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Strengthening Community Involvement in Dengue Prevention through Education Intervention in Arjasa Village, Jember

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) is a communicable disease caused by the dengue virus (DENV) and transmitted through the bite of Aedes mosquitoes. Arjasa Village, located in Arjasa Sub-district, Jember Regency, is considered a high-risk area for an increase in DHF cases, particularly due to environmental conditions that support vector breeding. This community service activity aimed to improve public knowledge regarding the prevention and control of DHF through educational intervention. The program was implemented through material delivery and interactive discussions, accompanied by pre-test and post-test evaluations to measure changes in understanding. The results showed a significant increase in public knowledge, with the average score rising from 62% before the training to 90% afterward. The effectiveness of the educational activity was assessed using the non-parametric Wilcoxon test to compare participants' knowledge levels before and after the intervention. The analysis produced a p-value of 0.001, which is below the 0.05 significance level, demonstrating a statistically significant difference between the pre-test and post-test results. This improvement demonstrates the effectiveness of the educational activity in raising awareness about the importance of environmental cleanliness and eliminating mosquito breeding grounds. Therefore, this educational intervention successfully enhanced community understanding and has the potential to encourage sustained active participation in DHF prevention efforts.

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INTRODUCTION

Dengue Hemorrhagic Fever (DHF) remains one of the major public health issues in tropical regions and certain subtropical areas (WHO, 2018). The disease is caused by a dengue virus infection transmitted to humans through the bite of Aedes mosquitoes, which act as the primary vectors (Kaswulandari et al., 2024). This infection contributes to high morbidity and mortality rates, particularly in endemic areas. The spread of DHF is influenced by various factors, such as human-vector interactions affected by agricultural activities, night-time occupations, and population mobility; factors related to the virus itself, such as species variation and the duration of its life cycle within the vector; and vector-related aspects including mosquito population density, larval breeding sites, environmental temperature, and the physical, biological, and socioeconomic conditions of a region (Kandi et al., 2023). The combination of these factors demonstrates that the presence of vector mosquitoes and their interaction with humans in the transmission chain presents a significant challenge in controlling DHF.

In recent years, Indonesia has recorded a significant surge in DHF cases. According to InfoDATIN data from the Indonesian Ministry of Health in 2023, more than 90% of districts and cities in the country were affected by DHF between 2019 and 2022, with a national incidence rate reaching 52.12 per 100,000 population in 2022—far exceeding the 2020–2024 Strategic Plan target of fewer than 10 cases per 100,000 population (Pusdatin Kemenkes RI, 2023). The increase in DHF cases is influenced by several factors, including climate change, high population mobility, poor environmental sanitation, and delays in medical treatment. In Jember Regency, one of the areas that experienced a DHF outbreak was Arjasa Village, located in Arjasa Subdistrict, which has environmental conditions conducive to the breeding of Aedes aegypti mosquitoes, such as stagnant water and inadequate drainage systems (Jember Regency Health Profile, 2020). This phenomenon underscores the importance of empowering communities through educational activities, strengthening mosquito breeding eradication programs, and expanding access to healthcare services as strategic efforts for sustainable DHF control. Based on this background, the educational activity in Arjasa Village was carried out to enhance community understanding and involvement in DHF prevention and control at the local level.

So far, efforts to control DHF in communities have generally focused on the use of larvicides such as abate and the implementation of fogging to eliminate adult mosquitoes. However, several evaluations have indicated that these methods are less than optimal in reducing DHF incidence, especially when not supported by more comprehensive approaches (Ibrahim et al., 2016). This ineffectiveness is closely related to the complexity of the life cycle and behavior of Aedes spp. as the primary vector. In addition, the low level of public awareness regarding the importance of maintaining environmental cleanliness contributes to the proliferation of mosquito breeding sites, which directly increases the risk of DHF transmission. Therefore, disease control strategies must be designed in a comprehensive, sustainable manner and actively involve community participation in maintaining environmental hygiene as a key preventive measure.

In response to this situation, the community service team from the “Vector Biology” research group took part in supporting dengue prevention efforts in Jember Regency, particularly in Arjasa Village, Arjasa Sub-district. Therefore, education serves as an important initial step to improve residents’ understanding of the disease and the preventive methods that can be applied in daily life. This educational activity aims to provide accurate information about dengue, including its causes, modes of transmission, and preventive actions that can be independently undertaken, especially in maintaining the cleanliness of the home environment. Through this initiative, it is expected that behavioral changes will occur toward greater environmental health awareness, particularly in preventing the formation of breeding grounds for Aedes mosquitoes as the dengue vector. This effort aligns with the government's

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integrated and sustainable dengue control strategies and reinforces the role of the community as the frontline in environmental-based disease prevention.

METHOD

The implementation method of this activity was designed to provide solutions to the problems faced by the community regarding the spread and control of DHF, through several well-planned stages. The initial phase of this community service activity began with the preparation process, starting with obtaining permission from the village government officials, namely the Village Head and his staff in Arjasa Village, Arjasa Sub-district, Jember Regency. After receiving approval, further coordination was carried out with the Village Secretary and other officials to present the general plan of the activity and to ensure that the program would be implemented smoothly.

The next step was to develop educational materials in the form of a PowerPoint presentation that comprehensively covered DHF. The content included basic information about DHF, its impacts, causative factors, clinical symptoms, preventive measures, and available treatment options. To enhance the effectiveness of information delivery, a pocketbook was also prepared, containing a summary of practical information presented in simple language and supported by visual illustrations. The pocketbook was chosen as an additional medium because it is easy to carry, uses communicative language, and presents key points in a concise format, thereby helping participants to better focus on and understand the core of the educational material.

The next stage of this activity was the implementation phase, during which the community service team delivered educational materials on the prevention and control of DHF. The participants invited to take part in this activity were 30 people who came from Karang Taruna, the Family Welfare Movement (PKK), and Posyandu. The outreach was conducted through a PowerPoint presentation containing comprehensive information about DHF, including a general definition, associated risks and impacts, causative factors, clinical symptoms, preventive measures, and treatment methods. The presentation lasted approximately 60 minutes, followed by a 30-minute interactive discussion session that provided participants with an opportunity to ask questions and deepen their understanding of the topics presented. In addition, to support learning, participants were given a pocketbook containing a concise and illustrated summary of the material, which could be used as further reading and a reminder of important information.

The final stage of this activity was the evaluation phase, which aimed to measure the increase in participants' knowledge after attending the educational session. The evaluation was conducted by distributing a questionnaire containing 10 questions related to dengue fever and its prevention efforts. This questionnaire was administered twice: once before the educational session (as a pre-test) and once after the session concluded (as a post-test). Statistical analysis was performed based on the Wilcoxon test. The difference in scores between the pre-test and post-test served as an indicator to assess the effectiveness of the program.

RESULT AND DISCUSSION

The community service activity in the form of education on the prevention and treatment of DHF was carried out at the Arjasa Village Hall, Arjasa Subdistrict, Jember Regency (Figure 1). This location was chosen based on the status of Arjasa Village as an area with a high potential for dengue transmission,

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influenced by environmental factors such as the presence of stagnant water, inadequate drainage systems, and low public awareness of environmental cleanliness (Jember District Health Office, 2020). These conditions create an ideal habitat for the development of Aedes mosquitoes, the primary vector of dengue transmission. Therefore, this educational activity was conducted as part of a strategic preventive and promotive effort to support dengue control programs in endemic areas.

FIGURE 1. The location of the community education activity was at the Arjasa Village Office, Arjasa Subdistrict, Jember Regency, East Java Province

The participants of this activity were residents of Arjasa Village, representing various community organizations such as Karang Taruna, the Family Welfare Movement (PKK), and Posyandu. Information regarding participant profiles involved in the community education program is presented in Table 1. During the preparation phase, the proposal submitted by the community service team to the Arjasa Village Government was met with a positive response. This was because health education activities specifically addressing dengue prevention and control had rarely been conducted in the area. Coordination between the implementing team and village officials proceeded smoothly according to the planned schedule (Figure 2). The outcomes of this coordination included the determination of the activity location, provision of supporting facilities and infrastructure, delegation of roles between the service team and village apparatus, and the organization of participants who would attend the educational session.

All invited participants arrived punctually at the event location, reflecting the high level of enthusiasm from the community toward the educational material presented (Figure 3A). The activity began with a welcoming speech by a representative of the Arjasa Village Government, who also officially opened the event. This was followed by an introduction and explanation of the activity's objectives delivered by the Coordinator of the “Vector Biology” Community Service and Research Group (KeRis-DiMas) (Figure 3B). The main focus of this program was to enhance the knowledge and awareness of Arjasa Village residents regarding the prevention and control of dengue fever as a proactive effort to reduce the likelihood of future outbreaks.

The educational material was delivered by the community service implementation team, who systematically explained various aspects related to the prevention and control of dengue fever (Figures

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3C and 3D). Throughout the session, participants appeared engaged and enthusiastic, as reflected in the conducive atmosphere and their active use of writing tools and notebooks provided by the committee to take notes on the key points presented.

FIGURE 2. Location of the community education activity at the Arjasa Village Office, Arjasa Sub-district, Jember Regency, East Java Province

TABLE 1. Profile of Participants in the Community Education Activity

Characteristics	Category	Participants Number	Percentage
Sex	Male	9	30%
	Female	21	70%
Age	< 20 years	3	10%
	20 – 30 years	15	50%
	31 – 40 years	10	33,33%
	> 40 years	2	6,67%
Job	Working	12	40%
	Not Working	18	60%
Education	Unfinished elementary school	3	10%
	Finished elementary school/ equivalent	7	23,33%
	Finished junior high school/ equivalent	9	30%
	Finished senior high school/ equivalent	11	36,67%

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3A 3B

FIGURE 3. Community education activities in Arjasa Village, Arjasa District, Jember Regency

The educational materials in this activity were delivered alternately by the community service implementation team, covering systematically and comprehensively designed topics. The materials included an introduction to various mosquito-borne diseases, with a specific emphasis on DHF. The initial explanation provided a basic understanding of DHF, including its causative agent, as well as the role of the dengue virus, and a clarification on the differences among diseases transmitted by mosquitoes.

Next, the team explained the diversity of the Aedes mosquito species, including their life behavior as the primary vector of dengue transmission. The discussion also covered environmental factors that contribute to the continuation of the mosquito's life cycle, such as the presence of stagnant water, poor sanitation, and the lack of public awareness in maintaining environmental cleanliness. The mechanism of dengue transmission was also presented, from the mosquito bite process to the entry of the virus into the human body, along with the factors that influence the increase in case numbers.

The symptoms of dengue fever were also explained in detail, covering both mild and severe conditions, enabling participants to recognize early warning signs of the disease. The team further presented prevention strategies that can be independently applied by the community, including reducing direct contact with vector mosquitoes, eliminating mosquito breeding sites and larvae, using larvicides such as Abate, conducting fogging appropriately, and implementing the 3M Plus movement. To conclude, the session also discussed dengue treatment, ranging from first aid measures to medical procedures available at nearby healthcare facilities.

The interactive discussion session was conducted after the entire educational material had been delivered through a PowerPoint presentation enriched with images and educational videos to clarify the information. Participants showed high enthusiasm by actively asking questions about aspects they had not fully understood regarding DHF and its prevention strategies (Figures 4A and 4B). The community service team responded openly to these questions, providing detailed explanations supported by real-life case examples from the participants' own surroundings, which helped enhance understanding and made the material more relevant to their local context.

To support the learning process, all participants were also provided with a pocketbook containing a summary of the educational materials (Figure 5). Selecting the appropriate educational medium greatly influences the effectiveness of information delivery to the community (Anisa et al., 2022). The pocketbook was considered an efficient educational tool as it presented concise yet substantial content, complemented by visual illustrations, and was easy to carry and practical for repeated reading. The use of communicative language and narrative supported by images made the content easier for participants

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to understand. Moreover, the availability of the pocketbook allowed participants to access essential information even if parts of the presentation were missed or forgotten.

Overall, health education activities like this are an essential part of preventive efforts aimed at raising public awareness—particularly in shaping mindsets, attitudes, and clean and healthy lifestyle behaviors to prevent disease transmission (Fitrianingsih et al., 2021). By combining interactive material delivery with the use of supporting media such as pocketbooks, the information provided can be more effectively received and has the potential to encourage positive behavioral changes within the community.

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

FIGURE 5. Sample of the pocketbook containing educational materials on dengue fever prevention

The next stage in the series of educational activities was the evaluation session, conducted by the community service implementation team to assess the participants of the program. This evaluation aimed to measure the effectiveness of the educational material delivery related to DHF prevention and control, using a questionnaire-based instrument consisting of a pre-test and post-test. The pre-test was distributed before the presentation began to determine the participants' baseline knowledge, while the post-test was administered after the counseling and discussion sessions, using the same set of questions.

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Through the comparison of the pre-test and post-test results, an overview of the participants' improved understanding after the activity was obtained. The evaluation showed that the average pre-test score was 62%, while the average post-test score increased to 90%. This improvement indicates that prior to the educational activity, most participants had limited knowledge about DHF and the measures needed for its prevention and control (Harapan, 2018). The comparison of pre-test and post-test results is visually presented in Figure 6, further supporting the success of the activity in enhancing public knowledge and awareness regarding environmental health issues.

The evaluation of the success of the educational activity was analyzed using the non-parametric Wilcoxon test, which serves as an alternative statistical method for paired data that do not follow a normal distribution. This analysis aimed to determine whether there was a significant difference between participants' pre-test and post-test scores. The Wilcoxon test results showed a p-value of 0.001, which is below the significance threshold of 0.05. This finding indicates that there was a statistically significant difference in participants' knowledge levels before and after attending the educational session.

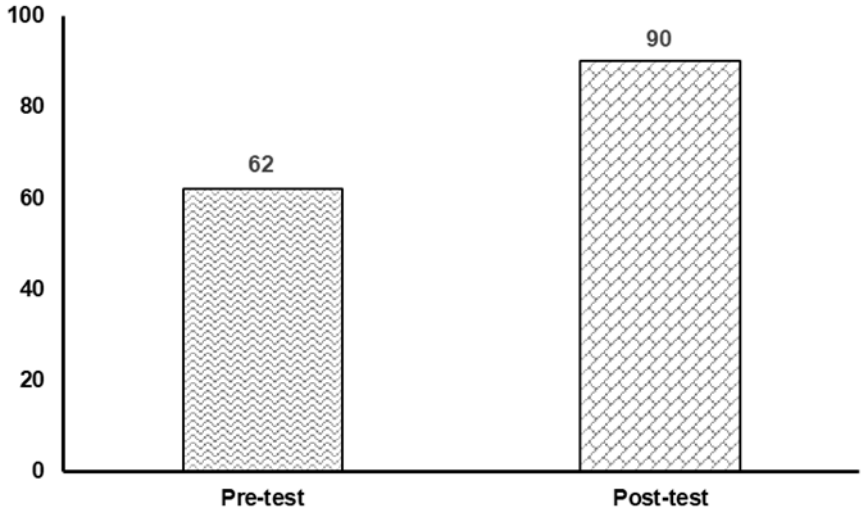

FIGURE 6. Pre-test and Post-test Results of Participants in the Educational Activity on Dengue Fever Prevention

Numerically, the average pre-test score of participants was 62%, while the average post-test score increased to 90%. This 28% difference indicates a significant improvement in participants' knowledge levels following the educational intervention. To further assess the effectiveness of the program, an effect size calculation was conducted, yielding an r value of 0.58. This value exceeds the 0.5 threshold and falls into the large effect category according to Cohen's (1988) classification. Therefore, it can be concluded that the educational intervention had a strong and significant impact on enhancing community understanding regarding the prevention and control of dengue fever.

Based on the average score results and statistical analysis conducted, it can be concluded that the educational activity successfully increased the knowledge of the Arjasa Village community regarding DHF and its prevention measures. This success is closely linked to the use of varied methods in delivering the material, such as presentation media, educational video screenings, interactive discussions, and the distribution of pocketbooks. This combination of methods proved effective in strengthening participants' understanding and encouraging more positive attitudes toward dengue prevention. Moreover, the pocketbook served as an efficient and easily comprehensible health education tool for the community (Marcus et al., 2017).

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Based on the participant profile data, most individuals who took part in this educational activity were housewives, accounting for 60% (Table 1). This finding aligns with previous studies indicating that housewives often still face limitations in knowledge and attitudes regarding the importance of maintaining environmental cleanliness (Ramadhanti et al., 2022). Poorly maintained residential environments—such as stagnant water, overgrown yards, and the habit of hanging clothes indoors—significantly contribute to the life cycle of Aedes aegypti mosquitoes, thereby increasing the risk of dengue fever transmission (Makrufardi et al., 2021).

Preventive measures such as draining and covering water storage containers, clearing yards of shrubs, and maintaining household environmental hygiene have been proven effective in reducing resting places for Aedes mosquitoes, thereby decreasing the potential for disease transmission (Makrufardi et al., 2021). Another study conducted in the Tanjungpinang area demonstrated that routinely cleaning water storage containers at least once a week and keeping them tightly covered significantly reduced the presence of Aedes larvae (Daswito & Samosir, 2022). In addition, the use of larva-eating fish as a biological control agent in household water storage has also been found effective in suppressing mosquito larval populations (Widyanto et al., 2013).

Therefore, it is expected that housewives who have received education through this program can serve as driving forces for change within their communities. Their active role is crucial in fostering a sense of environmental awareness and initiating preventive measures at the household level to reduce the risk of Dengue Fever transmission in Arjasa Village.

The evaluation of the success of the educational activity was conducted using the non-parametric Wilcoxon statistical test to determine differences in participants' knowledge levels before and after the intervention. The analysis revealed a p-value of 0.001, which is lower than the significance threshold of 0.05, indicating a statistically significant difference between the pre-test and post-test results. The average pre-test score was recorded at 62%, while the post-test score increased to 80%, reflecting a 28% improvement in understanding. Additionally, an analysis of effectiveness using effect size calculation yielded an r value of 0.58, which is considered high according to Cohen (1988). These results indicate that the educational intervention had a substantial impact on increasing participants' knowledge.

These findings indicate that the educational activity conducted in Arjasa Village successfully achieved its objective of increasing public awareness and understanding regarding the prevention and control of DHF. This success was supported by the use of diverse delivery strategies, including visual presentations, educational video screenings, interactive discussions, and the distribution of pocketbooks. The pocketbook was considered effective as a supplementary medium because it contained concise, illustrative, and easy-to-understand information, thus helping to reinforce participants' comprehension (Marcus et al., 2017). Overall, this combination of methods made a tangible contribution to promoting changes in community attitudes toward DHF prevention efforts.

Based on participant profile data, most participants in the educational activity in Arjasa Village were housewives, accounting for 70% (Table 1). This group generally still faces limitations in knowledge and attitudes regarding the importance of maintaining environmental cleanliness (Ramadhanti et al., 2022). Poorly maintained residential environments—such as standing water, overgrown yards, and the habit of hanging clothes indoors—are factors that support the life cycle of Aedes aegypti mosquitoes, thereby increasing the risk of DHF transmission (Makrufardi et al., 2021). Preventive measures such as covering water containers, clearing bushes, and tidying up yards have proven effective in reducing mosquito resting places and lowering the risk of DHF transmission. A study in Tanjungpinang also showed that cleaning and covering water storage containers at least once a week significantly reduces the

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population of Aedes larvae (Daswito & Samosir, 2022). In addition, using larva-eating fish as biological control agents in household water containers has also been effective in suppressing mosquito larvae populations (Widyanto et al., 2013). Therefore, it is expected that the housewives who received education through this program can become active agents of change, foster a caring attitude and encourage community participation in Arjasa Village to maintain environmental hygiene as a concrete step toward DHF prevention.

Most participants in the educational activity in Arjasa Village were under the age of 40, accounting for 93,3% (Table 1), indicating a dominance of younger participants. This finding presents a positive potential in efforts to control DHF, as a study by Rakhmani et al. (2018) suggests that as individuals age, their tendency to engage proactively in DHF prevention tends to decline. Active participation from younger individuals can serve as a crucial asset in driving behavioral change within the community, particularly in maintaining environmental cleanliness and implementing preventive actions. The high enthusiasm and active involvement observed throughout the activity also reflect an awareness and readiness among the younger generation to contribute to DHF prevention efforts in their living environment.

Based on the distribution of participants' education levels, the majority of those who took part in the educational activity in Arjasa Village had completed basic to secondary education (elementary, junior high, senior high school, or equivalent), with a percentage of 90%, while only 10% had not completed basic education (Table 1). This indicates that most participants had an adequate educational background to receive, comprehend, and apply the information provided regarding efforts to control DHF. Education plays a crucial role in shaping disease prevention behavior, as individuals with higher levels of education tend to possess better knowledge and engage in more active preventive actions. Studies by Funna et al. (2024) and Sutriyawan et al. (2023) also support the notion that low education levels can be a barrier to understanding risks and may reduce community participation in effective DHF control efforts.

Most participants in this educational activity came from groups without formal employment, accounting for 60%, while the remaining 30% were employed (Table 1). Employment status is closely related to the potential risk of exposure to DHF, where unemployed participants—mostly housewives—tend to have a lower risk due to their predominantly indoor activities and limited exposure to outdoor environments at night. The active participation of housewives in this educational activity adds value, considering their strategic role in disseminating health information within their families and communities. The information gained during the activity can be easily shared with household members and neighbors, thereby contributing to a wider dissemination of knowledge on DHF prevention and control efforts within the community.

The prevention of DHF requires a comprehensive approach, one of which is the adoption of clean and healthy living behaviors such as the 3M Plus principle. This includes regularly draining water containers, tightly covering water storage vessels, and eliminating or recycling used items that may serve as breeding grounds for Aedes aegypti mosquitoes. These efforts can be further strengthened by additional measures such as installing wire mesh on ventilation openings to prevent mosquitoes from entering the house (Rakhmani et al., 2018). Alfalakh (2023) found that adherence to the 3M Plus behavior significantly reduces the risk of contracting DHF, with an odds ratio of 5.84—indicating that individuals who adopt these habits are five times more likely to avoid DHF compared to those who do not. Moreover, the use of mosquito repellents in various forms—such as coils, electric devices, or lotions—serves as an important additional layer of protection, especially for those who engage in outdoor activities at night. The combination of physical and chemical control strategies has proven

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effective in reducing mosquito populations and enhancing community protection against DHF transmission.

This educational activity aimed to improve public knowledge and understanding regarding the prevention and control of DHF, with the hope of fostering attitudes and behaviors that are more concerned with environmental cleanliness. The knowledge a person acquires from received information directly influences their perspective and daily actions; the more frequently someone accesses information, the better their level of knowledge tends to be (Budiman & Riyanto, 2014). Individuals with a good level of knowledge are generally more inclined to adopt healthy lifestyle behaviors (Notoatmodjo, 2010). However, community habits related to environmental cleanliness are often difficult to change, as they are deeply rooted in long-standing cultural practices. Although various DHF prevention campaigns have been conducted, public understanding and practical implementation remain relatively low and inconsistent (Sulistyawati et al., 2019). A lack of awareness about the importance of sanitation is one of the main obstacles in mosquito breeding site eradication efforts, making health education a strategic step (Harapan et al., 2018). Additionally, low concern for unhealthy environmental conditions also hinders community involvement in DHF prevention efforts (Rakhmani et al., 2018). Through this educational program, it is expected that a positive change will occur in the mindset and behavior of the people in Arjasa Village, leading to a cleaner environment and reduced risk of DHF transmission.

Overall, the educational activity conducted in Arjasa Village, Arjasa Subdistrict, Jember Regency ran smoothly and without significant obstacles. The collaboration between the implementation team, the local village government, and the community was effective, as reflected in the high enthusiasm and active participation of residents in each session. Evaluation results showed an increase in participants' knowledge regarding the prevention and management of DHF. This activity served as an effective means of delivering information, not only broadening the community's understanding of the clinical and ecological aspects of DHF but also fostering collective awareness of the importance of maintaining environmental cleanliness. This awareness directly contributes to reducing the potential for the proliferation of DHF vectors, namely Aedes mosquitoes. Thus, the residents of Arjasa Village are expected to play an active role in the sustainable prevention and control of DHF, especially in areas with a high endemic risk.

CONCLUSION

The implementation of the community education program on the prevention and management of DHF in Arjasa Village, Arjasa Subdistrict, Jember Regency, proceeded smoothly and according to plan. Good collaboration between the service team, village officials, and community members as participants created a conducive and effective educational atmosphere. The program yielded positive results, marked by a 28% increase in participants' knowledge after attending the series of activities. This success was supported by diverse delivery methods, including material presentations, informative video screenings, participatory discussions, and the distribution of pocket books as supplementary media. With the knowledge gained, the people of Arjasa Village are expected to become active agents in the independent and sustainable prevention of DHF, especially considering the area’s high potential for disease transmission. It is recommended that follow-up evaluations be conducted to measure whether the increased knowledge translates into sustained behavioral changes in DHF prevention.

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