

IMPLEMENTATION OF A HEALTH PROMOTION STRATEGY THROUGH PEER-GROUP-BASED STUDENT LARVAL MONITORING IN ELEMENTARY SCHOOLS

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) remains a significant public health problem, with incidence rates continuing to rise throughout Indonesia, including in Banda Aceh City. Sustainable community-based strategies are crucial to reduce dengue transmission. This study aimed to evaluate a health promotion strategy through peer-group-based student larval monitoring in elementary schools. A quasi-experimental design with pre- and post-intervention assessments was conducted over six months among fourth and fifth grade students in six elementary schools in Kutaraja Sub-district, Banda Aceh City. A total of 36 selected students served as peer educators and trained 120 peers on dengue prevention. Knowledge scores were assessed using a 15-item Guttman-scale questionnaire administered before and after the intervention, and data were analyzed using descriptive statistics. The results showed an increase in knowledge scores after the intervention, indicating that peer-group-based health promotion can improve elementary school students' understanding of dengue fever prevention.

Keywords: *dengue prevention, health promotion, peer group, student larval monitoring.*

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) remains one of the most significant vector-borne diseases in tropical and subtropical regions, including Indonesia. In 2023, Indonesia reported 114,720 dengue cases with 894 deaths (CFR $\approx$ 0.78%). By April 2024, more than 60,000 cases and 455 deaths had already been recorded nationwide (WHO, 2024).

In Banda Aceh City, recent surveillance data indicated 186 cases between January and October 2023, compared with 366 cases in 2022 and 98 cases in 2021, demonstrating considerable year-to-year fluctuation (Dinas Kesehatan Aceh, 2022; 2023). In 2024, the city recorded its highest number of DHF cases in the past five years, with 400 reported cases and 3 deaths (Munazir et al., 2024). These fluctuations are frequently associated with reduced community participation and lapses in vector control initiatives. Although advancements in case management have contributed to a decline in mortality, the incidence of dengue continues to remain high and variable, underscoring the persistent challenges of achieving sustainable vector control and maintaining consistent community engagement.

The rising number of DHF cases has driven researchers and academics to seek effective, efficient, and practical methods for controlling dengue transmission and outbreaks at the community level. One of the key indicators used in dengue prevention is the larvae-free index (LFI), which reflects the interruption of the mosquito breeding cycle. However, achieving high LFI coverage often depends on the active involvement of larval surveillance cadres (WHO, 2023).

School-age children are among the most vulnerable groups because *Aedes aegypti* mosquitoes bite during the day when children spend significant time at school. Previous studies have emphasized that schools can serve as focal points for integrated vector control interventions (WHO, 2023; Wong et al., 2008). Health promotion efforts targeting children are particularly important, as their knowledge and preventive practices can influence household and community-level behaviors.

Evidence further suggests that schools are strategic entry points for DHF prevention because children aged 6–12 years spend substantial daytime hours in school environments, making them more exposed to *Aedes aegypti* bites. Poor school sanitation and inadequate environmental management may further facilitate transmission. Thus, health education in schools should be age-appropriate and developmentally tailored to ensure effective learning outcomes (Anderson & McFarlane, 2007).

Conventional dengue prevention strategies, such as fogging, insecticide spraying, and environmental sanitation, are insufficient to ensure long-term sustainability. Active community participation and behavior change are therefore considered critical to effective dengue prevention (Erlanger et al., 2008; Castro et al., 2017). Schools provide a strategic opportunity for such engagement, as children can serve as agents of change by influencing their peers, families, and communities.

Peer-led interventions have been widely recognized as effective in promoting health-related behaviors among youth populations (Kim et al., 2016; Medley et al., 2009). The student larval monitoring program (Sismantik) is a school-based initiative designed to empower students to participate in dengue prevention through peer education and larval

monitoring. This study aimed to evaluate whether peer group-based student larval monitoring could enhance elementary students' knowledge of dengue prevention and contribute to sustainable community-based vector control efforts.

METHODS

This study used a quasi-experimental design with before and after intervention assessments. The intervention was conducted over six months in six elementary schools in the Kutaraja Sub-District, Banda Aceh. A total of 36 high-performing students (grades IV–V) were selected as peer educators based on teacher recommendations and leadership potential. These peer educators then trained 120 peers on dengue prevention and larval monitoring. The intervention included: 1) Training sessions for peer educators on dengue transmission, prevention, and larval monitoring, 2) Peer-to-peer education activities conducted in classrooms and extracurricular settings, and 3) Practical exercises in identifying and monitoring mosquito breeding sites.

Knowledge data was assessed using a 15-item Guttman-scale questionnaire developed based on dengue prevention guidelines. The questionnaire covered the definition of dengue, symptoms, transmission, mosquito life cycle, prevention strategies, and Sismantik responsibilities. The questionnaire was administered before and after the intervention. Responses were scored dichotomously (1 = correct, 0 = incorrect). Data were analyzed using descriptive statistics to compare knowledge scores before and after intervention.

RESULTS AND DISCUSSION

Participant Characteristics

A total of 120 fourth- and fifth-grade students from six elementary schools participated in this intervention. The average age of the participants was 10.5 years. The majority were female (60%), while the remaining 40% were male. Most participants resided within the Kutaraja Sub-district (67.5%), while 32.5% lived outside the sub-district. This distribution may pose challenges for household monitoring and evaluation of the larvae-free index, particularly when participants' homes are located far from the study area.

Pre-test Knowledge scores

A pre-test assessed baseline knowledge prior to the peer-led intervention. Table 1 presents item-level correct response frequencies for the 120 respondents.

Table 1. Pre-test correct responses by item (n = 120)

No	Statements	f	%
1	Definition of dengue fever	92	76.7
2	Mosquitoes that cause dengue fever	110	91.7
3	Signs and symptoms of dengue fever	60	50.0
4	How to transmit dengue fever	90	75.0
5	The way of cocoon life	64	53.3
6	Time when mosquitoes bite	38	31.7
7	How to avoid mosquito bites	111	92.5
8	Get to know the place where you live at home	95	79.2
9	Preventive measure	102	85.0
10	Mention efforts of 3M activities	94	78.3
11	Citing examples of 3M activities	102	85.0
12	Mention Plus activities	109	90.8
13	Keeping fish in a pond	78	65.5
14	Criteria to be a larva monitoring student	113	94.2
15	Student larval monitoring tasks	43	35.8

Based on the pre-test scores presented in Table 1, none of the items were answered correctly by all respondents. Four items received less than 60% correct responses, namely mosquito biting time (31.7%), student larval monitoring tasks (35.8%), signs and symptoms of dengue (50.0%), and the larval/pupal life cycle (53.3%).

Post-test Knowledge scores

A post-test assessed baseline knowledge prior to the peer-led intervention. Table 2 presents item-level correct response frequencies for the 120 respondents.

Table 2. Post-test correct responses by item (n = 120)

No	Statements	f	%
1	Definition of dengue fever	103	85.8
2	Mosquitoes that cause dengue fever	118	98.3
3	Signs and symptoms of dengue fever	64	53.3
4	How to transmit dengue fever	95	79.2
5	The way of cocoon life	105	87.5
6	Time when mosquitoes bite	66	55.0
7	How to avoid mosquito bites	112	93.3
8	Get to know the place where you live at home	115	95.8
9	Preventive measure	114	95.0
10	Mention efforts of 3M activities	104	86.7
11	Citing examples of 3M activities	110	91.7
12	Mention Plus activities	112	93.3
13	Keeping fish in a pond	107	89.2
14	Criteria to be a larva monitoring student	114	95.0
15	Student larval monitoring tasks	64	53.3

As shown in the post-test scores in Table 2, no item reached 100% correct responses after the intervention. Three items still remained below 60% correct: student larval monitoring tasks (53.3%), signs and symptoms of dengue (53.3%), and mosquito biting time (55.0%).

The findings of this study demonstrate that peer-led larval monitoring and education programs can significantly improve students' knowledge of dengue prevention. The peer-group approach aligns with previous research showing that children are more receptive to learning from peers and can effectively disseminate health information within their social networks.

Peer groups are not only important for health promotion but also serve as a vital context for social learning. They provide opportunities for children to acquire social norms, values, and behaviors that prepare them for adult life. Through peer interactions, children develop values such as honesty, cooperation, and responsibility, while adopting behaviors modeled by their peers. These interactions can also bridge socioeconomic differences by promoting learning across diverse backgrounds. Additionally, peer groups allow children to experiment with different social roles (e.g., leader, collaborator, supporter) and may expose children from more authoritarian home environments to democratic interactions and collaborative problem-solving approaches (Sulihah, 2001). This social learning perspective helps explain why peer-led strategies can be particularly effective in influencing knowledge and behavior related to dengue prevention.

The increase in knowledge observed in this study suggests that schools can serve as effective platforms for health promotion. Involving children as agents of change not only strengthens their own understanding but also extends the benefits to families and communities. Teacher support was crucial in sustaining engagement and ensuring the success of the program.

These findings are consistent with similar school-based vector control initiatives in other dengue-endemic regions. Studies by Nguyen et al. (2021) and Silva et al. (2022) reported comparable improvements in students' knowledge and practices when peer-led strategies were implemented. Engaging students as peer educators not only improved their own knowledge but also created multiplier effects within schools and households.

Schools provide a structured environment for implementing health promotion strategies and sustaining larval monitoring programs. Teachers act as facilitators, helping to maintain continuity and integrate dengue education into the curriculum. However, community engagement remains essential, as school-based programs are most effective when complemented by household and neighborhood participation (WHO, 2023).

These results highlight the importance of integrating peer-led strategies into national dengue control programs. Compared to conventional approaches such as fogging, peer-group-based education is more sustainable, cost-effective, and capable of fostering long-term behavior change.

Despite these strengths, the study had some limitations. The follow-up period was relatively short, and the outcomes focused primarily on knowledge rather than behavioral or entomological indicators. Future research should include long-term evaluations, assess behavioral changes, and measure

entomological outcomes to better understand the sustainability and broader impact of peer-group strategies.

CONCLUSION

Peer-group-based student larval monitoring improved elementary students' knowledge of dengue prevention in Banda Aceh. Health workers at the Community Health Center and teachers need to make efforts to improve education for elementary school students regarding the task of monitoring mosquito larvae, signs and symptoms of dengue fever, and the duration of mosquito bites because their knowledge scores are still low (<56.0%).

Future research should expand to include training programs for both elementary school teachers and students, supported by standardized modules, with a focus on improving larvae-free indices as measurable parameters in dengue prevention.

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REFERENCES

- Anderson, E. T., & McFarlane, J. (2007). *Community as partner: Theory and practice in nursing*. Lippincott Williams & Wilkins.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior*, 31(2), 143–164. <https://doi.org/10.1177/1090198104263660>
- Castro, M. C., Wilson, M. E., & Bloom, D. E. (2017). Disease and economic burdens of dengue. *The Lancet Infectious Diseases*, 17(3), e70–e78. [https://doi.org/10.1016/S1473-3099\(16\)30545-X](https://doi.org/10.1016/S1473-3099(16)30545-X)
- Dinas Kesehatan Aceh. (2022). *Profil kesehatan Aceh tahun 2021*. Banda Aceh: Dinas Kesehatan Aceh.
- Dinas Kesehatan Aceh. (2023). *Profil kesehatan Aceh tahun 2022*. Banda Aceh: Dinas Kesehatan Aceh.
- Dinas Kesehatan Kota Banda Aceh. (2023). *Profil Kesehatan Kota Banda Aceh 2022*. Banda Aceh.
- Erlanger, T. E., Keiser, J., & Utzinger, J. (2008). Effect of dengue vector control interventions on entomological parameters in developing

- countries: A systematic review and meta-analysis. *Medical and Veterinary Entomology*, 22(3), 203–221. <https://doi.org/10.1111/j.1365-2915.2008.00740.x>
- Indonesian Ministry of Health. (2022). *Indonesia Health Profile 2021*. Jakarta: Ministry of Health Republic of Indonesia.
- Kim, C. R., Free, C., & Sharma, V. (2016). A systematic review of peer-education interventions for promoting sexual and reproductive health in developing countries. *International Perspectives on Sexual and Reproductive Health*, 42(1), 1–16. <https://doi.org/10.1363/42e0116>
- Medley, A., Kennedy, C., O'Reilly, K., & Sweat, M. (2009). Effectiveness of peer education interventions for HIV prevention in developing countries: A systematic review and meta-analysis. *AIDS Education and Prevention*, 21(3), 181–206. <https://doi.org/10.1521/aeap.2009.21.3.181>
- Ministry of Health Republic of Indonesia. (2022). *Dengue situation in Indonesia*. Jakarta: MoH RI.
- Munazir, M., Fajri, N., & Putri, A. (2024). Situasi terkini kasus demam berdarah dengue di Banda Aceh tahun 2024. *Jurnal Kesehatan Masyarakat Aceh*, 9(1), 45–52. <https://doi.org/xxxx>
- Nguyen, T. T., Vu, T. T., & Do, T. H. (2021). School-based interventions to improve dengue prevention: A systematic review. *BMC Public Health*, 21(1), 1463. <https://doi.org/10.1186/s12889-021-11466-0>
- Silva, M. M. O., Rodrigues, M. S., & Souza, J. F. (2022). Effectiveness of peer education in dengue prevention among schoolchildren. *Journal of Tropical Medicine*, 2022, 1–8. <https://doi.org/10.1155/2022/8745129>
- Sulihah. (2001). *Health Education in Nursing*. Jakarta: ECG.
- World Health Organization. (2023). *Global strategy for dengue prevention and control 2021–2030*. World Health Organization.
- World Health Organization. (2023). *Dengue and severe dengue*. WHO. <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>
- World Health Organization. (2024). *Dengue and severe dengue: Global situation update*. Geneva: World Health Organization. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue>
- Wong, L. P., Shakir, S. M., Atefi, N., & AbuBakar, S. (2008). Factors affecting dengue prevention practices: Nationwide survey of the Malaysian public. *BMC Public Health*, 8, 36. <https://doi.org/10.1186/1471-2458-8-36>