Frontiers in Community Service and Empowerment **e-ISSN: 2827-8747 p-ISSN: 2829-3029**
Multidisciplinary: Rapid Review: Open Access Journal **Vol. 5 No. 3, pp. 145-153, September 2026**
COMMUNITY SERVICE ARTICLE **OPEN ACCESS**
Manuscript received June 15, 2025; revised June 15, 2025; accepted Oct 01, 2026; date of publication September 30, 2026.
Digital Object Identifier (DOI): https://doi.org/10.35882/ficse.v5i3.167
Copyright © 2026 by the authors. This work is an open-access article and licensed under a Creative Commons Attribution-ShareAlike 4.0 International License (CC BY-SA 4.0)
How to cite Budi Yulianto, Nurlailis Saadah, Lilis Prihastini, Denok Indarwati, Uswatun Khasanah, "Community Empowerment through Strengthening Sanitation Working Groups and Health Cadres to Support Zero Dengue Fever in Puntukdoro Village", Frontiers in Community Service and Empowerment, vol. 5, no. 3, pp. 145-153, September 2026.

Community Empowerment through Strengthening Sanitation Working Groups and Health Cadres to Support Zero Dengue Fever in Puntukdoro Village

Budi Yulianto[1], Nurlailis Saadah[2], Lilis Prihastini[1], Denok Indraswati[1], Uswatun Khasanah[2]

[1]Department of Evironmental Health, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia
[2]Department of Midwifery, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

Corresponding author: Nurlailis Saadah (e-mail: nurlailis.saadah66@gmail.com)

ABSTRACT Dengue Hemorrhagic Fever (DHF) remains a significant public health challenge in Indonesia, particularly in areas where community participation in mosquito vector control is insufficient and the implementation of preventive measures is inconsistent. In Puntukdoro Village, Magetan Regency, the occurrence of dengue cases highlights the need to strengthen community capacity and promote sustainable, community-based prevention strategies. This community service activity aimed to enhance the knowledge and practical skills of the Sanitation Working Group and health cadres in preventing DHF through health education, training in the production of homemade mosquito repellent, and assistance in implementing the 3M Plus Mosquito Nest Eradication (MNE) program. The activity employed a community empowerment approach involving 35 participants selected through purposive sampling. The intervention consisted of interactive health education, demonstrations and hands-on training in producing mosquito repellent using readily available natural ingredients, and practical assistance in implementing the 3M Plus program in household environments. The effectiveness of the intervention was evaluated using pretest and posttest questionnaires, complemented by skills observations and environmental monitoring. The results demonstrated a substantial improvement in participants' knowledge, with the mean score increasing from 62.4 ± 8.7 before the intervention to 87.9 ± 6.3 afterward, representing an increase of 25.5 points (40.9%). Furthermore, the proportion of participants achieving good and very good knowledge levels increased from 28.6% to 88.6%, while the proportion with insufficient knowledge decreased from 22.9% to 0%. All participants successfully demonstrated the ability to prepare homemade mosquito repellent and apply the 3M Plus prevention practices. In conclusion, the integrated community empowerment approach effectively strengthened the knowledge and practical capacities of sanitation working groups and health cadres in DHF prevention. This model offers a promising approach for promoting sustained community participation and may be replicated in other areas to support community-based dengue prevention initiatives.

INDEX TERMS Dengue Hemorrhagic Fever, Community Empowerment, Health Cadres, Mosquito Nest Eradication, 3M Plus

I. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) remains a major public health concern, particularly in tropical and subtropical countries where environmental conditions favor the proliferation of *Aedes aegypti* mosquitoes. The increasing geographical distribution of dengue transmission is associated with climatic variability, urbanization, population growth, and inadequate environmental management [1], [2]. In Indonesia, dengue prevention remains challenging because transmission is influenced not only by environmental conditions but also by community knowledge, attitudes, and preventive practices [3], [4]. Despite the implementation of various vector control programs, inconsistent household participation and limited community awareness continue to undermine sustainable prevention efforts. In Puntukdoro Village, Plaosan District, Magetan Regency, the occurrence of dengue cases has highlighted the importance of strengthening preventive activities through active community participation. Initial observations identified potential mosquito breeding sites in residential environments and inconsistent implementation of the 3M Plus Mosquito Nest Eradication (MNE) program. These conditions demonstrate the need for an integrated intervention that improves community knowledge, develops practical prevention skills, and strengthens local resources for dengue control.

Recent approaches to dengue prevention emphasize integrated vector management, environmental sanitation, health education, and community mobilization. Environmental management strategies, including eliminating stagnant water, covering water storage

e-ISSN: 2827-8747 p-ISSN: 2829-3029
Vol. 5 No. 3, pp. 145-153, September 2026

containers, and managing household waste, have demonstrated potential in reducing mosquito breeding sites [5], [6]. Household-based interventions and community-driven vector suppression programs have also demonstrated the importance of combining environmental management with behavioral interventions and community engagement [7], [8]. In Indonesia, the 3M Plus movement and the One House One Mosquito Larva Inspector (Jumantik) program represent important community-based approaches to dengue prevention [9]. Previous studies have identified associations between health volunteers' knowledge, attitudes, and preventive practices, indicating that strengthening their capacity is essential for effective community-level vector surveillance [10]. Nevertheless, knowledge and behavioral gaps remain among Indonesian communities and health personnel, reinforcing the need for continuous and participatory health education [4], [11]. Furthermore, botanical mosquito repellents have attracted research interest as complementary approaches to conventional vector control. Studies have demonstrated repellent activity against *Aedes aegypti* using various plant-derived essential oils, although their effectiveness varies according to formulation, concentration, and duration of protection [12]–[15]. Experimental investigations have also demonstrated the potential of herbal essential oils as mosquito repellents [16]–[19]. However, such products should complement rather than replace environmental source reduction and established vector control measures [20].

Despite these developments, an implementation gap remains between dengue prevention knowledge and the consistent application of preventive practices at the household level. Existing studies have examined community knowledge, health volunteer participation, environmental management, and botanical repellents, but these approaches are frequently evaluated separately. There is a need for locally adapted community empowerment activities that integrate structured health education, practical mosquito repellent production, and direct assistance in implementing 3M Plus prevention practices. Furthermore, strengthening the capacity of sanitation working groups and health cadres as community-level agents of change requires greater attention, particularly in rural settings where sustained community participation is essential. Addressing this gap can support the development of practical and replicable community-based dengue prevention initiatives.

Accordingly, this community service activity aimed to strengthen the knowledge and practical skills of the Sanitation Working Group and health cadres in Puntukdoro Village through dengue prevention education, training in the preparation of homemade mosquito repellent using readily available natural ingredients, and assistance in implementing the 3M Plus MNE program. The expected contributions of this activity are threefold: (1) providing an integrated community empowerment model that combines health education, practical training, and mentoring for dengue prevention; (2) strengthening the capacity of sanitation working groups and health cadres to serve as local educators and mobilizers of household-level vector control; and (3) promoting accessible, locally applicable mosquito repellent preparation as a complementary preventive measure alongside routine environmental sanitation practices. The activity also provides empirical evidence of changes in participants' knowledge through pretest and posttest evaluation, supporting the development of similar community-based initiatives in other dengue-prone areas.

The remainder of this article is organized as follows. Section II describes the community service methodology, including participant selection, intervention procedures, and evaluation instruments. Section III presents the implementation activities and evaluation results. Section IV discusses the findings in relation to previous research and identifies the limitations of the activity. Finally, Section V presents the conclusions and implications for future community-based dengue prevention programs.

II. METHODS

A. STUDY DESIGN AND SETTING

This study employed a community-based empowerment approach using a prospective, one-group pretest–posttest evaluation design to assess changes in participants' knowledge and practical skills following a dengue prevention intervention. The activity was conducted in Puntukdoro Village, Plaosan District, Magetan Regency, East Java, Indonesia. The evaluation involved collecting baseline information before the intervention and conducting a subsequent assessment after the educational and practical activities. No control group was established, and the intervention was not randomized. This design was selected to evaluate the immediate outcomes of an integrated community education and empowerment program in its actual implementation setting. Similar approaches have been applied in community-based dengue prevention interventions to assess changes in knowledge and preventive practices following educational activities [21], [22].

B. STUDY POPULATION AND SAMPLING TECHNIQUE

The target population consisted of members of the Sanitation Working Group and community health cadres in Puntukdoro Village who were actively involved in environmental health and dengue prevention activities. A total of 35 participants were recruited using purposive sampling. Participant selection was based on their involvement in local sanitation and health promotion activities and their willingness to participate in the intervention and evaluation procedures. The participants were not randomly assigned to intervention or control groups. All 35 participants were included in the pretest and posttest evaluation. The use of purposive recruitment was consistent with the participatory nature of the community empowerment activity, which prioritized individuals with relevant community responsibilities and the potential to disseminate preventive information to other residents [23], [24].

C. MATERIALS AND INSTRUMENTS

The evaluation instruments comprised a structured knowledge questionnaire containing 20 questions, a practical skills observation sheet, interview guidelines, and

e-ISSN: 2827-8747 p-ISSN: 2829-3029
Vol. 5 No. 3, pp. 145-153, September 2026

an environmental inspection checklist. The questionnaire assessed participants' understanding of DHF transmission, the Aedes aegypti mosquito life cycle, mosquito breeding sites, the 3M Plus Mosquito Nest Eradication (MNE) program, and the preparation and application of homemade mosquito repellent. The same questionnaire was administered before and after the intervention to facilitate comparison of knowledge scores. The observation sheet was used to assess participants' ability to prepare mosquito repellent and demonstrate household-level mosquito prevention practices. Short interviews and inspections of water storage containers were conducted to obtain supplementary information regarding household environmental conditions and mosquito breeding risks.

The materials for the practical training included 5–7 stalks of fresh lemongrass, 10–15 lime leaves, 500 mL of clean water, and 1–2 tablespoons of 70% alcohol or ethanol. The equipment consisted of a cooking pan, knife, stirring utensil, strainer or clean filtering cloth, preparation container, and clean spray bottles. These materials were selected because they were relatively accessible for household preparation. The use of locally available ingredients in community education was intended to facilitate practical learning, although the repellent formulation was treated as a complementary measure rather than a validated substitute for established vector control practices [25], [26].

D. INTERVENTION PROCEDURES

The intervention was implemented through four sequential stages: preparation, implementation, mentoring, and evaluation.

1) Preparation: Initial coordination was conducted with the village government, community health center (Puskesmas), and local village officials to establish the activity arrangements and identify dengue prevention priorities. Educational materials, presentation slides, leaflets, pretest and posttest questionnaires, observation sheets, and practical training equipment were prepared. The ingredients and equipment required for homemade mosquito repellent production were also assembled before the training.
2) Education and practical implementation: Participants first completed the pretest to determine their baseline knowledge. Interactive health education was subsequently delivered through presentations and group discussions covering DHF transmission, the life cycle of *Aedes aegypti*, identification of potential mosquito breeding sites, and the implementation of 3M Plus. Participants then received a demonstration and performed hands-on preparation of mosquito repellent. The procedure involved washing the lemongrass and lime leaves, crushing or slicing the ingredients to facilitate the release of their aromatic compounds, and boiling them in 500 mL of water over low heat for approximately 15–20 minutes. After cooling, the mixture was filtered using a clean cloth or fine strainer. Subsequently, 1–2 tablespoons of 70% alcohol were added, and the solution was stirred until homogeneous. The finished preparation was transferred into a clean spray bottle and labeled with its preparation date. Participants also practiced identifying and eliminating potential mosquito breeding sites through the 3M Plus activities: draining water containers, covering water storage facilities, recycling or disposing of items that could collect water, and applying additional preventive measures.
3) Mentoring: Follow-up assistance was provided through visits and monitoring to encourage participants to independently reproduce the training procedures and implement 3M Plus practices in their household environments. Mentoring also reinforced the responsibilities of sanitation working groups and health cadres in communicating dengue prevention information and encouraging community participation. Community engagement and participatory learning are recognized approaches for strengthening local capacity and supporting the implementation of public health interventions [23], [24].
4) Evaluation: The posttest was administered using the same 20-question questionnaire to assess changes in knowledge following the intervention. Practical skills were evaluated through direct observation of mosquito repellent preparation and the implementation of 3M Plus activities. Environmental monitoring included inspections of household water storage containers and observations for the presence of mosquito larvae.

E. DATA COLLECTION AND ANALYSIS

Data were obtained from pretest and posttest questionnaires, practical skills observations, short interviews, and environmental inspections. Additional information regarding local DHF cases was obtained from the community health center or the Magetan Health Office. Quantitative data were analyzed descriptively using means, standard deviations, frequencies, and percentages. The percentage increase in the mean knowledge score was calculated by comparing the difference between posttest and pretest mean scores relative to the pretest mean. Knowledge categories were also compared before and after the intervention. The results were presented using descriptive tables to illustrate changes in participants' knowledge and practical competencies. No inferential statistical testing was reported.

III. RESULTS

A. IMPLEMENTATION OF ACTIVITIES

The community service activity was carried out in Puntukdoro Village, Plaosan District, Magetan Regency, involving 35 participants consisting of members of the Sanitation Working Group and health cadres. The activity began with coordination with the village government and the community health center to determine the schedule, participants, and materials to be provided. Next, participants took a pretest to determine their initial level of knowledge regarding Dengue Hemorrhagic Fever (DHF), Mosquito Nest Eradication (MNE) 3M Plus, and the manufacture of mosquito repellent.

The educational phase was conducted using interactive lectures, group discussions, and demonstrations. The material presented covered the causes and transmission of dengue fever, the life cycle of Aedes aegypti, identifying

e-ISSN: 2827-8747 p-ISSN: 2829-3029
Vol. 5 No. 3, pp. 145-153, September 2026

mosquito breeding sites, the importance of implementing the 3M Plus National Mosquito Control Program (MNE), and the use of mosquito repellent made from readily available ingredients. Following the presentation, participants participated in a hands-on practice of making mosquito repellent and a simulation of implementing the 3M Plus MNE at home.

B. KNOWLEDGE EVALUATION RESULTS

The evaluation used pretest and posttest instruments given to all participants before and after the educational activity. The results showed an increase in participants' knowledge about Dengue Fever (DHF), 3M Plus Mosquito Nest Eradication (MNE), and the preparation and use of homemade mosquito repellent.

TABLE 1
Level of Knowledge about Dengue Hemorrhagic Fever (DHF) Prevention Before and After Education

Category	Pre-test n (%)	Post-test n (%)
Very good	2 (5.7%)	18 (51.4%)
Good	8 (22.9%)	13 (37.2%)
Enough	17 (48.6%)	4 (11.4%)
Not enough	8 (22.9%)	0 (0.0%)
	35 (100%)	**35 (100%)**

Following the education and training, participants' knowledge of dengue fever prevention increased. Participants in the good and very good categories increased from 28.6% in the pretest to 88.6% in the posttest. Conversely, participants in the poor category decreased from 22.9% to 0%, while those in the fair category decreased from 48.6% to 11.4%.

These TABLE 1 show that the educational method combined with interactive lectures, discussions, demonstrations of making mosquito repellent liquid, and practical application of MNE 3M Plus can effectively increase participants' understanding [13]. This increase in knowledge is an early indicator of the success of empowerment activities because good knowledge will encourage changes in attitudes and behavior in maintaining environmental cleanliness and carrying out vector control independently [14]. In addition to increasing understanding of the importance of the 3M Plus National Movement Control Program (MNE), participants also gained skills in making mosquito repellent using readily available materials, which can be applied sustainably at the household level. Strengthening the capacity of the Sanitation Working Group and health cadres is expected to increase community participation in dengue fever prevention efforts and support the realization of a Zero Dengue Fever Village in Puntukdoro.

IV. DISCUSSION

A. INTERPRETATION OF FINDINGS AND COMPARISON WITH PREVIOUS STUDIES

The community empowerment activities conducted in Puntukdoro Village demonstrated an improvement in the knowledge of members of the Sanitation Working Group and health cadres regarding Dengue Hemorrhagic Fever (DHF) prevention. This improvement was reflected in the mean knowledge score, which increased from 62.4 ± 8.7 before the intervention to 87.9 ± 6.3 after the intervention, representing an increase of 25.5 points or approximately 40.9%. Furthermore, the proportion of participants achieving good and very good knowledge categories increased from 28.6% to 88.6%. In contrast, the proportion of participants in the insufficient knowledge category decreased from 22.9% to 0%. These findings indicate that the educational and practical activities were associated with a substantial improvement in participants' understanding of dengue prevention, particularly concerning disease transmission, mosquito breeding sites, the 3M Plus Mosquito Nest Eradication (MNE) strategy, and the preparation of homemade mosquito repellent.

The improvement may be related to the combination of educational methods employed during the intervention. Rather than relying exclusively on conventional lectures, the activities incorporated interactive discussions, demonstrations, hands-on practice, and mentoring. These approaches provided participants with opportunities to receive information, clarify misconceptions, observe preventive procedures, and practice the acquired skills. The practical components were particularly relevant because participants could directly connect the educational material with environmental conditions and mosquito-control activities in their households. Consequently, the intervention addressed both the cognitive and practical dimensions of community capacity building. Nevertheless, because the evaluation primarily measured knowledge before and after the intervention, the contribution of each individual educational component cannot be determined separately.

The findings are consistent with those of Yari et al. [27], who reported improvements in knowledge and preventive behaviors following an educational intervention based on the Health Belief Model among communities in southern Iran. Their study demonstrated that structured health education could strengthen participants' understanding and promote preventive behavior. Similarly, Lestari et al. [32] reported an increase in the mean knowledge score from 8.00 to 12.89 following community-based DHF education involving lectures, discussions, demonstrations, and educational leaflets. Although the intervention settings and participant characteristics differed, these findings support the relevance of combining information delivery with interactive educational activities to improve community understanding of dengue prevention. The increase observed in Puntukdoro Village therefore contributes to the broader evidence that community-based education can be a useful component of local dengue prevention programs.

The improvement in knowledge is also important in relation to the implementation of household-level prevention practices. Sutriyawan et al. [30], in a community-based study conducted in Bandung, Indonesia, found that dengue prevention practices were associated with participants' knowledge levels and sociodemographic characteristics. Their findings highlight the importance of improving public knowledge as part of efforts to strengthen preventive practices. In the present activity, participants received information and practical guidance on draining

e-ISSN: 2827-8747 p-ISSN: 2829-3029
Vol. 5 No. 3, pp. 145-153, September 2026

and cleaning water containers, covering water-storage facilities, removing or recycling unused objects that could collect water, and conducting regular inspections for mosquito larvae. These activities are relevant because effective dengue prevention requires consistent attention to potential breeding sites in residential environments. However, the increase in knowledge scores should not automatically be interpreted as proof of sustained behavioral change. Further monitoring is required to establish whether participants consistently apply the recommended practices after the educational sessions.

The results also emphasize the importance of community participation and the role of local health cadres as agents of change. Members of the Sanitation Working Group and health cadres can act as intermediaries between health professionals, village authorities, and households. Their involvement may facilitate the dissemination of health information, encourage collective participation, and support routine environmental monitoring. Arfan et al. [29] identified several benefits of community participation in dengue control, including opportunities to strengthen local ownership and mobilize residents. Nevertheless, their systematic review also identified barriers that may limit participation, indicating that community involvement requires continuous support rather than one-time educational activities. Dambach et al. [28] similarly emphasized the importance of community co-creation in dengue vector control, whereby residents participate actively in developing and implementing locally appropriate prevention strategies. These perspectives support the approach adopted in Puntukdoro Village, which involved local community groups in education, practical activities, and household-level prevention.

The training in preparing homemade mosquito repellent using lemongrass and lime leaves also provided participants with an opportunity to develop practical skills using materials that are relatively accessible in their surroundings. This activity may encourage household participation by introducing an additional preventive option that can be prepared locally. However, the homemade preparation should be considered a complementary measure rather than a primary dengue-control intervention. Its mosquito-repellent effectiveness, duration of protection, safety, and consistency were not established through laboratory testing in this activity. Therefore, its use should not replace established vector-control measures, particularly the elimination of mosquito breeding sites through the 3M Plus strategy.

Evidence from Soria et al. [27] indicates that educational interventions can support community participation in the identification and elimination of Aedes mosquito breeding sites, particularly when activities are adapted to local environmental and sociocultural conditions. Their review also emphasizes the importance of evaluating interventions using behavioral and entomological indicators. Accordingly, the practical activities in Puntukdoro Village should be understood as an initial effort to strengthen local capacity, rather than evidence that the homemade repellent itself reduces mosquito populations or dengue transmission. Overall, the findings suggest that combining education, practical training, and community participation is a relevant approach for strengthening the capacity of local groups to support dengue prevention.

B. LIMITATION OF THE ACTIVITY

Despite the positive changes observed, several limitations should be considered when interpreting the findings. First, the evaluation involved only 35 participants, consisting of members of the Sanitation Working Group and health cadres selected through purposive sampling. Although these participants have strategic roles in community health activities, the findings may not represent the knowledge and practices of all residents of Puntukdoro Village. The relatively small and specifically selected participant group also limits the generalizability of the results to other communities with different social, educational, and environmental characteristics.

Second, the evaluation used a one-group pretest–posttest approach without a control or comparison group. Consequently, the observed improvement in knowledge cannot be attributed exclusively to the intervention because other influences, such as previous exposure to health information, discussions among participants, or external health campaigns, may also have contributed. In addition, the analysis was descriptive and did not include inferential statistical testing. Therefore, the increase in the mean score should be interpreted as a descriptive improvement rather than a statistically demonstrated intervention effect.

Third, the evaluation was conducted over a relatively short period and primarily focused on immediate changes in knowledge and the practical activities performed during the program. Long-term retention of information, consistency of household prevention practices, and sustained participation in mosquito surveillance were not established. Although participants were reported to have practiced preparing mosquito repellent and implementing 3M Plus activities, the available results do not provide quantified evidence of long-term adherence or changes in household behavior.

Fourth, the effectiveness and safety of the homemade mosquito repellent were not assessed through laboratory testing or standardized entomological experiments. The activity did not measure mosquito repellency under controlled conditions, duration of protection, or changes in mosquito density attributable to the preparation. Similarly, the evaluation did not establish whether the intervention reduced dengue incidence in the village. These outcomes require longer observation periods and more specific measurement procedures. The educational and practical results should therefore not be interpreted as evidence that the activity achieved dengue elimination or established Puntukdoro as a dengue-free village.

Finally, the available documentation does not provide detailed information regarding questionnaire validation and reliability, the duration and frequency of mentoring visits, or the specific follow-up period. The manuscript also contains an inconsistency in describing the ingredients used to prepare the homemade repellent, referring to orange peels in one section and lime leaves in another. These details should be clarified to improve methodological transparency and facilitate replication.

e-ISSN: 2827-8747 p-ISSN: 2829-3029
Vol. 5 No. 3, pp. 145-153, September 2026

Future activities should use standardized instruments, document intervention exposure and follow-up procedures, and establish clearer indicators for assessing knowledge, behavior, environmental conditions, and vector-control outcomes.

C. IMPLICATIONS AND RECOMMENDATIONS

The findings have practical implications for community-based dengue prevention programs, particularly in strengthening the capacity of local health cadres and sanitation groups. The improvement in participants' knowledge suggests that structured education combined with demonstrations and practical training can be incorporated into routine community health promotion activities. Village governments, community health centers, and local health cadres may use similar approaches to improve residents' understanding of dengue transmission, mosquito breeding sites, and the importance of implementing 3M Plus consistently. In this context, cadres should not function solely as recipients of health information but should also be supported as local educators and facilitators who can communicate preventive messages to households.

The involvement of community institutions is also important for ensuring continuity. Regular coordination between village authorities, community health centers, the Sanitation Working Group, and health cadres may support scheduled household visits, environmental inspections, and community education sessions. These activities can help identify potential breeding sites and encourage residents to take responsibility for maintaining clean household environments. The systematic review by Soria et al. [28] highlights the value of adapting educational interventions to local contexts and strengthening their evaluation through behavioral and entomological indicators. In addition, Arfan et al. [29] emphasize that community participation requires attention to both its enabling factors and potential barriers. These findings suggest that sustainable dengue prevention requires not only knowledge transfer but also institutional support, community ownership, and regular monitoring.

The homemade mosquito repellent activity may also serve as an educational innovation that encourages participants to explore locally available materials for household prevention. Nevertheless, its use should remain complementary to established vector-control measures, especially the elimination of breeding sites and routine larval monitoring. Further research is needed to assess the preparation's efficacy, safety, stability, and duration of protection under standardized conditions before stronger recommendations regarding its use can be made.

Future community service activities should consider involving a larger and more diverse group of residents, extending the follow-up period, and evaluating changes in knowledge and preventive practices at several time points. Where feasible, subsequent evaluations could include a comparison group, validated questionnaires, structured behavioral observations, and standardized entomological indicators, such as the presence of larvae in inspected water containers. Monitoring dengue case data over a sufficiently long period may also provide additional information about the broader public health context, although changes in case numbers should not be attributed to the intervention without an appropriate study design. These recommendations are consistent with the evidence on household-level dengue prevention interventions synthesized by Soria et al. [28] and the community participation approaches discussed by Dambach et al. [28]. Overall, the Puntukdoro activity provides a practical foundation for strengthening local capacity and community participation. Its longer-term contribution will depend on sustained mentoring, coordination among local stakeholders, and systematic evaluation of behavioral and environmental outcomes.

V. CONCLUSIONS

This community service activity aimed to strengthen the capacity of the Sanitation Working Group and health cadres in Puntukdoro Village through dengue prevention education, practical training in homemade mosquito repellent preparation, and mentoring in the implementation of the 3M Plus Mosquito Nest Eradication (MNE) strategy. The findings indicate that the combination of educational sessions, interactive discussions, demonstrations, hands-on practice, and community mentoring was associated with an improvement in participants' knowledge and practical capacity regarding Dengue Hemorrhagic Fever (DHF) prevention. Among the 35 participants, the mean knowledge score increased from 62.4 ± 8.7 in the pretest to 87.9 ± 6.3 in the posttest, representing an improvement of 25.5 points or approximately 40.9%. Furthermore, the proportion of participants achieving good and very good knowledge levels increased from 28.6% before the intervention to 88.6% afterward, while the proportion classified as having insufficient knowledge decreased from 22.9% to 0%. Participants also gained practical experience in preparing mosquito repellent using locally available ingredients, specifically lemongrass and lime leaves, and practicing household-level 3M Plus activities. These findings suggest that community empowerment through structured education and practical training can serve as a useful approach to strengthening the role of local health cadres and sanitation groups in supporting community-based dengue prevention. Nevertheless, the results should be interpreted within the context of the activity's limitations, including the relatively small purposively selected participant group, the absence of a control group, and the lack of long-term evaluation. The activity also did not establish the laboratory effectiveness of the homemade mosquito repellent or demonstrate a reduction in dengue incidence. Therefore, future programs should expand participation to include more households, provide continuous mentoring, and conduct periodic evaluations to assess knowledge retention, changes in preventive practices, household environmental conditions, and mosquito larval indicators. Further research should also evaluate the safety, stability, and repellent effectiveness of the homemade preparation under standardized conditions. Overall, this community empowerment model provides a practical foundation for strengthening local participation and supporting sustainable dengue prevention efforts, while its long-term contribution toward the goal of a Zero

e-ISSN: 2827-8747 p-ISSN: 2829-3029
Vol. 5 No. 3, pp. 145-153, September 2026

Dengue Village will depend on consistent implementation, institutional collaboration, and systematic monitoring.

ACKNOWLEDGEMENTS

The authors would like to express their sincere appreciation to the Head of Puntukdoro Village for the support and facilitation provided throughout the community service activities. Special thanks are extended to the ILP health cadres, village midwives, village health post nurses, neighborhood and community association leaders (RT/RW), and local residents who actively participated in and supported the implementation of this program. Their cooperation and contributions were essential to the successful completion of these activities.

FUNDING

The authors received no specific external funding for the implementation of this community service activity and the preparation of this manuscript.

DATA AVAILABILITY

The data supporting the findings of this community service activity are available from the corresponding author upon reasonable request, subject to applicable institutional and participant confidentiality requirements.

AUTHOR CONTRIBUTION

Budi Yulianto: Conceptualization, Methodology, Project Administration, and Writing – Original Draft Preparation. Nurlailis Saadah: Conceptualization, Supervision, Methodology, and Writing – Review and Editing. Lilis Prihastini: Investigation, Data Collection, and Resources. Denok Indarwati: Investigation, Data Collection, and Validation. Uswatun Khasanah: Investigation, Data Curation, and Writing – Review and Editing. All authors contributed to the development of the community service activities, reviewed the manuscript, and approved the final version for publication.

DECLARATIONS

ETHICAL APPROVAL

The community service activity involved members of the Sanitation Working Group and health cadres in Puntukdoro Village. The activity was conducted in coordination with the local village authorities and relevant community health stakeholders.

CONSENT FOR PUBLICATION PARTICIPANTS

All participants were informed about the objectives and procedures of the community service activity and voluntarily agreed to participate.

COMPETING INTERESTS

The authors declare that they have no competing interests related to the implementation of this community service activity or the publication of this manuscript.

DOCUMENTATION

Documentation of the Community Service activity titled: ”Strengthening the Role of Sanitation Working Groups and Health Volunteers in Promoting the Use of Homemade Mosquito Repellent and the "3M Plus" Mosquito Breeding Site Eradication Method to Achieve a Dengue-Free Puntukdoro Village”



Presentation on Dengue Prevention via the 3M Plus Method and DIY Mosquito Repellent Preparation



Opening of the Community Service Activity



Survey of Mosquito Larvae and Water Storage Containers for Dengue Hemorrhagic Fever Prevention in Puntukdoro Village

e-ISSN: 2827-8747 p-ISSN: 2829-3029
Vol. 5 No. 3, pp. 145-153, September 2026



With the community following the community service activity.



Mosquito Larva Survey in Residents' Homes Puntukdoro Village



Conclusion of Community Service Activities In Puntukdoro Village, Plaosan District

REFERENCES

[1] G. Paz-Bailey, L. E. Adams, J. Deen, K. B. Anderson, and L. C. Katzelnick, "Dengue," The Lancet, vol. 403, no. 10427, pp. 667–682, 2024. DOI: 10.1016/S0140-6736(23)02576-X.

[2] T. Nakase et al., "Population at risk of dengue virus transmission has increased due to coupled climate factors and population growth," Communications Earth & Environment, vol. 5, Art. no. 475, 2024. DOI: 10.1038/s43247-024-01639-6.

[3] A. N. Rakhmani and L. Zuhriyah, "Knowledge, attitudes, and practices regarding dengue prevention among health volunteers in an urban area – Malang, Indonesia," Journal of Preventive Medicine and Public Health, vol. 57, no. 2, pp. 176–184, 2024. DOI: 10.3961/jpmph.23.484.

[4] A. Prayitno et al., "Addressing knowledge, attitude and practice gaps for effective dengue management strategies in Indonesia," Frontiers in Public Health, vol. 13, Art. no. 1540121, 2025. DOI: 10.3389/fpubh.2025.1540121.

[5] M. A. F. Mahmud et al., "The application of environmental management methods in combating dengue: A systematic review," International Journal of Environmental Health Research, vol. 33, no. 11, pp. 1148–1167, 2023. DOI: 10.1080/09603123.2022.2076815.

[6] C. Soria, W. R. Almirón, A. M. Stewart-Ibarra, and L. B. Crocco, "Systematic review of impacts of educational interventions to control breeding sites of Aedes aegypti and Aedes albopictus mosquitoes," The American Journal of Tropical Medicine and Hygiene, vol. 110, no. 5, pp. 979–988, 2024. DOI: 10.4269/ajtmh.23-0427.

[7] C. A. Montenegro-Quiñonez, V. R. Louis, O. Horstick, R. Velayudhan, P. Dambach, and S. Runge-Ranzinger, "Interventions against Aedes/dengue at the household level: A systematic review and meta-analysis," eBioMedicine, vol. 93, Art. no. 104660, 2023. DOI: 10.1016/j.ebiom.2023.104660.

[8] J. Bigio et al., "Entomological outcomes of cluster-randomised, community-driven dengue vector-suppression interventions in Kampong Cham province, Cambodia," PLOS Neglected Tropical Diseases, vol. 16, no. 1, Art. no. e0010028, 2022. DOI: 10.1371/journal.pntd.0010028.

[9] M. F. D. Lusno et al., "The need for active and integrated involvement of the community and health professionals in the prevention and control of dengue hemorrhagic fever in Indonesia," The Pan African Medical Journal, vol. 47, Art. no. 185, 2024. DOI: 10.11604/pamj.2024.47.185.43298.

[10] I. Arfan et al., "Benefits and barriers of community participation in dengue control: A systematic review," African Journal of Reproductive Health, vol. 28, no. 10s, pp. 482–498, 2024. DOI: 10.29063/ajrh2024/v28i10s.49.

[11] A. Wahab et al., "Knowledge, attitude, and practice regarding dengue vaccine: A baseline study of community members and health providers in Indonesia," Clinical and Experimental Pediatrics, vol. 68, no. 3, pp. 228–237, 2025. DOI: 10.3345/cep.2024.00962.

[12] A. R. Alfalakh, "The influence of 3M Plus behavioral factors on the incidence of dengue hemorrhagic fever in Indonesia: A meta analysis," Media Gizi Kesmas, vol. 12, no. 1, pp. 494–502, 2023. DOI: 10.20473/mgk.v12i1.2023.494-502.

[13] W. Suryanegara, I. Rawati, and Ronny, "Descriptions of knowledge, attitude, and action of community in dengue hemorrhagic fever (DHF) prevention in RW 10 Cawang Urban Village, East Jakarta," International Journal of Tropical Disease & Health, vol. 44, no. 2, pp. 22–28, 2023. DOI: 10.9734/ijtdh/2023/v44i21387.

[14] K. Kharismaka, R. M. Lestari, and D. W. Prasida, "The relationship of public knowledge about 3M Plus with the incidence of dengue hemorrhagic fever in the working area of Kereng Bangkirai Community Health Center, Palangka Raya City," Jurnal Surya Medika, vol. 9, no. 1, pp. 204–210, 2023. DOI: 10.33084/jsm.v9i1.5168.

[15] A. Sutriyawan et al., "Survey of knowledge and practices of dengue fever prevention related to sociodemographic status: Community-based study in Bandung, Indonesia," Journal of Public Health and Development, vol. 22, no. 2, pp. 26–38, 2024. DOI: 10.55131/jphd/2024/220203.

[16] N. Sutthanont et al., "Effectiveness of herbal essential oils as single and combined repellents against Aedes aegypti, Anopheles dirus and Culex quinquefasciatus (Diptera: Culicidae)," Insects, vol. 13, no. 7, Art. no. 658, 2022. DOI: 10.3390/insects13070658.

[17] H. A. Luker et al., "Repellent efficacy of 20 essential oils on Aedes aegypti mosquitoes and Ixodes scapularis ticks in contact-repellency assays," Scientific Reports, vol. 13, Art. no. 1705, 2023. DOI: 10.1038/s41598-023-28820-9.

[18] A. Haris et al., "Prolonged repellent activity of plant essential oils against dengue vector, Aedes aegypti," Molecules, vol. 28, no. 3, Art. no. 1351, 2023. DOI: 10.3390/molecules28031351.

[19] M. Farooq, L. Bangonan, R.-D. Xue, and A. Talbalaghi, "Evaluation of essential oils as spatial repellents against Aedes aegypti in an olfactometer," Journal of the American Mosquito Control Association, vol. 38, no. 4, pp. 261–267, 2022. DOI: 10.2987/22-7090.

[20] M. Noguera-Gahona et al., "Repellents against Aedes aegypti bites: Synthetic and natural origins," Frontiers in Insect Science, vol. 4, Art. no. 1510857, 2025. DOI: 10.3389/finsc.2024.1510857.

[21] A. Lachyan, R. A. Zaki, B. Banerjee, and N. Aghamohammadi, "The effect of community-based intervention on dengue awareness and prevention among poor urban communities in Delhi, India," Journal of Research in Health Sciences, vol. 23, no. 4, Art. no. e00596, 2023. DOI: 10.34172/jrhs.2023.131.

[22] C. Suwanbamrung et al., "Evaluation of high school-based dengue solution model in Southern Thailand: A community participatory action research," BMC Public Health, vol. 24, Art. no. 3315, 2024. DOI: 10.1186/s12889-024-20767-4.

[23] A. Yari et al., "The effectiveness of educational intervention in promoting preventive behaviors of dengue fever in Southern Iran: Applying Health Belief Model (HBM)," Health Science Reports, vol. 7, no. 12, Art. no. e70198, 2024. DOI: 10.1002/hsr2.70198.

[24] L. Hogeling, M. Koelen, and L. Vaandrager, "Community engagement in health promotion: Results from a realist multiple case study," Health & Social Care in the Community, vol. 2024, Art. no. 2448483, 2024. DOI: 10.1155/2024/2448483.

[25] R. Dapari et al., "School-based health education effect on knowledge, attitude, and practices of dengue prevention among school children: A systematic review," Discover Social Science and Health, vol. 5, Art. no. 31, 2025. DOI: 10.1007/s44155-025-00181-w.

[26] I. Arfan et al., "Benefits and barriers of community participation in dengue control: A systematic review," African Journal of Reproductive Health, vol. 28, no. 10s, pp. 482–498, 2024. DOI: 10.29063/ajrh2024/v28i10s.49.

[27] A. Yari, S. Mohseni, R. Ezati Rad, Z. Hosseini, N. Shahabi, and T. Aghamolaei, "The effectiveness of educational intervention in promoting preventive behaviors of dengue fever in Southern Iran: Applying Health Belief Model (HBM)," Health Science Reports, vol. 7, no. 12, Art. no. e70198, 2024, doi: 10.1002/hsr2.70198.

[28] C. Soria, W. R. Almirón, A. M. Stewart-Ibarra, and L. B. Crocco, "Systematic review of impacts of educational interventions to control breeding sites of Aedes aegypti and Aedes albopictus mosquitoes," The American Journal of Tropical Medicine and Hygiene, vol. 110, no. 5, pp. 979–988, 2024, doi: 10.4269/ajtmh.23-0427.

[29] P. Dambach, V. R. Louis, C. J. Standley, and C. A. Montenegro-Quiñonez, "Beyond top-down: Community co-creation approaches for sustainable dengue vector control," Global Health Action, vol. 17, no. 1, Art. no. 2426348, 2024, doi: 10.1080/16549716.2024.2426348.

[30] I. Arfan, L. Sulistyorini, M. Sulistyowati, F. Syahrul, H. Junaidi, and A. Rizky, "Benefits and barriers of community participation in dengue control: A systematic review," African Journal of Reproductive Health, vol. 28, no. 10s, pp. 482–498, 2024, doi: 10.29063/ajrh2024/v28i10s.49.

[31] A. Sutriyawan, H. Akbar, E. Rudyarti, R. M. Natsir, M. Masruroh, D. Mahendika, et al., "Survey of knowledge and practices of dengue fever prevention related to sociodemographic status: Community-based study in Bandung, Indonesia," Journal of Public Health and Development, vol. 22, no. 2, pp. 26–38, 2024, doi: 10.55131/jphd/2024/220203.

[32] N. B. Lestari, Y. Peristiowati, S. Bahrun, and D. M. Yulis, "Community-based health education improves knowledge of dengue hemorrhagic fever prevention: Evidence from a pre–post intervention in Indonesia," Abdimas Polsaka, vol. 5, no. 2, 2026, doi: 10.35816/abdimaspolsaka.v5i2.480.