PHYSICAL ENVIRONMENT CHARACTERISTICS WITH THE PRESENCE OF Aedes Larvae At the Ummul Mukminin Islamic Boarding School Makassar, Indonesia

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ABSTRACT

Objective: The research aimed to know characteristics of the physical environment with the presence of Aedes larvae at the Ummul Mukminin Islamic Boarding School in Makassar City.

Methods: The type of research used is descriptive, the sample number is 33 containers with exhaustive sampling as a sampling technique. The research instrument used was an observation sheet with univariate analysis using SPSS and Excel program. The study was conducted in June 2022 at the Ummul Mukminin Islamic Boarding School.

Results: A total of 33 containers were found at the study site, 31 (93.9%) containers were not found to have larvae (negative) and 2 (6.1%) containers were positive for Aedes larvae. Plastic container base material with 100% presentation. There are 24 (72.7%) containers were water reservoir (TPA) and 9 (27.3%) containers were non-water reservoir, 27 (81.8%) containers were located indoor and 6 (18.2%) containers were located outdoor.

Conclusions: The larva-free dormitory program by the school health post (poskestren) should be continued and if possible the frequency of activities is increased, as well as toilets that are rarely used and in dark conditions are still considered because they have the potential to be Aedes larva breeding place.

Research Implications: Such findings are expected to be a source of information for the community, especially the teachers and students of the Ummul Mukminin Islamic Boarding School regarding the importance of maintaining the cleanliness of the mosquito breeding environment, especially regarding the presence of Aedes larvae and efforts to prevent dengue incidents. And can be an information material for the Makassar City Health Office, especially in overcoming dengue problems and can be a source of reference and comparison for further research.

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Originality / value: This study discusses some characteristics of water reservoirs (containers) that have the potential to become breeding sites for Aedes larvae, as one of the references in efforts to eradicate Aedes mosquito nests as vectors for dengue fever transmission.

Keywords: national political dynamics, local political dynamics, political policy, conflict of interest.

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CARACTERÍSTICAS DO AMBIENTE FÍSICO COM A PRESENÇA DE LARVAS DE AEDES NO INTERNATO ISLÂMICO DE UMMUL MUKMININ EM MAKASSAR, INDONÉSIA

RESUMO

Objetivo: A pesquisa teve como objetivo conhecer características do ambiente físico com a presença de larvas de Aedes no internato islâmico Ummul Mukminin na cidade de Makassar.

Métodos: O tipo de pesquisa utilizado é descritivo, o número de amostras é de 33 recipientes com amostragem exaustiva como técnica de amostragem. O instrumento de pesquisa utilizado foi uma folha de observação com análise univariada usando SPSS e programa Excel. O estudo foi realizado em junho de 2022 no internato islâmico Ummul Mukminin.

Resultados: Foram encontrados 33 recipientes no local de estudo, 31 (93,9%) recipientes não apresentaram larvas (negativo) e 2 (6,1%) recipientes foram positivos para larvas de Aedes. Material base recipiente de plástico com 100% de apresentação. Existem 24 (72,7 %) contentores em reservatório de água (TPA) e 9 (27,3 %) contentores em reservatório não aquático, 27 (81,8 %) contentores em interior e 6 (18,2 %) contentores em exterior.

Conclusões: O programa de dormitório sem larvas pelo posto de saúde escolar (poskestren) deve ser continuado e, se possível, a frequência de atividades é aumentada, bem como banheiros que raramente são utilizados e em condições escuras ainda são considerados porque eles têm o potencial de ser Aedes larva local de reprodução.

Implicações da pesquisa: Tais descobertas devem ser uma fonte de informação para a comunidade, especialmente para os professores e estudantes do internato islâmico Ummul Mukminin sobre a importância de manter a limpeza do ambiente de reprodução do mosquito, especialmente no que diz respeito à presença de larvas de Aedes e esforços para evitar incidentes de dengue. E pode ser um material de informação para o Gabinete de Saúde da Cidade de Makassar, especialmente na superação de problemas de dengue e pode ser uma fonte de referência e comparação para futuras pesquisas.

Originalidade / valor: Este estudo discute algumas características dos reservatórios de água (recipientes) que têm potencial para se tornar criadouros de larvas do Aedes, como uma das referências nos esforços para erradicar os ninhos de mosquitos do Aedes como vetores de transmissão da dengue.

Palavras-chave: dinâmica política nacional, dinâmica política local, política política política, conflito de interesses.
1 INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an infectious disease that is still a health problem and has become an outbreak in several areas due to its rapid spread and has the potential to cause death.\(^1\) DHF is caused by dengue virus which belongs to the Arthropod-Borne Virus, genus Flavivirus, family Flaviviridae with Aedes aegypti mosquitoes as the main vector and Aedes albopictus as secondary vectors.\(^2\) The occurrence of DHF cannot be separated from the role of the environment as an interaction medium, one of which is the physical environment as a risk factor for the presence of larvae.\(^3\)

Many programs have been carried out to prevent the spread of DHF, but the number of DHF cases from year to year continues to increase and becomes a serious health problem in the world.\(^4\) Data from the European Center for Disease Prevention and Control (ECDC) by the Pan American Health Organization (PAHO) in December 2021, the number of dengue cases in the world was 1,179,311 cases, including America with 496,382 cases and 391 confirmed deaths.\(^5\) Meanwhile, DHF cases in Indonesia were reported by the Indonesian Ministry of Health stating that in 2019 there were 138.12 cases of DHF cases with 919 deaths (CFR = 0.67%) which increased from 2018 as many as 65,602 cases with 467 deaths (CFR = 0.715%).\(^6\)

The occurrence of DHF can be caused by the physical environment, one of which is the availability of containers. The existence of the container affects the level of vector density because it is at risk as a breeding place and resting place for Aedes mosquitoes. The more containers there are, the greater the risk as a breeding ground and the impact on the high transmission of dengue disease.\(^7\) The presence of Aedes larvae is closely related to the type, location, basic materials and the number of containers in the house/building.\(^3\)

Islamic boarding schools as one of the public places are at risk of becoming a place of transmission of dengue fever because there are many students who gather with different hygiene behaviors. In addition, the large number of students can be at risk of meeting high water needs and at any time can experience shortages because they are used simultaneously. This allows them to hold water in containers.\(^8\) The availability of containers then poses a risk as a breeding ground for Aedes larvae and can have an impact on the health of students.

Based on research conducted by (Rofifah et al, 2019) at one of the Islamic boarding schools in Banyumas Regency, it was found that the sanitary condition of the
dormitory is still not good, indicated by the personal hygiene condition of the students who are still not good, such as hanging dirty clothes in the room or drying towels and clothes that are not directly exposed to sunlight. The behavior of hanging clothes after use is a risk factor for dengue because it is a place favored by Aedes mosquitoes to rest after sucking human blood.

Ummul Mukminin Islamic Boarding School is one of the Islamic boarding schools in Biringkanaya District, Makassar City. Based on the results of interviews with Poskestren Officers, information was obtained that for the past 3 years, at this Islamic Boarding School, there have been cases of dengue fever in female students (santriwati), although some facilities have met the healthy requirements.

From the explanation above, this study aims to know the characteristics of the physical environment with the presence of Aedes larvae at the Ummul Mukminin Islamic Boarding School in Makassar City.

2 METHODS

2.1 SUBJECT

The population of this research is all containers or containers filled with water that have the potential as a breeding place for Aedes mosquitoes (breeding place) mosquitoes. The sampling technique used exhaustive sampling, so that the entire population was used as a sample. The research was conducted at the Ummul Mukminin Islamic Boarding School in Makassar City in June 2022.

2.2 RESEARCH DESIGN

The type of research used is descriptive, to know characteristics of the physical environment with the presence of Aedes larvae at the Ummul Mukminin Islamic Boarding School in Makassar City.

2.3 DATA COLLECTION

Collecting data using observation sheets and flashlights to see the presence of larvae. The collection is carried out directly by complying with health protocols. Data analysis was carried out using the Statistical Product and Service Solutions (SPSS) and Excel program and data analysis was univariate with the presentation of data in the form of a graph.
3 RESULTS

3.1 DISTRIBUTION OF CONTAINERS

Based on Graph 1, in this study, it was found that of the 33 containers inspected, 2 containers were positive for larva (%), while 31 containers negative larvae (94%).

Graph 1: Distribution of containers based on the presence of Aedes Larvae at the Ummul Mukminin Islamic Boarding School Makassar city

Source: Primary Data by the authors (2022)

Based on graph 2, it shows that the most common types of containers found were 21 buckets (63.6%), and at least 2 flower vases/pots (6.1%). Graph 3 shows that the basic ingredients of the containers found were 33 (100%) plastic. Graph 4 is known that the most common container categories found are landfill as many as 24 (72.7%) and non-landfill as much as 9 (27.3%). Graph 5 shows that there are 27 (81.8%) indoor containers and 6 (18.2%) outdoor containers.
Based on graph 6, it shows that the Aedes larvae were found in containers with the landfill category, as much as 2 (7.4%). Graph 7 shows that the most Aedes larvae were found in indoor containers, as much as 2 (7.4%).
Graph 6: Distribution of container Locations with the presence of Aedes Larvae at the Ummul Mukminin Islamic Boarding school In Makassar City

Source: Primary Data by the authors (2022)

4 DISCUSSION

Based on the results of the study, it was found that of the 33 containers inspected, 2 containers were positive for larvae (6.1%), while the other 31 containers (93.9) were not found to have larvae. The larval survey method used was a visual method with a flashlight and a scoop. The same method was used by (Tomia et al., 2021) in his research by simply seeing the presence or absence of Aedes larvae in each water reservoir (container) without taking the larvae. The two containers that were positive for larvae were found in the bucket-type landfill category with a plastic base and were found indoors (toilet /WC).

The cause of the small number of larval positive containers found was that the study site was quite clean, no natural containers were found, and all non-landfill containers were also larvae negative. The cleanliness of the toilets and containers at the research site was good, but the containers found by the larvae were indeed in dirty conditions and were at the end or back of the room which was assumed to be rarely cleaned.

The presence of Aedes larvae in an area is a description of the incidence of DHF. Although the number of larvae found is low, at the Ummul Mukminin Islamic Boarding School, the presence of larvae is a threat to school residents who carry out many activities at school. The solution that can be done in eradicating mosquito nests is the larvae-free dormitory program which is carried out to increase its frequency such as twice a month. In addition, the sowing of abate powder can also be done to control mosquito larvae.

Containers that are positive for larvae of the landfill type are more likely to be preferred by mosquitoes as a breeding ground because the landfill can hold clean water for a long period of time so that it provides an opportunity for mosquitoes to breed. In addition, landfills that are used daily also generally have currents and contain other predators that can prey on larvae. Based on the observations, it was also found that the
most common type of container found and positive for larvae was the bucket type landfill. This is because generally people often save a lot of water to ensure the availability of their clean water. In addition, buckets are also used because they are more practical, lightweight, and easy to move and get.\(^{13}\)

At the research site, it was also found that all containers had plastic base material (100%) and 2 of them were positive for larvae. This study is in line with what was obtained by (Kurniawan et al., 2021) in Boyolali Regency that the most basic material for containers is plastic as many as 78 pieces.\(^{14}\) This is confirmed by (Majida and Paauthor, 2019) that many schools are now using plastic-based containers which are generally applied in the form of buckets or basins. This is because plastic is the most abundant and easy-to-find material in the market, the price tends to be cheaper and easier to clean, so it is a consideration in choosing plastic containers in school bathrooms.\(^{15}\) Research by (Lubabul et al., 2019) then obtained different results where it was found that bathtubs were the most commonly found containers, namely 59 pieces.\(^{16}\)

Containers that were positive for larvae were both found in the building (WC). This is corroborated by (Nurmalasari, et al., 2020) that larvae positive containers are found in many buildings due to the nature of the Aedes mosquito which likes shelters that are protected from direct sunlight so that humidity and temperature are maintained and optimum for breeding.\(^{17}\) Aedes mosquitoes also really like resting places on hanging objects such as clothes, curtains, mosquito nets, etc.\(^{12}\)

Placement of containers by the community is usually a deliberate act, where the community places containers inside or outside the house based on their needs. Generally, breeding places in houses/buildings are landfills such as buckets, bathtubs/WC, drinking water reservoirs, jars, plastic barrels, drums, vases, aquarium ornamental plants, and others, while breeding outside the home can be in the form of cans or bottles, used, used pots, ornamental plant pots, etc.\(^{13}\)

Based on the results of observations, it was found that the Ummul Mukminin Islamic Boarding School had a fairly clean cleanliness. In the yard of the pesantren and the sewers, there was no trash bottles or used glasses, nor was there a natural landfill that became a breeding ground for Aedes mosquitoes. In addition, containers that are outside also have a cover so that they can prevent Aedes mosquitoes from reaching and laying eggs. The Poskestren program, namely the Larva Free Program, is also implemented where the presence of larvae is monitored every 2 months at Islamic Boarding Schools.
by students. This may be a factor that affects the small number of Aedes larvae found at the study site.

The cleanliness of the toilet is also quite clean, it can be seen from the toilet floor and clean containers (bucket & basin). However, containers that were positive for larvae were indeed found in the toilets at the back and ends of the building which were probably rarely cleaned. In addition, research cannot be carried out in all research locations because there are several areas that are private from the Pondok and some reservoirs are not possible to study because they are in high-rise buildings which can also cause at least larvae to be found in the research location.

Based on the results of the study found as many as 24 containers (72.7%) with the Landfill category and the category of non-landfill containers as many as 9 (27.3%). There were 2 larvae positive containers found in the landfill category, while non-landfill containers did not find larvae. This research is in line with what was done (Handayani et al., 2020) in Pancur Pungah Village, Okus City that more landfill containers were found at the study site and more positive for larvae than non-landfill category containers.18

Another similar study was conducted by (Raharjanti and Paauthor, 2018) that landfill was more commonly found in the research location (89.2%) than the non-landfill category (10.8%) in Karangjati Village.19 Inconsistent research was later found by (Amalan, 2022) that as many as 790 non-landfill containers were found and 505 landfill containers were found in Gambesi Village, South Ternate District.20

There are 3 categories of containers that can be a breeding ground for Aedes mosquitoes, namely containers with water reservoirs (TPA/landfill), non-water reservoirs (Non TPA/non-landfill), and natural containers. landfill-type containers are containers that contain clean water and are used for purposes, non-landfill containers are containers that have the potential to be filled with water but not for daily purposes. Meanwhile, natural containers are defined as places or containers that exist naturally and can produce puddles of water, such as holes in bamboo pieces, holes in trees, coconut shells, leaf midribs, and others.21

The results showed that the most common types of landfill found were buckets and basins. This is in accordance with research from (Kinansi and Pujiyanti, 2020) that the type of landfill that is most widely used by the community is a tub, drum, or bucket. This is because people often save a lot of water to ensure the availability of their clean
water. In addition, buckets are also used because they are more practical, lightweight, and easy to move and get.\textsuperscript{13}

Bucket or basin containers are types of containers used in daily life that should be easy to clean to control the presence of Aedes larvae. This is because of the ease of draining the bucket and its function, which sometimes uses water once it runs out, causing pre-adult mosquitoes to not be able to breed in the bucket because the water is constantly changing.\textsuperscript{19} The use of bucket containers and basins for water storage in schools should be able to provide convenience in controlling the presence of larvae, but in fact these containers play a role in the presence of Aedes larvae, especially Ae. Aegypti larvae.\textsuperscript{22}

Although the presence of Aedes larvae based on the characteristics of the landfill category at the Ummul Mukminin Islamic Boarding School was found in small numbers, it must always be watched out, especially the type of landfill that is found in abundance of Aedes larvae, namely buckets or bathtubs that are dominantly mossy and dark in color due to being rarely cleaned so that they can become Aedes’ breeding ground.\textsuperscript{13}

Based on the results of the study it was found that as many as 27 containers (81.8\%) were found to be indoors and at least 6 were outside the room as many as 6 (18.2\%). Larva positive containers were found in 2 indoor containers while no larval positive containers were found outdoors. This research is in line with that obtained by (Pramadani et al., 2020) as many as 1,650 containers were found indoors with 107 positive containers (6.5\%), while outdoor containers were found to be 988 with 80 positive containers (8.1\%).\textsuperscript{23}

This study is also in line with what was obtained (Nurmalasari et al., 2021) that there were 40 larval positive indoor containers (58\%) and 2 larval positive outdoor containers (28.6\%). This study then contradicts what was found by (Sianipar et al., 2018) that 23 outdoor containers were found (85.18\%) while indoor containers were 4 (14.81\%).\textsuperscript{24}

Placement of containers by the community is usually a deliberate act, where the community places containers inside or outside the house based on their needs. Generally, breeding places in houses/buildings are landfills such as buckets, bathtubs/WC, drinking water reservoirs, jars, plastic barrels, drums, vases, ornamental plant aquariums, etc., while breeding outside the home can be in the form of cans or bottles. used, used pots, ornamental plant pots, etc.\textsuperscript{13}
WHO (2011) in (Santi and Ardillah, 2021) states that in most Southeast Asian countries, Aedes mosquitoes lay eggs in artificial containers located inside and outside houses/buildings. This is due to the community's habit of storing water for daily needs in houses that are not closed so that it will invite adult Aedes mosquitoes to lay their eggs in it. Likewise, containers outside buildings/houses have a big risk because of the presence of containers that may be protected from the sun so that it is optimal for the breeding of Aedes mosquitoes.  

Landfill positive larvae were found inside the building (WC) and after further identification the results were obtained with Ae. aegypti. This result is corroborated by the finding (Nurmalasari et al., 2021) that in the house there are more Ae. aegypti as many as 40 (58%) inside the house compared to outside the house. Lag-positive containers are found in many buildings due to the nature of the Aedes mosquito which likes shelters that are protected from direct sunlight so that humidity and temperature are maintained and optimum for breeding.  

While generally landfill that is outside the house is also at risk of becoming a breeding ground for Aedes mosquitoes, in this case Ae. albopictus. This species of mosquito is generally more commonly found outside buildings, because it is included in the forest mosquito species that can adapt outside buildings. 

One of the factors that determine the success of reducing the Larvae Free Rate (ABJ) and the Presence of Larvae is to implement a public service strategy of the management program, in this case, students who live in the boarding school area, are part of the public and need an effective service strategy.  

According to Rojas, S.P.A, 2023, For strategic management to work properly, it is necessary to have clear and precise policies on how to encourage teamwork, as this facilitates strategy planning and allows the proper use of allocated resources in the interest of the company and its customers, ultimately ensuring service quality in all processes. 

This research has not conducted further studies related to the management of public service strategies, so this is a consideration for developing variables as future research development.
5 CONCLUSIONS

Of the 33 containers observed at the Ummul Mukminin Islamic Boarding School, there were 6.1% of containers that were found to be positive for larvae, and made of plastic with a percentage of 100%. Based on the container category, the majority were found in landfills at 72.7%, and based on the location of the containers, the majority were found indoors with a total of 81.8%.

Although the number of containers found positive for larvae is still small, it is not rule out the possibility of dengue cases. This indicates that the school will continue to be safe and free from dengue transmission, so it needs to be anticipated in the future, so that this condition is always maintained, for that then, the larva-free dormitory program by Poskestren should be continued and if possible the frequency of activities is increased. Likewise, the sanitation of the pesantren environment must be maintained and further improved to prevent the laying of female mosquitoes and break the mosquito life cycle.

Moreover, More research is needed to identify aspects of student behavior associated with the presence of larvae. And also further studies related to the management of public service strategies, so that this is a consideration for developing variables as future research development.
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