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Survey of *Aedes* sp. Using Ovitrap to Prevent DHF in Beti Ogan Ilir Village

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Abstract

Purpose: This community service activity aims to provide education and introduce ovitrap to residents of Beti Village, Ogan Ilir Regency so that they can use inexpensive, simple, and safe mosquito traps as one of the efforts to control Dengue Hemorrhagic Fever (DHF).

Method: This service consists of counseling knowledge, attitudes, and behaviors about DFH using a pre-test and post-test as measuring tools, as well as making ovitrap skills.

Practical Applications: This activity was successful in raising public awareness about the benefits of ovitrap, how to make them, attractants, and how to install them. The results of the ovitrap survey show that *Aedes* sp. is frequently found in ovitrap installed outside the house.

Conclusion: Education to the public has an impact on increasing community awareness and knowledge of DFH prevention. Ovitrap can be used as basic information for the community to improve the clean environment by decreasing mosquito breeding sites.

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Introduction

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the dengue virus and spread by the bite of an *Aedes aegypti* mosquito. Adult mosquitoes and their larvae can be targeted with vector eradication programs. However, efforts to eradicate dengue fever in Indonesia have been unsuccessful, so the disease persists and has caused outbreaks in various regions. DHF is an environmental disease caused by urbanization, community mobility, climate change, and a lack of public awareness about environmental cleanliness (Saputra, 2021).

Many efforts to eradicate the Aedes aegypti through community participation have yielded unsatisfactory results. Even though the Ogan Ilir Regency Government has undertaken several initiatives, including empowering elementary school children and Family Welfare Programs (PKK) and focusing on fogging, dengue cases continue to rise year after year. In fact, every rainy season, people have difficulty finding a place to be patient because the number of dengue fever patients admitted to hospitals rises (Dinkes Kabupaten Ogan Ilir, 2019). *Aedes* sp. breed in water reservoirs/containers in or around houses or public places, usually less than 500 meters away, in the form of air containers stored in a place or container and avoid puddles of water that are in direct contact with the ground (Hadi et al., 2020).

South Sumatra Province is one of the areas where dengue fever is prevalent. The DHF has spread throughout South Sumatra Province, affecting seventeen cities and districts, including the Ogan Ilir Regency. The number of dengue fever cases in Ogan Ilir Regency was 131 in 2019, 75 in 2020, and 51 in 2021 (Dinas Kesehatan Provinsi Sumatera Selatan, 2022). Beti Village in Ogan Ilir Regency is one of the areas prone to outbreaks. Dengue fever is more likely to occur in areas with dense housing. Aside from that, some people's habit of throwing trash in random places causes air to accumulate in used goods, creating a breeding ground for mosquitoes (Prameswarie et al., 2022).

Adult mosquitoes can be eliminated by fogging with insecticide. Fogging alone is insufficient because it only kills adult mosquitoes; fumigation does not kill mosquito larvae (Kemenkes RI., 2019). In addition, incorrect dosages of organophosphate insecticides during fumigation can result in vector resistance (Hardjanti et al., 2016). The use of egg traps (ovitraps) in the form of equipment to detect the presence of *Aedes aegypti* and *Aedes albopictus* mosquitoes has been shown to reduce vector density in several countries. The ovitrap is specifically used to detect the reintroduction of mosquitoes into previously eradicated areas. The ovitrap is made from used plastic bottles, such as mineral water bottles. The material is easy to find, and it also aims to reduce the amount of plastic waste. Aside from that, the method of making it is extremely simple and can be done by anyone (Rahayuningsih et al., 2019; Ramayanti et al., 2022).

Until now, no officers or members of the public have used ovitraps to reduce the density of Aedes sp. in Beti Village, South Indralaya District, Ogan Ilir Regency. An ovitrap containing fermented brown sugar, yeast, and water is thought to be a solution for controlling mosquitoes that spread dengue fever. Aside from being simple to make, the tools and materials are also readily available, and the costs are low and affordable to the community. Based on the foregoing, the service team wishes to conduct community service activities that will teach the community how to make ovitraps, which will be used to reduce the population of *Aedes* sp. in their home.

Method

This community service activity took place from December 13 to 15, 2022, in Beti Village, South Indralaya District, Ogan Ilir Regency. The method used in this community service activities (PKM) was to present material, practice making ovitrap, and apply ovitrap in the community. This PKM activity involved thirty-three Posyandu cadres and Family Welfare Programs (PKK). This activity begins with the training participants filling in for

absences and continues with the presentation of material, discussion, practice, and application of the Ovitrap. The material presented in this activity is about mosquitoes that play a role in the transmission of dengue fever, such as Aedes aegypti and Aedes albopictus, as well as the various methods used to control dengue fever, one of which is the ovitrap. The presentation emphasized the ovitrap's role in measuring vector density and preventing vector-borne diseases. Following the presentation of the material, there will be a discussion, ovitrap-making practice, and ovitrap application.

The primary tools and materials used in the production of ovitraps are plastic bottles of mineral water collected from household waste. This aims to teach the public that plastic waste can still be reused and to reduce the amount of plastic waste. The tools and materials used include a 1500-ml mineral water bottle, filter paper, mineral water, thread, black paint, brush, plaster, scissors, and cutter. The steps to create an ovitrap are as follows:

1. Gather necessary tools and materials, including scissors, rope or thread, plastic water bottles, a platter, a brush, a cat, filter paper for ovistrip, and air. Cut the top of the plastic approximately 10–15 cm from the bottle's lip.
2. Place the ovistrip on the bottle's lip and stick it on.
3. Use adhesive to secure the bottle and lid.
4. Paint the entire surface of the bottle with black paint and let it dry.
5. Once dry, pour the water containing the attractant, which is a water solution of sugar and yeast, into the bottle until it reaches the ovistrip.
6. Place the trap in an area with a high mosquito population.

All materials are provided, allowing each participant to practice making an ovitrap. After practicing making an ovitrap, the training participants were divided into groups and assigned to apply the ovitrap by installing it in their homes. Evaluation activities are carried out by examining the extent to which community skills have been applied in the production and use of ovitraps. The following three days, the service team checked to see if any trapped mosquito eggs remained.

Result

1. Counseling and Assistance in Making Ovitrap Skills

Participants were very enthusiastic about participating in this activity. Counseling sessions and mosquito trap-making practices were held in the Beti Village Office Hall. Table 1 shows the results of the ovitrap-making training activity for Posyandu cadres and Family Welfare Programs (PKK) in Beti Village, which measured the students' knowledge, attitudes, and actions toward eradicating dengue fever using the ovitrap method.

Table 1. Describes the level of knowledge, attitudes, and behavior of the activity participants.

Variabel	Category	Pretest		Post test	
		n	%	n	%
Knowledge	Good	15	39,5	29	76,3
	Enough	23	60,5	9	23,7
Attitudes	Good	22	57,9	35	92,1
	Enough	16	42,1	3	7,9
Behavior	Good	18	47,4	34	89,5
	Enough	20	52,6	4	10,5

Source: Primary data, 2022

Table 1 shows changes in the knowledge, attitudes, and behavior of participants in outreach activities about mosquitoes that transmit dengue fever, as well as the types of methods used to control dengue fever. The findings revealed that more than half of the

participants had low knowledge, attitudes, and behaviors prior to counseling and training. Following counseling and training, there was an increase in participants with good knowledge (76.3%), good attitudes (92.1%), and good behavior (89.5%).

Figure 1. Pretest and Post test Process of Knowledge, Attitudes and Behavior

2. Installation of Ovitrap in Residents' Homes

Following the counseling and ovitrap making training activities, the participants installed two ovitrap units inside and one outside the house. In this activity, the community service activities team conducts a larval inspection prior to installing an ovitrap to assess the previous entomology index. Inspections were conducted on containers both inside and outside the house. Then, 66 ovitraps were installed both inside and outside the home.

Figure 2. Inspection of Mosquito Breeding Containers and Ovitrap Installation

Ovitrap installation takes 4 days. Ovistrip was taken and collected from ovtirap. Ovistrip collection determines whether an ovitrap tested positive for mosquito eggs or not. On the 7 days, the oviposition substrate collected from an ovitrap was removed to count the number of larvae and mosquito species caught in Table 2 shows.

Table 2. Distribution of Larva Types Trapped in Ovitrap Bottles

Place the Ovitrap	∑ Larvae Trapped Ovitrap	Types of mosquito larvae trapped in the ovitrap of used plastic bottles	Ovitrap Indeks (%)

			Aedes sp.	*Culex* sp.	
Inside the house		10	10	2	30,3%
Outside the house		18	11	6	54,5%

Source: Primary data, 2022

There is a difference in the number of mosquito larvae found inside and outside the house; observation results show that the number of larvae found outside is greater than the number of larvae found, it can be seen in Table 2. The mosquito egg survey revealed that the mosquito eggs from the ovitrap belong to the Genera Aedes sp. and Culex sp. According to larval identification observations, *Aedes aegypti* species were frequently found in ovitraps placed inside the house, whereas *Aedes albopictus* and *Culex sp*. were frequently found in ovitraps placed outside. The Beti Village Ovitrap Index (OI) inside the house was 30.3%, which was classified as medium; However, the Ovitrap installed outside the house produced an Ovitrap Index (OI) of 54.5%, which was classified as high.

Discussion

Dengue fever control efforts must involve the general public. This community service engages the community through outreach activities about mosquitoes that transmit dengue fever and the various methods used to control dengue fever. The results of outreach activities show that residents' knowledge of dengue fever has increased since before the outreach. This is consistent with previous research, which found that health education has a significant impact on mothers' knowledge, attitudes, and practices for preventing dengue fever (Saputra, 2021). Lawrence and Green define health education as changes that can influence behavior and help achieve desired outcomes. Benjamin Blum's theory states that knowledge, or cognition, is a critical domain for the formation of a person's actions (Nursalam, 2014; Zhou et al., 2015).

Apart from counseling, this service activity also carries out training in making ovitraps, which is an activity to increase knowledge and skills in making ovitraps. Good knowledge about making ovitraps is expected to be one solution that can be used to reduce the density of *Aedes* sp. larvae (Kurniawati & Sutriyawan, 2020). Making ovitrap training for posyandu cadres and Family Welfare Programs (PKK) in Beti Village, South Indralaya District, Ogan Ilir Regency needs to be carried out because Ogan Ilir Regency is classified as a dengue endemic area in South Sumatra Province. The raw material for making ovitraps in this training uses plastic mineral water bottles which are easy to obtain and can reduce the volume of plastic waste. The ovitrap made by the participants during the training was good. This shows that after participating in this activity the participants have the knowledge and skills and are able to make an ovitrap independently.

Participants who take part in this activity not only understand the theory but are able to make it. However, participants were also able to apply for it in the community, through installing an ovitrap. The emergence of more and more dengue vector habitats will affect vector density. Vector density influences the transmission of dengue fever, thereby triggering dengue fever outbreaks (Wiyata et al., 2023). The community is expected to have a responsibility to assist the government in controlling dengue fever. One way that can be done is by installing an ovitrap. Ovitrap is used to break the life cycle of mosquitoes (Sasmita et al., 2021).

The installed ovitrap produces an Ovitrap Index (OI), which is significantly higher outside the house than inside. The ovitrap is installed outside the house within a radius of five meters. Ovitrap installed outside the house is protected because it is in a shady location and not exposed to direct sunlight (Haziqah-Rashid et al., 2019). Inspections of larval breeding sites revealed that *Aedes* sp. prefers to lay eggs in an ovitrap outside the house.

Ovitrap has been shown to attract mosquitoes and other insects, which then die because they are trapped and unable to escape (Tatontos et al., 2022).

The increase in larvae-free rates as a result of implementing this service activity cannot be separated from the formula for using a brown sugar and yeast solution. Ovitrap detects *Aedes aegypti* and *Aedes albopictus* in areas with low population density and unproductive larval surveys (Sasmita et al., 2021). Ovitrap can be used to successfully control vectors and reduce mosquito density. It is hoped that Mosquito Nest Eradication Behavior (PSN) activities will be repeated on a regular basis to reduce containers or items that can serve as breeding grounds for mosquitoes. Old tires, cans, and rainwater buckets are examples of household items that serve as mosquito breeding grounds. This activity reduces the number of items inside and outside the house, resulting in a significant reduction in the mosquito population. The number of dengue cases in a given area is not always determined by the mosquito population. However, describing mosquito density in a given area can demonstrate the level of alertness required to prevent and control dengue fever transmission.

Conclusion

This service effectively raises community knowledge, attitudes, and behaviors regarding dengue prevention. Aside from that, this service activity has proven effective in motivating the community to control mosquitoes with ovitrap technology, which is simple, inexpensive, and safe. The first step toward reducing dengue fever incidence is to provide information and assistance in the construction of ovitraps, particularly in Beti Village, South Indralaya District, Ogan Ilir Regency, South Sumatra Province. This activity suggests that Posyandu cadres should routinely carry out the ovitrap installation program for their residents in order to reduce the mosquito population.

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