

Community Assistance through Environmental Maintenance to Overcome Dengue Disease in Waterlog-prone Environments Season

Angelita Oktavia Permadi¹, Arik Aguk Wardoyo², Inge Williandani Setya Putri³,
Nadia Novianandra Balkis⁴, Bella Lia Puspitasari⁵

^{1,2,3,4,5} Universitas Jember, Indonesia

Correspondence e-mail; angelitaoktavia2017@gmail.com

Article history

Submitted: 2024/07/02; Revised: 2024/08/25; Accepted: 2024/10/27

Abstract

This service aims to increase public understanding and awareness of environmental conservation to overcome the spread of dengue hemorrhagic fever (DHF) in an environment that is prone to waterlogging in the rainy season. In addition, it is also aimed at increasing understanding of environmental factors that contribute to the increase in the population of *Aedes aegypti* mosquitoes, overcoming challenges in increasing public awareness of the environment and developing effective strategies to encourage the adoption of pro-environmental behaviors to prevent the spread of dengue fever. This service method uses PAR (Participatory Action Research) and descriptive methods through a qualitative approach. The results of the service show that the socialization of the implementation of socialization at Kosmik Kos Putra 39 in Jember makes this educational and interactive activity increase public understanding and concern about the importance of maintaining environmental cleanliness to prevent dengue. This activity is expected to provide benefits in the form of increasing understanding, awareness, and skills of the community in protecting the environment so that it does not become a breeding ground for mosquitoes, as well as contributing to efforts to protect and manage the environment sustainably.

Keywords

Aedes Aegypti Mosquitoes, Dengue Hemorrhagic Fever (DHF), Environmental Maintenance, Public Awareness.



© 2024 by the authors. This is an open-access publication under the terms and conditions of the Creative Commons Attribution 4.0 International (CC BY SA) license, <https://creativecommons.org/licenses/by-sa/4.0/>.

1. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an acute fever caused by four types of dengue virus. The disease is characterized by four main clinical symptoms: high fever, bleeding, enlarged liver, and signs of circulatory failure that can progress to dengue shock syndrome due to plasma leakage, which can be fatal (Boroumand et al., 2018). This virus enters the human body through the bite of Aedes mosquitoes, such as Aedes aegypti or Aedes albopictus. Dengue is found in tropical and subtropical regions around the world, especially during the humid rainy season (Motsumi et al., 2020). According to estimates by the World Health Organization (WHO), there are 50-100 million cases of dengue virus infection worldwide every year. Acute dengue, accompanied by bleeding and shock, can be fatal. The disease can affect adults as well as children under the age of 15 (Bezak et al., 2022). Dengue Hemorrhagic Fever (DHF) is an infectious disease that spreads easily and attacks quickly. Dengue fever symptoms vary, ranging from mild to high fever. People with dengue can also experience pain in the eyes, headaches, and pain in muscles and joints, and it is not uncommon for spontaneous bleeding to occur (Morrow et al., 2022). The dengue transmission process involves Aedes mosquitoes that infect humans during viremia. After the virus incubates for 8-10 days in the mosquito's body, the virus can be transmitted to other humans through bites. Symptoms of dengue include prolonged fever, decreased platelet count, and plasma leakage, with severity varying from mild to very serious (Mavani et al., 2020).

Therefore, Dengue Hemorrhagic Fever (DHF) remains a major challenge for health in Indonesia, with the number of cases continuing to increase. The disease mainly affects children under the age of 15 and adults and is caused by the Dengue virus transmitted through the bite of the Aedes aegypti and Aedes albopictus mosquitoes (Ranti, 2021). Every year, the World Health Organization (WHO) reports around 500,000 cases of dengue worldwide, with around 22,000 deaths, and Indonesia is one of the countries with the highest number of cases in Asia (Sethi et al., 2019). To combat dengue, the Indonesian Ministry of Health has implemented the 3M Plus Mosquito Nest Eradication (PSN) strategy, which includes draining water reservoirs, closing water reservoirs, and recycling used items that can be breeding grounds for mosquitoes (Stansfeld et al., 2021). In addition, additional measures such as the use of larvicides, planting mosquito repellent plants, and the use of mosquito repellent are also recommended.

To increase awareness and prevention of dengue, the community needs to participate in mosquito nest eradication activities and socialization about dengue prevention. This service aims to increase public knowledge about effective strategies for overcoming the spread of dengue so that it can significantly reduce the incidence of this

disease. Therefore, we decided to hold a socialization on the prevention of Dengue Hemorrhagic Fever to educate the public and increase knowledge in preventing this disease.

2. METHOD

This service uses the PAR (Participatory Action Research) method and the descriptive method through a qualitative approach. The PAR (Participatory Action Research) method is a service activity through research as a result of the service process, namely research that begins with the planning, implementation, and evaluation of an activity or action (Salviana et al., 2022). The community is the subject, and the author is the facilitator in carrying out the information delivery in the program. Focusing on real participation in the community action process to encourage community activism in decision-making and raising awareness. The qualitative descriptive research method studies an object, space, person, or other phenomenon in real conditions to create a factual and accurate systematic review. The aim is to understand and describe in depth the socialization of environmental maintenance to overcome dengue fever.

The service was carried out at Kosmik Kos Putra 39 No. 39, Jalan Kalimantan X, Summersari District, Jember Regency, East Java, which is an environment prone to waterlogging in the rainy season in 2024. The subject of service is the Cosmic Resident of Kos Putra 39. The data collection methods carried out include observation, socialization, and documentation. The observation was conducted on Friday, March 29, 2024, at 13.00–Finished. Socialization was carried out to convey information about the community's understanding, attitudes, and behaviors towards environmental conservation. Documentation is carried out to collect related documents such as photos, environmental conditions, and socialization activities. The data obtained will be analyzed qualitatively through information reduction, presentation, and conclusion. To ensure the accuracy of the data, triangulation of sources and methods is carried out by comparing data from various sources and data collection methods.

3. FINDINGS AND DISCUSSION

On Friday, March 29, 2024, students from the Mathematics Education Study Program at the University of Jember carried out socialization activities as part of the Environmental Education course assignment. This activity is in collaboration with the Chairman of Kosmik Putra and aims to increase the awareness and knowledge of boarding house residents about the prevention of dengue fever (DHF). This theme was chosen because there are concerns about the low understanding of boarding house

residents about dengue disease and the condition of the boarding house environment, which is prone to flooding. The environment that is often waterlogged is an ideal place for *Aedes aegypti* mosquitoes to breed, which can then spread dengue disease to the residents.

In the socialization, students explained various effective measures to prevent dengue, such as maintaining environmental cleanliness, draining bathtubs regularly, closing water reservoirs, and sprinkling larvicide powder in places that are difficult to drain. In addition, the students also provided a question and answer session to answer questions and concerns from boarding house residents and provided posters on dengue prevention. This activity not only provides new knowledge for boarding house residents but also builds awareness of the importance of maintaining the cleanliness of the surrounding environment to prevent the spread of disease.



Figure 1. Socialization activities for residents of Kosmik Putra Boarding House



Figure 2. Dengue Prevention Poster

The main findings of the community service activities showed that public understanding and awareness of the importance of environmental maintenance in preventing dengue fever increased significantly after socialization. Previously, many residents needed to realize the importance of regularly draining water reservoirs and keeping the environment free of items that could become mosquito breeding grounds

(Dewi & Ruidahasi, 2020). Through the education delivered in the socialization, the community gained knowledge about effective ways to protect the environment from becoming a mosquito nest, such as draining and closing water reservoirs and using larvicide in hard-to-reach areas.

In addition, this activity has overcome several challenges, such as the low level of environmental awareness among the community, especially in the boarding house. The University of Jember students collaborated with the Chairman of Kosmik Kosmik Putra to ensure that this education is on target and can be applied in the daily routine of boarding house residents. Educational posters about dengue prevention also provide simple visualizations that help people understand the preventive steps they can take independently.

The active participation of boarding house residents in the question and answer session also shows an increase in their interest and involvement in maintaining the cleanliness of the environment. This shows that there is a change in positive attitudes and behaviors that are expected to continue so that boarding house residents are more concerned about the risk of dengue and are committed to maintaining a clean and safe environment from mosquitoes (Saha, 2023). These results show that community-based assistance and empowerment significantly impact dengue prevention efforts, especially in areas prone to waterlogging during the rainy season.

The analysis of these community service results shows that socialization activities have succeeded in increasing public understanding and awareness of efforts to prevent dengue. This activity involved students of the Mathematics Education Study Program at the University of Jember, who collaborated with the Chairman of Kosmik Putra to educate boarding house residents on the importance of maintaining a clean environment (Misbah et al., 2015). Through a participatory and qualitative descriptive approach, this program is able to touch on critical aspects in increasing public awareness of the risk of dengue and its preventive measures (Halimah & Machdum, 2023).

The main discussion in this service underlined the importance of regular socialization as an effective way to convey information to the community in waterlog-prone areas. This program provides basic knowledge about dengue disease and introduces practical preventive measures such as draining water reservoirs, closing bathtubs, and sprinkling larvicide (Hikmah Harun & Firdaus Mohamad, 2022). The active participation of boarding house residents in discussions and question-and-answer sessions shows that the community has a high level of concern for this issue but needs additional encouragement to adopt more proactive habits (Chen, 2018). This

awareness is expected to create long-term behavioral change, where environmental cleanliness is a priority to maintain common health.

On the other hand, this service has succeeded in overcoming the challenges often faced in health socialization, namely low environmental awareness due to a need for more understanding of the direct impact of dengue. Community-based approaches, such as in-person socialization at boarding houses, show that education can be more effective when delivered personally and in the context of participants' daily lives (Javadi Nejad et al., 2019). The students who guide this activity also complete the education with posters that can help the community understand preventive measures more easily and paste this information around the boarding house, making it a useful reminder for all residents (Stephenson, 2023).

The results of this service show that knowledge increased through socialization has a positive impact on the level of public awareness. The change in public attitudes that are more concerned and cautious about the potential dangers of dengue shows that service efforts have succeeded in achieving their goals (Pratomo et al., 2023). Continuous mentoring is expected to maximize this impact and provide a long-term impact, where people are increasingly accustomed to maintaining a clean environment and understand the direct relationship between environmental cleanliness and their health (Hasanah, 2021).

In terms of implementation, the PAR approach is an effective model in ensuring that all community members actively participate. This approach allows the community to receive information and, actively identify challenges, and formulate solutions that suit local needs (Key et al., 2019). The success of this program proves that with the right understanding and adequate supporting facilities, the community can take concrete steps to reduce the risk of dengue, even in areas prone to waterlogging (Albrecht et al., 2017).

This service program shows that collaboration between parties in providing environmental education can optimize results, where the community understands and is motivated to maintain environmental cleanliness. This is an important step in fighting dengue in a preventive and sustainable manner, as well as encouraging the creation of a healthier and safer environment for all community members (Lis & Szyszka, 2020). With this activity, boarding house residents will likely be more concerned and proactive in maintaining the health of their environment so that the risk of contracting dengue can be minimized (Solihin et al., 2020).

When juxtaposed with previous service research, the analysis of the results of this service shows similarities in the results of increasing public awareness about the

importance of maintaining environmental cleanliness to prevent dengue. Previous community service research by (Daverey & Dutta 2021), for example, showed that increased public knowledge about environmental hygiene practices significantly reduced the population of *Aedes aegypti* mosquitoes in waterlogging-prone areas. Similar to the service carried out by the University of Jember students at Kosmik Kosmik Putra, this program emphasizes direct education and interactive socialization to encourage changes in community behavior. This comparison underscores that the community-based socialization model with a participatory approach effectively increases citizen involvement in environmental health efforts (Vaughn & Jacquez, 2020).

Furthermore, in theoretical analysis, this study uses the PAR approach, which emphasizes the active participation of all community members in the educational and problem-solving process. As explained by (Brydon-Miller et al., 2020), the PAR theory emphasizes that active participation allows people to feel more responsible for the issues they face. This theory has proven to be useful in this service because the community not only receives information but also becomes a direct actor in efforts to prevent dengue in their environment (Choi et al., 2016). They not only gained new knowledge but also had the opportunity to identify practical measures relevant to their condition, such as applying the 3M Plus method (draining, closing, and recycling) to control mosquito growth (Sari et al., 2020).

The PAR approach also emphasizes that local solutions are more effective and sustainable because they are prepared based on mutual understanding between service providers and local communities. In this service, the PAR theory helps students overcome psychological barriers, such as a low sense of concern for the environment that often appears in boarding houses (Arachchige & Sathsara, 2020). Active participation, coupled with visual materials in the form of posters, can help the community recognize the importance of maintaining the environment independently, which ultimately increases the sense of personal and collective responsibility for the issue of dengue.

The theory of environmental disease prevention also provides an important analytical framework for understanding the impact of this service. Based on the Health Belief Model (HBM) theory, an individual's awareness of disease risk will encourage them to behave preventively (Shkolnikov et al., 2019). This service shows that people who understand dengue's dangers through socialization and visual media are starting to show a stronger preventive attitude. This is in line with previous studies using

HBM, which showed that increased risk perception can trigger an increase in disease prevention behavior (Arpaci, 2019).

Thus, the results of this analysis show that community-based service that combines PAR and HBM theories can create a significant positive impact on increasing public awareness and behavior in the prevention of dengue. It also emphasizes that the theories and approaches used in this community service research are relevant and effective in creating applicable solutions for communities in vulnerable environments.

4. CONCLUSION

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the dengue virus and transmitted through the bite of Aedes mosquitoes, such as Aedes aegypti and Aedes albopictus. The disease is common in tropical and subtropical regions, especially during the humid rainy season. Dengue fever is characterized by clinical symptoms such as high fever, bleeding, enlarged liver, and signs of circulatory failure that can be fatal. The dengue virus can attack both children and adults. The transmission rate of dengue is very high, especially in environments with a lot of standing water, where Aedes mosquitoes breed. To reduce the spread of dengue, active community participation is needed in maintaining environmental cleanliness, such as draining water reservoirs, closing water tanks, and recycling used items that can be breeding grounds for mosquitoes.

The Government of Indonesia has implemented various strategies through the Ministry of Health, including the 3M Plus Mosquito Nest Eradication (PSN) campaign and dengue prevention socialization. Public awareness and participation in this activity are very important to prevent the spread of this disease. The implementation of socialization at Kosmik Kos Putra 39 in Jember shows that educational and interactive activities can increase public understanding and concern for maintaining environmental cleanliness to prevent dengue. Thus, collective efforts in maintaining environmental cleanliness and following pre-established prevention procedures can help significantly reduce the incidence of dengue.

ACKNOWLEDGMENTS

The author would like to thank the University of Jember, Indonesia, for providing the space for the author of the article, the lecturers of the Environmental Education course, and friends of the University of Jember Mathematics Education student group who carry out community service activities and have collaborated to contribute to the writing of this article; Nadifa Ika Priyanti, Siti Holifah Hidayat, Lili Nur Afidah, Kurniatul Laily Romadhoni, Dzawawi Dimas Adani, Nindya Sheilaisyah

Adymanta, and other resource persons during the review process of this article, and to the publisher of this journal who has provided facilities in reviewing and will publish this article.

REFERENCES

- Adrianto, H., & Yuwono, N. (2018). *Introduction to Tropical Disease Blocks: From Ancient Times to the Recent 21st Century*. Pustaka Abadi.
- Amalia, L. N., Alnur, R. D., & Farradika, Y. (2023). Factors Related to the Behavior of Mosquito Nest Eradication (PSN) 3M Plus in the Community of Kalideres District, West Jakarta City in 2022. *PubHealth Journal of Public Health*, 2(2), 61-66.
- Ayuni, T. N. Overview of air temperature, air humidity, rainfall, and wind speed in dengue cases in Bali Province in 2019-2020 (Bachelor's thesis, UIN Syarif Hidayatullah Jakarta-FIKES).
- Kotaki, T., Yamanaka, A., Mulyatno, K. C., Churrotin, S., Labiqah, A., Sucipto, T. H., ... & Konishi, E. (2014). Continuous dengue type 1 virus genotype shifts followed by co-circulation, clade shifts and subsequent disappearance in Surabaya, Indonesia, 2008–2013. *Infection, genetics and Evolution*, 28, 48-54.
- LESTARI, A. D. (2023). Overview of the Implementation of Community Mosquito Nest Eradication (PSN) in Sukarame Village, Sukarame District, Bandar Lampung City in 2023 (Doctoral dissertation, Poltekkes Kemenkes Tanjungkarang).
- Liziawati, M., Zakiah, Z., Zakiati, U., Rachmawati, F., Miranti, M., Pohan, T., ... & Defriyana, D. (2023). Community Empowerment in Dengue Hemorrhagic Fever Control through the Establishment of Batik Villages in Pancoran Mas and Beji Villages, Depok City. *Journal Of Human And Education (JAHE)*, 3(1), 7-14.
- Putro, W. G., Ratnaningtyas, T. O., & KM, S. (2023). Application of the Dengue Reduction Expert System in the Perspective of Economic Loss as an Effort to Achieve Universal Coverage in the SDGs Era. *Media Pustaka Indo*.
- Sari, C. E. D. (2023). Relationship Between Laboratory Parameters And Length Of Hospitalization In Dengue Hemorrhagic Fever Patients Analytical Observational Study on Inpatients at Bayung Lencir Hospital, Musi Banyuasin Regency (Doctoral dissertation, Sultan Agung Islamic University, Semarang).
- SITORUS, E. W. (2023). Overview of Adolescent Knowledge on Preventing the Transmission of Dengue Hemorrhagic Fever (DBD) at the Medan Johor Health Center in Medan.
- Sukadana, I. W. (2018). Overview of the Density Level of Aedes Sp. Larvae In Singapadu Village, Sukawati District, Gianyar Regency In 2018 (Doctoral dissertation, Department of Environmental Health).
- Suryani, S., Bahri, A. S., & Putra, F. A. (2016). The Relationship between Knowledge and Behavior in the Prevention of Dengue Hemorrhagic Fever Outbreak in the Working Area of UPT Colomadu I Karanganyar Health Center (Doctoral

- dissertation, Sahid University of Surakarta).
- Syafruddin, S., Nurfadilah, N., Wahdania, Y., Jangga, J., Sulaiman, S., Zulkifli, Z., ... & Jariah, A. (2023). Counseling To The Community About The Prevention Of Dengue Hemorrhagic Fever (Dhd) Through Psn 3m Plus In Bontoala Village, Pallangga District, Gowa Regency. *J-ABDI: Journal of Community Service*, 2(9), 6171-6180.
- Hambali, I., Maksum, G. A., Prayoga, A., & Darmansyah, J. (2023). Optimization Of Environmental Cleanliness In Increasing Public Health Awareness In Babakan Village, Cisondari Village. *Setia Mengabdikan: Journal of Community Service*, 4(1), 1-7.
- Inayah, S. N., & Albar, M. K. (2021). English speech training using the CLT method for junior high school/MTS students in Ciakar Village. *Connection: Journal of Community Service*, 1(2), 58-68.
- Isfaizah, M. P. (2018). IbM Socialization Of Prevention And Eradication Of Dengue Hemorrhagic Fever (Dhd) In Candirejo Village, Ungaran Baratkab District. Semarang. *Journal of Service " Dharma Bakti "*, 100-107.
- Joko Malis Sunarno, D. A. (2021). An Overview Of Community Knowledge, Attitudes, And Behaviors About Efforts To Prevent Dengue Disease In Kenteng Village, Banjarnegara. *Medsains*, 1-7.
- Nisha Desfi Arianti, A. I. (2024). Socialization Of Dengue Prevention And Eradication Of Mosquito Nests In Pongkar Village, Karimun. *Journal of Community Service*, 47-52.
- Setiyo Adi Nugroho, A. R. (2021). PKM Socialization of Biocontrol of *Aedes Aegypti* Mosquito Larvae with Betta Fish (*Betta splendens*) in an Effort to Prevent Dengue Hemorrhagic Fever (DHF) in the Women's Dormitory of the Faculty of Health, Nurul Jadid Islamic Boarding School. *Journal of Community Engagement*, 710-719.