

Community Assistance in Efforts to Prevent Mosquito Development by Maintaining Cleanliness and Biopore Creation

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Abstract

Public health problems, especially those related to mosquito-borne diseases such as dengue fever and malaria, are often caused by poor environmental conditions. Due to irregular waste disposal, stagnant water becomes a breeding ground for mosquitoes, so the solution is the bio-pore method. This community service aims to eradicate the problem of mosquito breeding by increasing collective awareness and community involvement through the socialization of biopore creation. The community service method uses the Participatory Action Research (PAR) approach. The community service activity was carried out at the student dormitory on Jalan Jawa VI No. 35A, Summersari Village, Jember, which students attended. The results of the community service activity showed an increase in participants' understanding and awareness of the importance of biopores in preventing mosquito breeding. Evaluation through questionnaires before and after the socialization showed a significant increase in participants' knowledge and awareness regarding the function and benefits of biopores. The active participation of the community in maintaining environmental cleanliness can create a healthier environment and reduce the risk of diseases transmitted by mosquitoes.

Keywords

Biopores; Environment; Mosquito Breeding; Public Health; Public Awareness



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INTRODUCTION

One of the problems that often arise in daily life is related to public health. This problem is very close to the community because everyone must have experienced poor health conditions, such as illness (Komalawati, 2020). The public's low awareness of maintaining health causes various problems, especially in the increasing health sector. In addition, the lack of awareness to maintain environmental conditions exacerbates this situation (Haslinah et al., 2023; Rahayu et al., 2024). As a result, many health problems arise due to behaviors and environmental conditions that are not conducive

to health. Poor lifestyle and environmental conditions also affect the decline in public health.

One problem that often arises due to an unhealthy environment is the large amount of waterlogging around the community, which increases the risk of diseases such as dengue fever and malaria (Key et al., 2019). Poor environmental conditions, such as waterlogging around settlements caused by irregular waste disposal, are the main factors for the emergence of mosquitoes. In addition to environmental factors, weather also plays a role in accelerating mosquito breeding (Novita, 2019; Septiani et al., 2022). Therefore, the method of making biopores becomes relevant and is an effective solution in this context.

Biopores are small holes in the soil that serve as waterways and places for rainwater to enter the soil. The use of this method has been proven to be effective in reducing waterlogging as a perfect breeding ground for mosquitoes. Biopore creation will also help create a cleaner and healthier environment (Kose, 2020). As a result, we can reduce the spread of mosquito-borne diseases. Community involvement cannot be ignored; with active socialization and campaigns, awareness of the need to keep the environment clean and use preventive factors such as biopores will increase (Amri et al., 2024; Dewi et al., 2020).

This service aims to alleviate the mosquito problem most effectively while promoting collective awareness and community involvement that starts from a small scope to a healthy environment. Hopefully, this article will be able to analyze efforts to prevent mosquito development: maintaining cleanliness and making biopores on Jalan Jawa VI No. 35a so that there is expected to be collective awareness and community involvement.

METHOD

The service method uses the Participatory Action Research (PAR) approach. The service activity was carried out in the student dormitory, attended by students at the University of Jember, Indonesia (Salviana et al., 2022). This bio pore hole activity was carried out on Jalan Jawa VI Number 35A, Summersari Village, Summersari District, Jember Regency. The time for the implementation of this service activity will take place in March-April 2024. Biopore activities are one of the important environmental education efforts in the Jember community. The main goal is to increase public awareness and understanding of the importance of soil and water conservation and maintain environmental sustainability. By conducting biopores, people can learn about simple but effective ways to reduce waterlogging, prevent soil erosion, and improve soil quality. In addition, this activity can also educate the public about the

importance of organic waste management because biopores can be a natural decomposition place for organic waste. Thus, through participation in biopore activities, the people of Jember can directly benefit from a cleaner, healthier, and more sustainable environment and develop a sustainable attitude toward environmental care.

In delivering material on the creation of bio pore holes through the lecture method, an effective approach is to adopt systematic and comprehensive steps. The lecture should begin by thoroughly introducing the concept of biopores and explaining the importance of this practice in maintaining environmental sustainability. In addition, the practical steps in making bio pore holes must be outlined in detail, from site preparation to techniques for using the tools and materials needed. The use of concrete examples and visual illustrations can clarify the concept and make it easier for the audience to understand. In addition, being interactive by inviting audience participation to discuss or even conduct a live demonstration will make the material more interesting and easy to understand. At the end of the talk, it is important to reinforce the importance of caring for bio pore holes and encourage the audience to apply this practice in their daily lives. Then, the participants were given posters and shown various photos and videos. This is to facilitate participants' understanding of making bio pore holes.

FINDINGS AND DISCUSSION

In March 2024, socialization and education activities on the prevention of mosquito breeding by making biopores were carried out on Jalan Jawa VI Number 35A, Summersari Village, Summersari District, Jember Regency. The location of the socialization is a boarding house located in a potential environment as a breeding ground for mosquitoes. In the rainy season, the water flow is often not smooth, so puddles arise. Therefore, socialization activities were carried out for boarding house residents in the form of efforts to prevent mosquito breeding by making biopores. The socialization activity for the prevention of mosquito breeding was opened with remarks from the boarding house owner. The material on biopores was delivered by a speaker from the Environmental Introduction group of the University of Jember. The speaker said that biopores can be used as an alternative solution to reduce waterlogging. The presenter gave an interesting pamphlet in his delivery, so the audience was interested in reading it.



Figure 1. Biopore Infiltration Hole Brochure Figure 2. Mosquito Metamorphosis

At Figure 1. The speaker conveyed several important points related to bio pores, including the definition of bio pores, benefits, tools and materials used in making bio pores, and the maintenance of bio pore infiltration holes. Biopore infiltration holes are holes in the soil that are formed due to the activities of various organisms in them, such as plant roots, worms, termites, and others. The hole will later be filled with air and become a runoff flow pipe in the ground. Biopore holes can be made where puddles often appear in open spaces, yards, small sewers, and so on (Nurlila & La Fua, 2020; Rita Noveriza & Melati, 2022). The creation of bio pore infiltration holes aims to increase water infiltration into the soil in the hope that the bio pore holes that have been made will reduce the possibility of waterlogging, which is one of the breeding grounds for mosquitoes (Roos, 2021; Suryani, 2020). Figure 2 contains the life cycle of mosquitoes and activities that can prevent mosquito breeding.



Figure 3. Asistancing Activities for the Prevention of Mosquito Breeding by Biopore Production.



Figure 4. Biopore Manufacturing Location



Figure 5. Photo with Socialization Participants and the Presentation Team from the University of Jember

The boarding house residents, most of whom were students who participated in the socialization, were very enthusiastic and created a warm discussion session. They asked the presentation team several questions, one of which was about the placement of bio pores and whether they were also applied in sewers or sewers. The speaker explained that this can be applied but must be diligent in controlling the biopore hole at least once every three months. The steering audience was invited to show the biopore manufacturing site in the front yard of the boarding house (**Figure 4.**). The location chosen is a yard that is still in the form of soil to make the drilling process using a drilling tool easier. Boarding house residents feel that creating biopores will be very beneficial if applied in their environment.

The next activity was the measurement of their level of understanding and awareness about the topic of "prevention of mosquito breeding by making biopores," which was conveyed through the distribution of questionnaires to all socialization participants, namely residents of boarding houses on Jalan Jawa VI Number 35A. Based on the questionnaire given, it is known that there is an increase in understanding and awareness related to the creation of biopores to prevent mosquito breeding. The

explanation of knowledge and awareness about bio pores as prevention of mosquito breeding in more detail is as follows:

Biopores as a prevention of mosquito breeding

Knowledge about biopores and efforts to prevent mosquito breeding can be known through 10 questions consisting of 5 questions before and five questions after. The questionnaire results showed an increase in the knowledge of boarding house residents about biopores and efforts to prevent mosquito breeding. The analysis of the results of the participant questionnaire on knowledge before and after socialization is shown in Figure 6.

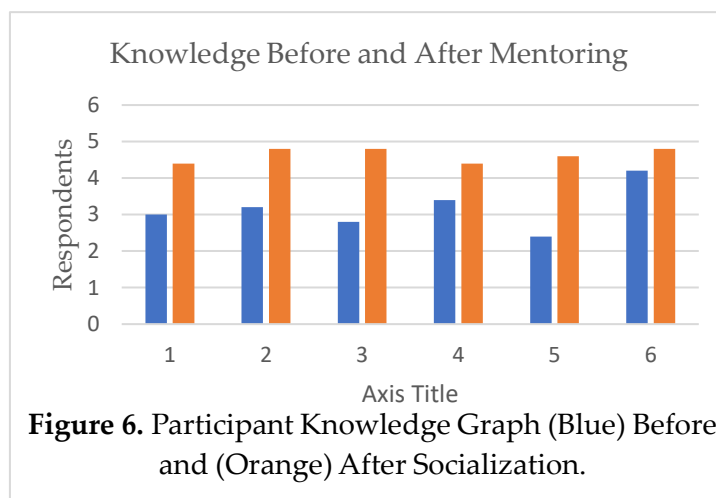


Figure 6. Participant Knowledge Graph (Blue) Before and (Orange) After Socialization.

In questions no. 11 (Blue) and no. 12 (Orange) regarding knowledge about the function of biopores to reduce mosquito breeding, it can be seen that the knowledge of boarding house residents who previously knew little about biopores has shown positive changes. The analysis of the results of the participant questionnaire on the knowledge of bio pore function before and after socialization is shown in Figure 7.

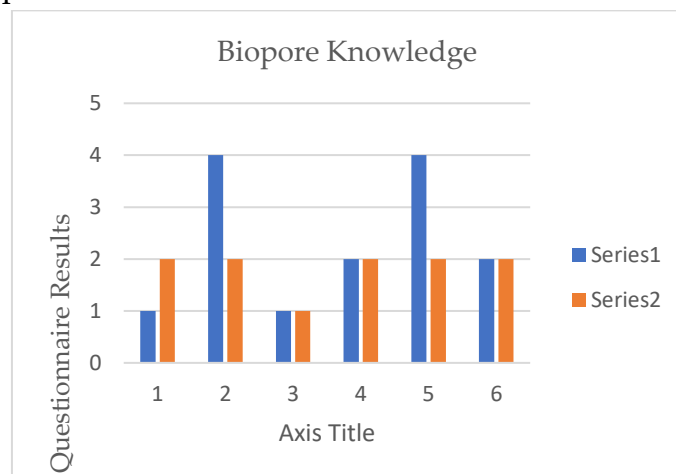


Figure 7. Graph of Participants' Knowledge about Biopores (Blue) Before and (Orange) After Socialization.

Participant awareness for bio pore creation

Participants' awareness of biopores and efforts to prevent mosquito breeding can be known through 2 questions consisting of 1 question before and 1 question after. The questionnaire results showed an increase in the knowledge of boarding house residents regarding the awareness of participants for the creation of biopores and efforts to prevent mosquito breeding (Ainis Rohtih et al., 2023). The analysis of the results of the participant questionnaire on knowledge before and after the socialization is shown in Figure 8.

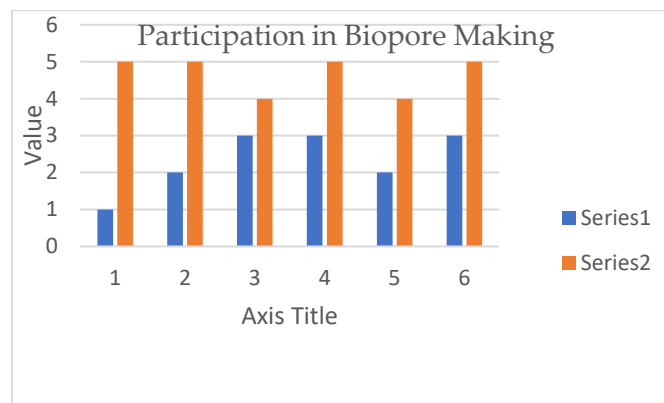


Figure 8. Participant Participation Graph (Blue) Before and (Orange) After Socialization.

These service results can be analyzed by referring to relevant previous service results and relating them to public health theories, community participation, and environmental approaches. This mentoring program, which focuses on preventing mosquito development through environmental cleanliness and biopore creation, has significantly raised public awareness (Yogia et al., 2023). This can be analyzed more deeply by linking the theory of public health behavior and active participation in protecting the environment.

Community Participation and Environmental Awareness

According to the theory of community participation put forward by (Darmawan et al., 2020) through the "Ladder of Citizen Participation," this assistance can be categorized at the level of "partnership," where the community is actively involved in the process of social change. With the PAR (Participatory Action Research) method, community involvement in making biopores is essential. In a previous study (Singgalen et al., 2019), where direct community participation in environment-based activities was proven to increase a sense of belonging and responsibility for environmental cleanliness, the results of this program showed a similar pattern.

Biopore Approach as an Environmental Solution

The biopore method implemented in this program is in line with the theory of environmental impact mitigation through an appropriate technological approach. As

explained by (O'Connor et al., 2023), biopores are one of the effective ways to minimize waterlogging, which is often a source of mosquito breeding. By reducing waterlogging, the breeding potential of mosquitoes, especially the *Aedes aegypti* type that causes dengue fever, can be significantly suppressed. This is in line with (Buil et al., 2019) research, which shows a direct relationship between flooded aquatic environments and an increase in cases of mosquito-borne diseases.

Public Health Preventive Behavior Theory

From the point of view of health behavior theory, the Health Belief Model (HBM) can be used to analyze the increase in participants' awareness of this service. HBM states that awareness of the susceptibility and severity of a disease, combined with the benefits of preventive measures, will motivate individuals to take preventive measures (Shkolnikov et al., 2019). In this case, socialization about the benefits of biopores in reducing the risk of spreading mosquito-based diseases has increased the perception of the benefits of preventive measures, thus encouraging the community to be actively involved (Ranti, 2021).

Evaluation of the Impact and Effectiveness of Service

The results of this service are also in line with the evaluation results, which show an increase in participants' understanding of the benefits of biopores, measured through surveys before and after the activity. In evaluating environment-based social programs, this method is often used to assess the effectiveness of campaigns (Hasanah, 2021). This evaluation proves that a direct approach to the community by providing practical education results in significant behavior changes in a short period of time, as also found by (Prabowo et al., 2021) in the context of the school environment.

Based on the results of this evaluation and analysis, it is recommended that this bio pore program is not only applied in a limited environment, such as at the service site on Jalan Jawa VI No. 35A, but also expanded to other densely populated areas that are vulnerable to diseases caused by mosquitoes. According to the Health Promotion approach (Agdal et al., 2019), the success of a public health program depends on the dissemination of information and its continuous implementation in a wider scope. Thus, the results of this service reinforce the importance of integrating community-based preventive efforts and appropriate technological methods, such as biopores, in creating a healthier environment and minimizing the risk of environment-based infectious diseases.

CONCLUSION

Public health problems, especially those caused by low awareness of maintaining environmental cleanliness, have increased various diseases, including those

transmitted by mosquitoes, such as dengue fever and malaria. Environmental factors, such as waterlogging due to irregular waste disposal, exacerbate this situation. One effective solution to overcome this problem is to create biopores. Biopores are small holes in the soil that function as waterways and places for rainwater to enter the soil. This method has proven effective in reducing waterlogging, which is a breeding ground for mosquitoes. In addition, biopores also help in soil and water conservation and improve soil quality. The socialization activity for making biopores, which was carried out on Jalan Jawa VI No. 35A, Sumbersari Village, Jember Regency, aims to increase public awareness about the importance of protecting the environment. This socialization involves delivering material interactively, using pamphlets, posters, photos, and videos to facilitate participants' understanding.

The activity results showed an increase in the understanding and awareness of boarding house residents about the importance of bio pores to prevent mosquito breeding, and the increase in knowledge and participant participation after socialization evidenced this. Knowledge about the function of biopores and efforts to prevent mosquito-borne diseases increased significantly based on the analysis of questionnaires before and after socialization. Public awareness of maintaining environmental cleanliness and applying the bio-pore method as a disease prevention measure must continue to be encouraged through socialization and active campaigns. Thus, a cleaner, healthier, and more sustainable environment will be created, reducing the risk of spreading diseases transmitted by mosquitoes.

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REFERENCES

- Agdal, R., Midtgård, I. H., & Meidell, V. (2019). Can asset-based community development with children and youth enhance the level of participation in health promotion projects? A qualitative meta-synthesis. *International Journal of Environmental Research and Public Health*, 16(19), 3778.
- Ainis Rohtih, W., Saifuddin Hamzah, S., & Sakdiyah, L. (2023). Enhancing Womenpreneurs' Digital Marketing Skills in Purutrejo Village, Purworejo District, Pasuruan. *Engagement: Jurnal Pengabdian Kepada Masyarakat*, 7(2), 534–550. <https://doi.org/10.29062/engagement.v7i2.1547>

- Amri, M., Asfahani, A., Kadeni, K., Arif, M., & Jamin, F. S. (2024). Community Empowerment In The Fields Of Education Entrepreneurship And The Environment In The Village. *Community Development Journal: Jurnal Pengabdian Masyarakat*, 5(2), 3704–3712.
- Buil, I., Martínez, E., & Matute, J. (2019). Transformational leadership and employee performance: The role of identification, engagement and proactive personality. *International Journal of Hospitality Management*, 77(October 2017), 64–75. <https://doi.org/10.1016/j.ijhm.2018.06.014>
- Darmawan, D., Alamsyah, T. ., & Rosmilawati, I. (2020). Participatory Learning and Action untuk Menumbuhkan Quality of Life pada Kelompok Keluarga Harapan di Kota Serang. *Journal of Nonformal Education and Community Empowerment*, 4(2), 160–169. <https://doi.org/10.15294/pls.v4i2.41400>
- Dewi, I. nurani, Royani, I., Sumarjan, S., & Jannah, H. (2020). Pemberdayaan Masyarakat Melalui Pengelolaan Sampah Skala Rumah Tangga Menggunakan Metode Komposting. *Sasambo: Jurnal Abdimas (Journal of Community Service)*, 2(1), 12–18. <https://doi.org/10.36312/sasambo.v2i1.172>
- Hasanah, Y. (2021). Eco enzyme and its benefits for organic rice production and disinfectant. *Journal of Saintech Transfer*, 3(2), 119–128. <https://doi.org/10.32734/jst.v3i2.4519>
- Haslinah, A., Tahir, U., Al Imran, H., Asfahani, A., & Larisu, Z. (2023). Pemberdayaan Masyarakat Dalam Program Lingkungan Hijau Bebas Polusi Di Kota Makassar. *Community Development Journal: Jurnal Pengabdian Masyarakat*, 4(4), 8906–8912.
- Key, K. D., Furr-Holden, D., Lewis, E. Y., Cunningham, R., Zimmerman, M. A., Johnson-Lawrence, V., & Selig, S. (2019). The continuum of community engagement in research: a roadmap for understanding and assessing progress. *Progress in Community Health Partnerships: Research, Education, and Action*, 13(4), 427–434.
- Komalawati, V. (2020). Responsibilities of Pharmacists in Drug Service With Prescription. *Tanggung Jawab Apoteker Dalam Pelayanan Obat Dengan Resep Dokter*, 237–238.
- Kose, R. (2020). Just Keep Going - Polyphony. Gentle Activism for Collective Survival. *The Journal of Public Space*, Vol. 5 n. 4. <https://doi.org/10.32891/jps.v5i4.1422>
- Novita, R. (2019). Kajian literatur: Dampak perubahan iklim terhadap timbulnya penyakit tular nyamuk terutama Limfatik Filariasis. *Journal of Health Epidemiology and Communicable Diseases*, 5(1), 30–39.
- Nurlila, R. U., & La Fua, J. (2020). Jahe Peningkat Sistem Imun Tubuh di Era Pandemi Covid- 19 di Kelurahan Kadia Kota Kendari. *Jurnal Mandala Pengabdian Masyarakat*, 1(2), 54–61. <https://doi.org/10.35311/jmpm.v1i2.12>

- O'Connor, J., Ludgate, S., Le, Q.-V., Le, H. T., & Huynh, P. D. P. (2023). Lessons from the pandemic: Teacher educators' use of digital technologies and pedagogies in Vietnam before, during and after the Covid-19 lockdown. *International Journal of Educational Development*, 103(January), 1–10. <https://doi.org/10.1016/j.ijedudev.2023.102942>
- Prabowo, P. A., Supriyono, B., Noor, I., & Muluk, M. K. (2021). Special autonomy policy evaluation to improve community welfare in Papua province Indonesia. *International Journal of Excellence in Government*, 2(1), 24–40. <https://doi.org/10.1108/ijeg-06-2019-0011>
- Rahayu, I., Suwarna, A. I., Wahyudi, E., Asfahani, A., & Jamin, F. S. (2024). Pendidikan Lingkungan Hidup dengan Membentuk Kesadaran Lingkungan dan Tanggung Jawab Sosial di Kalangan Pelajar. *Global Education Journal*, 2(2), 101–110.
- Ranti, Y. paula. (2021). Biofarmasetikal Tropis Biofarmasetikal Tropis. *The Tropical Journal of Biopharmaceutical*, 2(2), 158–169.
- Rita Noveriza, R. N., & Melati, M. (2022). Potensi Pemanfaatan Ekoenzim Air Cucian Beras (Acb) Sebagai Biopestisida Dan Biofertilizer. *Prosiding Seminar Nasional MIPA UNIPA, 2022*, 44–54. <https://doi.org/10.30862/psnmu.v7i1.7>
- Roos, D. O. (2021). David. O. Roos, Sampah dan Masalah Sosial Kemasyarakatan Di Ahuru Air Besar Kota Ambon. *HIPOTESA-Jurnal Ilmu-Ilmu Sosial*, 15(1), 57–69.
- Salviana, V., Fuadiputra, I. R., Bustami, M. R., & Jha, G. K. (2022). Participatory Action Research (PAR) Model for Developing A Tourism Village in Indonesia. *Journal of Local Government Issues (LOGOS)*, 5(2), 193–207.
- Septiani, R., Sundari, S., & Indrawan, B. (2022). Program Pemberantasan Nyamuk Penyebar Dbd Dengan Metode Community Based Research (Cbr) Di Desa Rejomulyo Lampung Selatan. *Al-Khidmat*, 5(2), 103–109.
- Shkolnikov, V. M., Andreev, E. M., Tursun-zade, R., & Leon, D. A. (2019). Patterns in the relationship between life expectancy and gross domestic product in Russia in 2005–15: a cross-sectional analysis. *The Lancet Public Health*, 4(4), e181–e188. [https://doi.org/10.1016/S2468-2667\(19\)30036-2](https://doi.org/10.1016/S2468-2667(19)30036-2)
- Singgalen, Y. A., Sasongko, G., & Wiloso, P. G. (2019). Community participation in regional tourism development: a case study in North Halmahera Regency-Indonesia. *Insights into Regional Development*, 1(4), 318–333.
- Suryani, A. S. (2020). Pembangunan Air Bersih dan Sanitasi saat Pandemi Covid-19. *Aspirasi: Jurnal Masalah-Masalah Sosial*, 11(2), 199–214.
- Yogia, H., Uly, P., Marten, L., & Ratu, D. (2023). *Make Learning Fun for Elementary School Grade 1 Students with Kahoot Games*. 2(1), 102–109.