% and a CI of 17.6%, in 2012 the HI rate was 0.05% and the CI was 0.014%, and in 2013 the HI was 0.5%, and the CI was 0.57% (7).

RESEARCH METHOD

This research is an observational study with a descriptive study approach, where data on the presence of *Aedes aegypti* larvae were obtained by direct observation of the perimeter area in the port of Gorontalo city. The samples in this study were 25 buildings and 48 containers. Total sampling was used, then analyzed descriptive, presented in tabular form and narrated (8).

RESULTS AND DISCUSSION

Finding

1. *House Index* (HI) Jentik *Aedes aegypti* on perimeter area in Gorontalo City Port

Table 1. Results of Survey of *Aedes aegypti* Larva in Perimeter Area in Port of Gorontalo City Based on Positive Buildings for *Aedes aegypti* Larvae.

Port of Gorontalo City	Surveyed Building	Positive Infected Building	House Index (HI) (%)	Indicator HI
Ferry port	9	1	4	0
Port of PT. Pelindo IV	3	1	4	
Fishing Port	13	2	8	
Total	25	4	16	

Source : Primer Data

Based on table 1, it is known that the House Index (HI) on the perimeter area at the port of Gorontalo city has exceeded the predetermined indicator, which is 0, where the Houses Index (HI) number on the

perimeter area at the port of Gorontalo city is 16% with the number of buildings being surveyed was 25 buildings and the positive infected buildings was four.

2. Container Index (CI) of *Aedes aegypti* larvae in the Perimeter Area at the Port of Gorontalo City

Table 2. Results of Surveillance of *Aedes aegypti* Larva in Perimeter Area at Port of Gorontalo City Based on Positive Container for *Aedes aegypti* Larvae

Port of Gorontalo City	Surveyed Container	Positive Infected Container	Container Index (CI) (%)	Indicator CI
Ferry port	17	2	4,16	0
Port of PT. Pelindo IV	5	2	4,16	
Fishing Port	26	2	4,16	
Total	48	6	12,5	

Source : Primer Data

Based on table 2, it is known that the Container Index (CI) on the perimeter area at the port of Gorontalo city has exceeded the predetermined indicator, which was 0. Where the number of Container Index (CI) on the perimeter area at the port of

Gorontalo city is 12.5% with the number of containers being inspected was 48 containers and 6 containers positive for *Aedes aegypti* larvae.

3. Types of Potential Breeding Places for Aedes aegypti Larvae in Perimeter Area in Gorontalo City Port

Table 3. Results of Survey of Aedes aegypti larvae based on the type of potential breeding sites for Aedes aegypti larvae in the Perimeter Area at the Port of Gorontalo City.

Port of Gorontalo City	Container Type	Surveyed Container	Infected Container	(%)
Ferry Port	Tub	4	0	0
	Bucket	9	1	2,08
	Dispenser	1	0	0
	Crock	2	0	0
	Refrigerator	1	1	2,08
Port of PT Pelindo IV	Tub	4	2	4,16
	Bucket	0	0	0
	Dispenser	1	0	0
	Crock	0	0	0
	Refrigerator	0	0	0
Fishing Port	Tub	1	0	0
	Bucket	18	2	4,16
	Dispenser	1	0	0
	Crock	0	0	0
	Refrigerator	6	0	0
Total		48	6	12,5

Source : Primer Data

On table 3, the results of the Aedes aegypti larva survey based on the type of potential breeding sites for Aedes aegypti larvae on the perimeter area in the port city of Gorontalo, it is known that at the ferry port, the most widely used container type is the bucket (9 pieces) with a positive number of 1 larva (2.08%) and the least are dispensers and refrigerators (1 piece). At the port of PT Pelindo IV, the most widely used containers are bathtubs (4 pieces) with a

positive number of 2 Aedes aegypti larvae found (4.16%), and the least is a dispenser (1 piece), and no larvae were found. While at the shing port (TPI), the most widely used containers are buckets (18 pieces) with a positive number of larvae found, namely 2 (4.16%), and the least used are dispensers and one bath/WC. Furthermore, no larvae were found.

Discussion

House Index (HI) and Container Index (CI) *Aedes aegypti* larvae in the Perimeter Area Port of Gorontalo City

Based on table 1 and table 2, it is known that the House Index (HI) and Container Index (CI) figures for the perimeter of the port area of Gorontalo city are HI (16%) and CI (12.5%), respectively. The HI and CI numbers have exceeded the predetermined indicators; HI and CI on the perimeter area are 0. The perimeter of a port area must be maintained from *Aedes aegypti* larvae because it is epidemiologically related to international traffic.

At the Gorontalo ferry port, nine buildings were inspected. A resident's house, one public toilet, two posts, a canteen, an office and three official residences. From the nine buildings, there was one positive for *Aedes aegypti* larvae; the canteen with a total of 17 containers was inspected. The positive ones were larvae in two containers; a refrigerator inside and a bucket outside the house. Larvae exist in the refrigerator since homeowners rarely clean the water reservoir behind the refrigerator. The bucket of a water reservoir is not closed and is rarely

replaced it becomes a breeding ground for *Aedes aegypti* larvae. Because this larval breeding place is in the form of puddles that are accommodated in a place or container that is not in direct contact with the soil and is protected from direct sunlight, and contains clean water. At the port of PT Pelindo IV, there are three buildings inspected, namely guard posts, offices and warehouses. Of the three buildings which were positive for *Aedes aegypti* larvae were offices. In this office, there are four baths/WCs that serve as reservoirs for water. Of the four baths/WC, larvae were found to be positive; there were two baths/WC. The two baths/WC are rarely used, so the water is rarely changed. There were no larvae found in the warehouse and guard post because, in this building, there is no water reservoir. At the fishing port, 13 buildings were inspected. Two buildings were positive for *Aedes aegypti* larvae, namely the Alma restaurant and Aya restaurant, with 26 containers inspected and two containers positive for *Aedes aegypti* larvae. The second type of container that is positive for larvae is a bucket found in a restaurant located on the perimeter of the fishing port

area. The buckets used as water reservoirs are not closed, and the water is rarely replaced so that it becomes a breeding ground for *Aedes aegypti* larvae. The high number of HI and CI in the perimeter area in the port of Gorontalo city can cause the transmission of dengue disease to residents around the port.

Based on data obtained from the working area of the Dumbo Raya Public Health Center, there were 1 DHF patient in the last year in Talumolo Village. In contrast, data obtained from the Hulonthalangi Public Health Center working area in Tenda Village in 2015 recorded 3 DHF sufferers. One person died in 2015 in Tenda village, which can be called KLB (Extraordinary Event). Therefore, the Port Health Ofce Class III Gorontalo and the Public Health Centre in the port area have to collaborate to control the *Aedes aegypti* mosquito larvae by fogging or giving abate powder to break the chain of transmission of dengue disease. In addition, efforts can be made to reduce potential breeding sites on the perimeter area of the port of Gorontalo city, namely by providing information and

outreach to residents to close containers or water reservoirs.

Types of Potential Breeding Sites for *Aedes aegypti* Larvae in Perimeter Area in the Port of Gorontalo City.

Based on table 3, it is known that the type of *Aedes aegypti* larvae breeding sites are the most widely used at ferry ports. PT Pelindo IV and sheries (TPI) are buckets, tubs/WC, and the most commonly found larvae are buckets and bathtubs/WC. In the port city of Gorontalo, medium and small buckets are the most widely used water reservoirs for residents to collect water needed for daily needs and are left open, allowing *Aedes aegypti* mosquitoes to lay their eggs. Because basically, this bucket in its use is often used not to hold drinking water, so it is not cleaned enough, and the remaining water is left long enough without being closed. Hasyimi (2009), in the journal Wahyudi (2013), stated that "one of the causes of water reservoirs being a breeding ground for *Aedes aegypti* larvae is that the water reservoirs are not closed". In addition, the bucket is also made of plastic material, which is not enough to throw away the water but must be brushed because the *Aedes*

aegypti larvae are attached to the wall of the bucket (9).

Another factor that causes *Aedes aegypti* larvae to breed in water reservoirs that are rarely cleaned or drained is the presence of manure deposits that provide much nutrition for mosquitoes due to a large amount of organic matter at the bottom of the container. Lintang (2020) stated, "*Aedes aegypti* larvae are actively moving to take oxygen on the water's surface and eat food on a bottom feeder.

CONCLUSION AND RECOMMENDATION

This study concludes that the House Index (HI) and Container Index (CI) numbers on the perimeter area at the port of Gorontalo City have exceeded the predetermined indicator, namely 0. The HI number is 16%, with 25 buildings being inspected, four buildings positive for *Aedes aegypti* larvae, and 12.5% CI with 48 containers inspected and six containers positive for *Aedes aegypti* larvae. Moreover, the type of potential breeding place for *Aedes aegypti* larvae on the perimeter area in the port of Gorontalo city is the bucket. Suggestions in this study address the port of

Gorontalo city; Ferry Port, PT PELINDO IV Port and Fishery Port stakeholders to enhance the attention to the port environmental conditions, increase the efforts in controlling *Aedes aegypti* mosquitoes, and also socialize or provide information on the maintenance of the port environment.

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