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Health Education on Dengue Hemorrhagic Fever Prevention for Students at SDN 02 Panduman, Jelbuk Village, Jember Regency

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ABSTRACT

Dengue hemorrhagic fever (DHF) remains a major public health concern in tropical and subtropical countries, including Indonesia. School-aged children are among the most vulnerable groups due to limited awareness and daily habits that may support mosquito breeding. This community service activity aimed to enhance students' knowledge of DHF prevention through health education at SDN 02 Panduman, Jelbuk Village, Jember Regency, East Java Province. Educational interventions were delivered interactively using PowerPoint presentations, posters, ovitrap demonstrations, videos, and pocketbooks adapted to the comprehension level of elementary school students. The evaluation was conducted using pre-test and post-test questionnaires consisting of 10 multiple-choice questions on dengue transmission, symptoms, and prevention. The results showed a significant improvement in student knowledge (25%), with average scores increasing from 63% to 88% ($p < 0.001$, Wilcoxon test). The distribution of illustrated pocketbooks served as an effective reinforcement tool, allowing students to share knowledge with their families and communities. Overall, the intervention successfully raised awareness and fostered preventive behavior among students, demonstrating that school-based health education is an effective strategy for reducing the risk of DHF transmission in endemic rural areas such as Jelbuk Village.

Keywords — Dengue, Education, Elementary School, Knowledge, Prevention

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1. Introduction

Dengue Hemorrhagic Fever (DHF) remains a major global public health concern, particularly in tropical and subtropical regions [1]. The disease is caused by dengue virus infection, primarily transmitted through the bite of *Aedes aegypti* and *Aedes albopictus* mosquitoes, and contributes significantly to morbidity and mortality in endemic areas [2]. The incidence and severity of DHF are influenced by a range of factors, including rapid urbanization, human mobility, climatic variables such as rainfall and temperature fluctuations, socioeconomic disparities, and limitations in public health infrastructure [3], [4]. The complexity of these interrelated determinants underscores the necessity of implementing sustainable vector management and community-based control strategies to reduce dengue transmission in the long term.

In recent years, Indonesia has experienced a substantial rise in dengue cases. National surveillance data reported an increase in incidence from approximately 37.3 per 100,000 population in 2012 to 52.1 per 100,000 in 2022, far exceeding the government's strategic target of fewer than 10 per 100,000 in most regions [5]. Although incidence has escalated, the Case Fatality Rate (CFR) has slightly declined, indicating improvements in clinical management and treatment outcomes [5]. Java Island—particularly West Java, Central Java, and East Java—continues to bear the highest burden, reflecting the region's persistent vulnerability [6], [7]. Environmental factors such as inadequate drainage, stagnant water, and low public awareness of mosquito breeding habitats exacerbate transmission risks. In Jember Regency, especially in rural communities, such conditions further heighten the threat of DHF transmission among residents, including school-aged children.

Children, particularly those in primary schools, are among the most vulnerable groups to DHF infection. Limited awareness of health risks and daily habits—such as playing near uncovered water containers or in poorly maintained environments—can indirectly foster mosquito breeding and increase exposure to infection. Therefore, school-based health education programs are essential to instill preventive behaviors from an early age. In response to this challenge, the Community Service and Research Team "Vector Biology" (KeRis-DiMas) initiated an integrated health education program specifically designed for students at SDN 02 Panduman, Jelbuk Village, Jember Regency. The program aimed to enhance students' knowledge of dengue transmission, symptoms, and prevention strategies through interactive, age-appropriate, and context-relevant learning activities both at school and at home.

By equipping primary school students with practical knowledge and skills to identify and eliminate potential mosquito breeding sites, this initiative supports broader community-based dengue prevention efforts. Educating children serves as an effective channel to reach their families, as students often share acquired knowledge with parents and peers. Consequently, this program not only raises individual awareness but also fosters collective responsibility in reducing dengue transmission risks within Jelbuk Village and surrounding areas.

2. Targets and Output

The primary target audience of this community service activity was students of SDN 02 Panduman, Jelbuk Village, Jember Regency. Children at the elementary school level were selected as the main beneficiaries because they represent one of the most vulnerable groups to DHF infection due to their limited awareness of health risks and daily behaviors that may indirectly support mosquito breeding. Teachers and parents were also considered indirect service partners, as the knowledge and practices introduced to students are expected to be shared within their households and the broader community.

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The expected outputs of the program included:

1. Improved knowledge and awareness among students regarding the transmission, symptoms, and prevention of DHF.
2. Increased student participation in preventive actions, such as identifying and eliminating mosquito breeding sites in school and home environments.The availability of supporting educational media (leaflets, posters, and interactive learning materials) tailored to primary school students.
3. An indirect increase in family and community awareness, as students transfer the information and preventive practices to their parents and peers.

Overall, the program was designed to instill sustainable preventive behaviors in children, while simultaneously strengthening collective responsibility in reducing the risk of DHF transmission in Jelbuk Village and surrounding areas.

3. Method

3.1. Preparation Stage

The implementation method of this activity was designed to address issues related to the spread of DHF and its prevention among elementary school students. The preparation stage began with obtaining permission from the local village authorities, represented by the Head of Jelbuk Village and staff, as well as coordination with SDN 02 Panduman, Jelbuk Village, Jember Regency. Discussions with the school principal and teachers ensured that the program was aligned with the school's schedule and needs.

During this stage, the service team developed educational materials on dengue prevention in the form of a PowerPoint presentation adapted to the age and comprehension level of elementary school students. Additional supporting media were also prepared, including illustrated pocketbooks, posters depicting the mosquito life cycle, ovitrap demonstration tools, and an educational video on vector-borne diseases. The pocketbook was designed to provide practical information in simple language with engaging illustrations, enabling students to review the material at home and share it with their families.

3.2. Implementation Stage

The health education program focused on delivering knowledge about DHF prevention to students of SDN 02 Panduman. The education session was delivered interactively by the service team through a combination of lecture-style presentations, question-and-answer sessions, and group activities designed as dengue prevention games. The presentation covered the introduction of DHF, its causes and symptoms, associated risks, preventive measures (such as the 3M Plus program), and early treatment steps.

The presentation lasted approximately 60 minutes and was followed by a 30-minute interactive discussion session, allowing students to clarify and deepen their understanding of the material. At the end of the session, each student received a pocketbook summarizing the key points of the lesson, which served as an additional learning resource and reminder of the preventive actions they should take both at school and at home.

3.3. Evaluation Stage

To evaluate the effectiveness of the program, a pre-test and post-test design was employed. A structured questionnaire consisting of 10 multiple-choice questions related to DHF prevention was administered to students before and after the education session. The pre-test results reflected the baseline knowledge of the students, while the post-test measured the knowledge gained after the intervention.

The comparison between pre-test and post-test scores was used to assess the impact of the educational activity on students' understanding of DHF. Additionally, a satisfaction questionnaire was distributed to evaluate student engagement and perceptions of the learning methods and materials.

4. Discussion

The community service activity on DHF prevention was conducted at SDN 02 Panduman, Jelbuk Village, Jember Regency (Fig. 1). This location was selected because Jember Regency continues to report high and fluctuating dengue incidence in East Java Province [8]. The rural setting of the school, with suboptimal sanitation, increases the risk of Aedes aegypti proliferation, the primary vector of dengue virus. According to the World Health Organization, school-based health education is a strategic intervention to instill preventive behaviors from an early age [9]. Therefore, providing health education to elementary school students as agents of change was considered a key approach to strengthen awareness and preventive behavior within both households and the surrounding community.

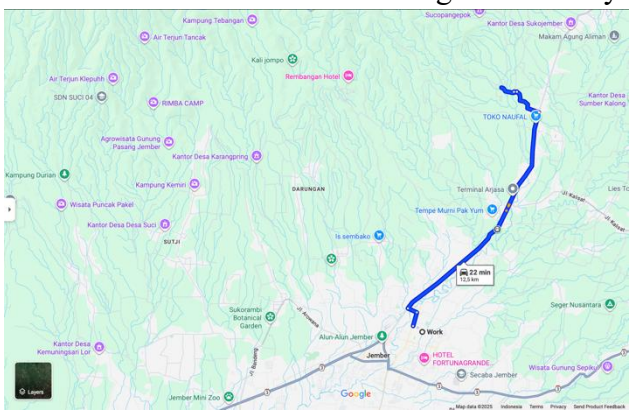


Figure 1. Location Of Educational Activities For The Community At Sdn 02 Panduman, Jelbuk District, Jember Regency, East Java Province.

Prior to implementation, the lecturer as community service program team coordinated with the village government and school staff to ensure effective planning and execution on 02 December 2024. This coordination process included preparing the venue, organizing teaching materials, and ensuring student participation (Fig. 2). The educational activities, which was carry out on 23 December 2024, was attended enthusiastically by the students, who actively engaged in listening to the presentation and participating in group discussions (Fig. 3). The sessions began with an introduction by the principal and the project coordinator, followed by lectures and demonstrations covering the basic concepts of DHF, its transmission, symptoms, and preventive measures (Fig. 3C and Fig. 3D). The interactive question-and-answer session that followed allowed students to clarify their understanding, with many showing high curiosity and asking questions related to daily preventive practices (Fig. 4).



Figure 2. Coordinating educational activities for school staff and students at SDN 02 Panduman, Jelbuk District, Jember Regency, East Java Province.



3A 3B

Figure 3. Educational activities for school staff and students of SDN 02 Panduman, Jelbuk District, Jember Regency, East Java Province.



Figure 4. Interactive discussion session between the educational activity implementation team and participants.

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To reinforce the delivered materials, all students received illustrated pocketbooks containing summarized information on DHF transmission and prevention (Fig. 5). The pocketbook served as a take-home educational tool that allowed students to share knowledge with their families. Printed educational materials such as booklets and leaflets are recognized as effective in improving knowledge retention and behavior related to vector-borne disease prevention [10], [11].



Figure 5. Sample pocket book containing educational materials on dengue fever prevention

The evaluation stage involved administering pre-test and post-test questionnaires with 10 multiple-choice questions. The results indicated a significant improvement in knowledge (25%), with average scores increasing from approximately 63% (pre-test) to 88% (post-test). Statistical analysis using the Wilcoxon test confirmed that the improvement was significant ($p < 0.001$), indicating the effectiveness of the intervention (Fig. 6). This finding is consistent with previous studies in Mojokerto and other dengue-endemic areas, which demonstrated that school-based health education significantly improved student knowledge and attitudes toward dengue prevention [12]–[14].

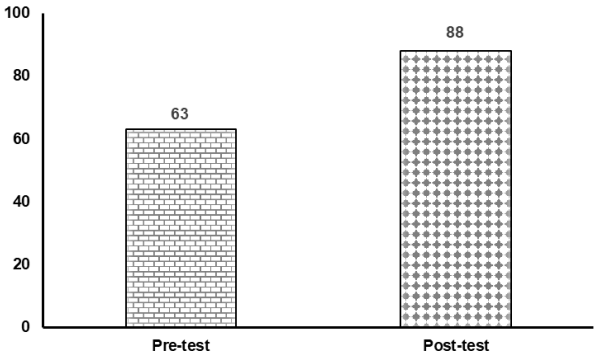


Figure 6. Pre-test and post-test assessment results of participants in dengue fever prevention education activities.

Sociodemographic analysis of participants suggested that most students came from households where mothers served as primary caregivers. This is important since women—particularly housewives—are recognized as key actors in household-level dengue prevention [15], [19], [20]. The indirect involvement of parents through their children creates a multiplier effect, strengthening community-level awareness and preventive practices. Targeting younger participants was also strategic, as children and adolescents are generally more receptive to behavior change compared to older populations [16].

The educational content emphasized the "3M Plus" strategy—draining water containers, covering water storage, and disposing of unused items that may serve as breeding sites—along with complementary preventive measures such as insect repellent and window screens. Previous meta-analyses confirm the strong effectiveness of the 3M Plus approach, with communities consistently applying the practice reporting up to six-fold reduced risk of dengue infection [21], [22].

The positive outcomes of this activity align with systematic reviews showing that school-based dengue prevention programs are highly effective in improving student knowledge, attitudes, and practices [23]. Moreover, students often share newly acquired knowledge with their families, amplifying the impact at the community level [24]. Thus, the intervention at SDN 02

Panduman not only improved the awareness of school-aged children but also fostered collective responsibility for dengue prevention in Jelbuk Village.

5. Conclusion

The DHF prevention education at SDN 02 Panduman, Jelbuk Village, significantly improved students' knowledge of causes, symptoms, transmission, and preventive measures. Interactive learning and pocketbook distribution proved effective in raising early awareness and encouraging information sharing within families. This activity not only enhanced individual understanding but also contributed to collective dengue prevention efforts in endemic rural areas.

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