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Home Environment and Larva Indices: A Cross-Sectional Study in the Indonesian Transition to Endemic COVID-19

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Abstract

This study aimed to assess the association between home environment and larval indices during the COVID-19 pandemic transition. A cross-sectional design was carried out in this study. The population was the houses in two villages of Gamping Sub-District, Sleman, Yogyakarta Province. The sample was calculated by considering the confidence interval value of 95%, the margin error of 5%, and the distribution response of 50%. Accordingly, the minimum sample size was 207 households. The chi-square test was used to analyze the data. The home environment was associated with the value of the container index (CI), indicated by a significant difference p-value of 0.008 with a prevalence ratio of 3.630, which means an unhealthy house will increase the value of the container index by 3.630 times greater. Sanitation of the home environment showed a significant relationship with the value of the container index (CI) with a p-value of 0.019 and a prevalence ratio of 2.625, which means that poor sanitation conditions will increase the value of the container index by 2.625 times. The health of the home environment is associated with the mosquito larvae index.

Introduction

Indonesia has had a relatively high number of COVID-19 cases during the pandemic attack. Data released by the Ministry of Health of the Republic of Indonesia in September 2022 shows Indonesia is in the second rank after Vietnam for the country with the most COVID-19 cases in Asia (Indonesia Ministry of Health, 2022). COVID-19 Pandemic affects all aspects of life, with the emergence of policies handling COVID-19 (Setyawan and Lestari, 2020; Susilawati, Falefi and Purwoko, 2020). Dengue prevention is one program impacted due to the COVID-19 Pandemic (Wilder-Smith et al., 2020)

Before the Pandemic, Dengue control was carried out with activities such as fogging, larvacidation, and larvae inspection by Jumantik cadres and 3M (closing and draining water containers and managing waste properly) (Sayono et al., 2019; Sulistyawati et al., 2019). Those involved in controlling Dengue are health workers, jumantik cadres, and households. Health workers are responsible for promoting health, community awareness of Dengue prevention policies, mentoring, and fogging (Nuryunarsih, 2015). The Jumantik's role is to assist the community in observing mosquito larvae in every house in their working area to monitor the population of Aedes aegypti or Aedes Albopictus mosquitoes surrounding the society (Indarwati & Prayitno, 2016).

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Household is expected to conduct 3M, namely closing and draining water containers, cleaning water reservoirs, and managing waste properly. The 3M campaign aims to reduce the potential breeding places for mosquitoes in the home environment (Nuryunarsih, 2015; Sayono et al., 2019). The collaboration between health workers, jumantik cadres, and households in the Dengue program can maintain the mosquito population under control, and Dengue cases can be reduced.

The government's COVID-19 policy, which entails social restrictions to stop the spread of the COVID-19 disease, is challenging for performing routine Dengue control during the Pandemic. Figure 1 shows the progress of Indonesia's COVID-19 control policy (Agustino, 2021; Roziqin, Mas'udi and Sihidi, 2021; Ikmal and Noor, 2022; Taher, 2022). On that figure, we know that from the beginning of COVID-19, announced in Indonesia for the first time, till the middle of 2022, Indonesia faced three waves of COVID-19 with different virus variants. Each wave was followed with a policy emphasizing social restriction and distancing. Even in the first wave, the policy can be seen as semi lockdown that directly affected the stop of dengue control operation (Ernawati et al., 2021). On the other hand, for health workers, during that time, activity related to COVID-19 was a priority over Dengue control. So, the combination between COVID-19 policy restrictions and health worker priorities impacted the Dengue control cannot be carried out normally. In society, Jumantik cadres cannot carry out larval observation in homes due to limited social interaction. As a result, the mosquito population needs to be adequately monitored. It could be the cause of why Dengue cases during the COVID-19 Pandemic remain high or reduced due to society's reluctance to have medical examinations (Mashudi, Ahmad and Said, 2022; Peri Arista, Sawitri and Suganda Yatra, 2022).

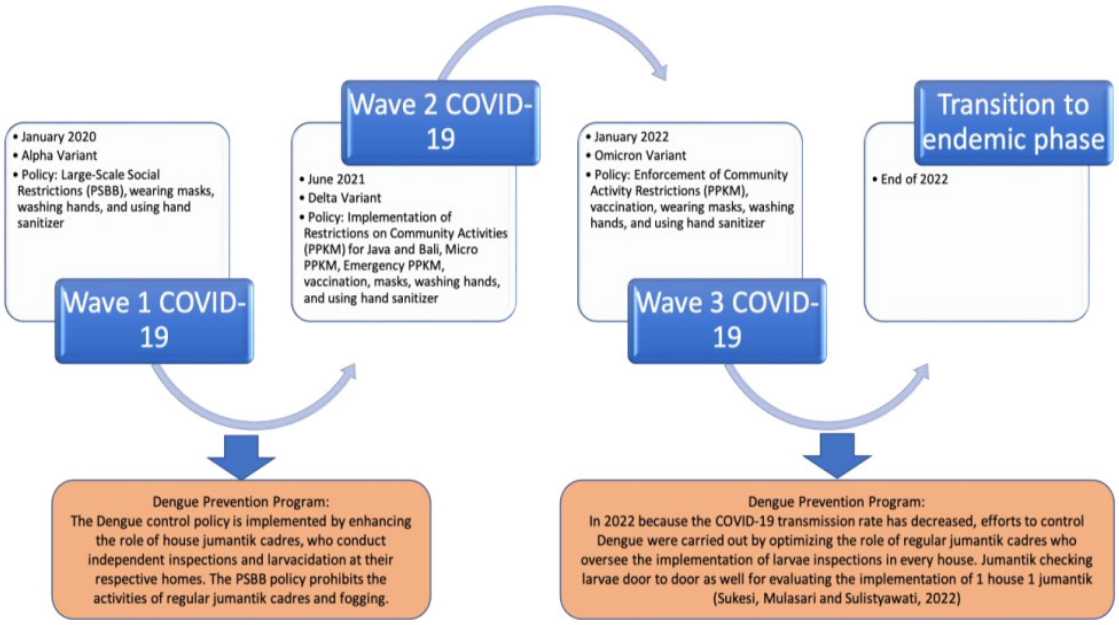

Figure 1. COVID-19 Journey and the Policy in Indonesia

Because from previous research, people say they do not have time to do 3M in their home environment for various reasons, such as work (Sulistyawati et al., 2019b). On the other hand, with social restrictions and the movement to work from home, people should have had time to observe and clean up their surroundings. Recently, Indonesia has entered a transition to endemic COVID-19, which implies that the policies have begun to be relaxed, and life activities in Indonesia are back to normal (Sinto, 2022). So, in this study, we want to monitor how the condition of the home environment relates to indices larvae in this transition to endemic. This research contributes to developing an understanding and potential

action on the Dengue vector control during the Pandemic and social restriction for future mitigation.

Method

The research took place in the Gamping District, Yogyakarta Province, Indonesia. The location was chosen as the research location because, based on data from the Gamping 1 Health Center, this area found some Dengue cases during the Pandemic. The population in this study was all houses (287) distributed in two villages (Nyamplung lor and Mejing Lor). The number of samples is calculated using the 95% confidence interval value, a 5% error margin, and a 50% response distribution. Accordingly, the minimum sample size was 207. During the research, we collected data from 217 houses.

In this study, the independent variables were the home environment, the habit of keeping clean water on hand, the parts of the house, and the sanitation facilities. The condition of a healthy home is measured using a standard checklist from the Ministry of Health of the Republic of Indonesia. Habits of holding water were measured using an observation sheet. The components of the house are calculated using a checklist to see the floor, walls, ventilation, roof, smoke holes, and lighting. Sanitation facilities are measured using a checklist to see clean water facilities and sources, toilets, waste, and garbage disposal. While the dependent variable was the container index. The container index is the value obtained from the number of positive larval containers divided by the number of containers inspected multiplied by 100% (Jesha M et al., 2015). According to WHO more than 5% of containers are at high risk of transmitting Dengue (Nofita, Renita Rusdji and Irawati, 2017). The presence of larvae is indicated in the house examined. Cross tabulation was used to calculate the univariate analysis, which was then carried out by a chi-square test to see the relationship among the variables. The value size for the prevalence ratio shows how much risk is caused by poor conditions. When the p-value is less than 0.05, the relationship is considered significant. Ethical approval was received from Universitas Ahmad Dahlan Ethical Board (#012205052)

Result and Discussion

In total, 217 houses were surveyed in this study. We assessed the percentage of healthy houses, habits of storing clean water, house components, sanitation facilities, and container index values.

Table 1. Home Environment Condition

Variables	Frequency	Percentage (%)
Healthy house		
Unhealthy	123	56.7
Healthy	94	43.3
The habit of holding water		
Yes	63	29.0
No	154	71.0
Home Components		
Poor	80	36.9
Good	137	63.1
Sanitation facilities		
Poor	31	14.3
Good	186	85.7

Source: Primary Data, 2022

Table 2. Indicators of Mosquito Larvae

Variables	Frequency	Percentage (%)
Index Container (CI)		
Poor	23	10.6
Good	194	89.4

Source: Primary Data, 2022

Table 3. The Relationship between Home Environmental Conditions and Larval Indicators

Variables	Container Index (CI)		*P value*	*Prevalence Ratio*	95% CI	
	High	Low			*Lower*	*Upper*
Healthy house						
Unhealthy	19	104	0.008*	3.630	1.278	10.314
Healthy	4	90				
The habit of holding water						
Yes	7	56	0.875	1.069	0.462	2.473
Not	16	138				
Home Components						
Poor	9	71	0.812	1.101	0.499	2.473
Good	14	123				
Sanitation facilities						
Poor	7	24	0.019*	2.625	1.176	5.858
Good	16	170				

*= significant at p-value 0.05

Source: Primary Data, 2022

Table 1 shows that more than half of the houses were unhealthy (56.7%). The majority (63.1%) of dwellings have proper home components, and more than 85.7% have good sanitation facilities. More than 71% of respondents reported not holding water in their containers.

The container index was found by dividing the number of containers with larvae by the number of containers checked and then multiplying that by 100% (Jesha M et al., 2015). From the larval inspection in the 217 houses, we found that almost 90% have a suitable container index (Table 2). Among four measured variables, we found two significantly associated with the container index: healthy house and sanitation facilities. People who reside in unhealthy houses have a 3.63 prevalence ratio of 3.63, higher than people who live in healthy ones. Sanitation facilities were significantly associated with the container index with a prevalence ratio of 2.625 (Table 3).

This research aimed to know how well Dengue vector control was going in Indonesia when COVID-19 went from a pandemic to an endemic. The condition of the home environment is one of the factors that can affect the transmission of Dengue fever (Sukesi et al., 2021). How the people who live in a house take care of the health of their home environment significantly affects how well it is kept. The house occupants' busy carrying out other activities outside the home will further reduce the time available to maintain the health of the home environment (Ibarra et al., 2014). The family's economic condition is another factor affecting the house's condition. Financial incapacity causes the minimum facilities met as a condition for a healthy home to be carried out (Ibarra et al., 2014).

COVID-19's impact on people living in poverty is increasing (Supriatna, 2020). Even though more time at home means they should have more time to clean the house. However, economic inadequacy causes an inability to manage home health related to fulfilling the housing requirement, such as providing clean water. Good CI value houses are under 5% are under 5% (Martini et al., 2019); this value can be seen in every house inspected by observing each container that possibly stores clean water for Aedes to lay their egg.

During the Pandemic, several policies were implemented that limit people's activities outside the home. More time is spent inside than outside. With more time in the house, someone can do more housekeeping than before. Good home environmental conditions can influence the presence of Aedes larvae (Sukesi et al., 2021). The health condition of the house associated with the value of the container index (CI) shows that there is a significant difference in a p-value of 0.008 with a prevalence ratio of 3.630, which means that an unhealthy house will increase the value of the container index by 3.630 times (Table 3). Biologically, the Aedes mosquito is anthropophilic; it likes humans, so its habitat will not be far from humans

(Mubarok et al., 2018). The house can be a place for humans to live and a habitat for Aedes mosquitoes, primarily if the house's condition can support the breeding of Aedes mosquitoes. The house's lack of home lighting and high humidity have good carrying capacities for Aedes mosquitoes (Kusumawati et al., 2016). Sanitation of the home environment shows a significant relationship with the value of the container index (CI) p-value of 0.019 (Table 3) with a prevalence ratio of 2.625, which means that poor sanitation conditions will increase the value of the container index by 2.625 times. Good sanitation facilities include clean water, suitable waste disposal, and closed sewers. If all these aspects are adequately met, the chances of the house becoming a habitat for Aedes mosquitoes will decrease. Adequate clean water can reduce water containers that can become breeding grounds for Aedes mosquitoes. Good waste and disposal facilities can reduce containers that accidentally hold clean water. Water stored in the garbage can be a breeding ground for Aedes mosquitoes (Nurmaini and Lubis, 2017)

In this study, the habit of storing clean water and house components did not have a significant relationship with the container index (CI). The data is dominated by people who do not habitually store water with a low container index value. People no longer have the habit of collecting water because water providers always supply clean water using water pipes. When the supply of clean water is fulfilled correctly, the community no longer has the habit of storing water. It is usually found where clean water is not available properly. Hence, people collect water using many containers to meet their family's clean water needs (Satoto et al., 2017). The average house component is good with a permanent house that has met the requirements of a good roof, wall, floor, ventilation, and lighting. It can reduce the carrying capacity of the house to become a preferred habitat for Aedes mosquitoes (Sukesi et al., 2021). Based on the results, a Dengue control flow can be made during the transition to endemic.

New policy policies during the Pandemic limit the community's space for movement, including jumantik cadres, who cannot monitor larvae at society's house (Sasmono and Santoso, 2022). Dengue control during the Pandemic until the transition to endemic is optimized by the role of families in maintaining a healthy environment in their respective homes. The family's role in controlling Dengue remains essential, especially in maintaining the home environment's health, which can influence mosquito larvae indicators. A healthy home environment can break the chain of Dengue transmission (Nurmaini and Lubis, 2017). During the transition period to endemic, efforts to control Dengue are returning to normal conditions, and jumantik cadres can carry out their duties again but with several protocols that must be met.

Conclusion

This research underlines that during this transitional period, vector control needs to be encouraged more because it turns out that even though many people were at home during the pandemic, this did not change all people's environmental health behavior in cleaning their houses. Housing, health, and sanitation are still the enabling factors for the container index value to be high. We recommend that the health authority must take action to implement and expand the one house one jumantik movement. So that community empowerment in controlling the dengue vector can be optimal. To support the optimization of the program, To support the program optimization, we need to strengthen the role of jumantik cadres who will supervise by sampling the implementation of the "1 house 1 jumantik" movement.

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