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The effectiveness of flash cards as a tool for educating elementary school students on the prevention of dengue hemorrhagic fever (DHF)

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Abstract

Background: Dengue Hemorrhagic Fever (DHF) remains a public health problem in Indonesia, including Jambi City. Low levels of knowledge and preventive attitudes toward DHF among school-age children may increase the risk of disease transmission. Flash card media was selected as an educational medium because it is visual, attractive, and suitable for elementary school students' learning characteristics.

Purpose: to determine the effectiveness of flash card media as DHF prevention education for elementary school students.

Method: a quasi-experimental design with a pretest-posttest control group approach. The research was conducted at SD Negeri 31 Jambi City as the intervention group and SD Negeri 02 Jambi City as the control group. The sample consisted of 68 respondents, including 34 students in the intervention group and 34 students in the control group. Data were collected using questionnaires on DHF prevention knowledge and attitudes. Data analysis was performed using paired t-test and Wilcoxon test with a 95% confidence level.

Results: The results showed that the mean knowledge score in the intervention group increased from 9.82 to 12.12 with a p-value of 0.000 ($p < 0.05$). The mean attitude score in the intervention group also increased from 29.35 to 30.91 with a p-value of 0.004 ($p < 0.05$). Meanwhile, the control group showed no significant improvement in students' knowledge and attitudes.

Conclusion: flash card media is effective in improving knowledge and attitudes toward Dengue Hemorrhagic Fever (DHF) prevention among elementary school students in Jambi City. Flash card media can be used as an alternative health promotion medium that is attractive and easy for school-age children to understand.

Keywords: Attitude; Dengue Hemorrhagic Fever; Flash Card; Health Education; Knowledge.

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a vector-borne disease that remains a global public health problem. The World Health Organization reports that the number of dengue cases has increased significantly over the past two decades, from approximately 500,000 cases in 2000 to more than 5 million cases in (World Health Organization, 2023). In 2024, the WHO again reported a surge in dengue cases across various countries, with more than 14 million cases and thousands of deaths reported globally (Haider, Hasan, Onyango, Billah, Khan,

Papakonstantinou, & Asaduzzaman, 2025; World Health Organization, 2024).

Indonesia is among the countries with a high burden of dengue hemorrhagic fever (DHF). The Ministry of Health of the Republic Indonesia reported that dengue fever cases continue to occur in nearly all provinces, with an increase in cases in several regions during the 2023–2024 period (Ministry of Health of the Republic of Indonesia., 2024). This situation indicates that efforts to prevent and control dengue fever remain a national public health priority.

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Dengue hemorrhagic fever is caused by the dengue virus, which is transmitted through the bites of *Aedes aegypti* and *Aedes albopictus* mosquitoes (Kok, Lim, Lim, Lai, Leow, & Leow, 2023). Environmental factors such as standing water, poor sanitation, population density, climate change, and low levels of preventive behavior among the public contribute to an increased risk of dengue fever transmission (Wulandari, Rahmawati, Asyary, & Nugraha, 2023; Monira, Karunarathna, Ezazul, Iqbal, Sayeed, & Hassan, 2025). Therefore, a preventive approach through community empowerment and health education is a critical strategy.

Efforts to prevent Dengue Fever in Indonesia focus on eliminating mosquito breeding sites through the implementation of the 3M Plus program and the "1 House, 1 Jumantik" (G1R1J) Movement (Farchanny, Widada, Subahagio, Simanjuntak, & Adhi, 2016; Ministry of Health of the Republic of Indonesia, 2022). The success of these programs is greatly influenced by the level of public knowledge and attitudes toward dengue fever prevention. Therefore, health education must be provided from an early age so that preventive behaviors can be established sustainably.

Elementary school-aged children are a prime target group for health education because they are in the concrete operational stage according to Piaget's theory of cognitive development. At this stage, children find it easier to understand information conveyed through visual media and real-life experiences than abstract concepts (Khiyarusoleh, 2016; Mu'min, 2013; Susanto & Wulandari, 2024). In addition, elementary school students can serve as agents of change by disseminating health information to their families and surrounding communities.

One educational tool well-suited to the characteristics of elementary school students is flashcards. Flashcards are a visual learning tool that presents images and brief information, thereby enhancing students' attention, understanding, and memory (Marbun & Nurhayatun, 2023; Arsyad, 2019). A other study showed that the use of educational

flashcards can improve the short-term memory of elementary school students (Safitri, Anggraeni, Hajija, Maya, & Shofia, 2025). Other studies have also found that flashcards are effective in improving science learning outcomes, reading skills among children with dyslexia, and understanding of scientific concepts among elementary school students (Rudiyanto, Kustiyowati, & Darsan, 2024; Adella & Lestari, 2024; Fauziyah, Ali, & Ismail, 2024).

Although the effectiveness of flashcards in education has been extensively studied, research on the use of flashcards as an educational tool for dengue fever prevention among elementary school students remains limited, particularly in the city of Jambi. Therefore, this study aims to analyze the effectiveness of flashcards in improving knowledge and attitudes toward dengue fever prevention among elementary school students in the city of Jambi.

RESEARCH METHOD

This study employed a quasi-experimental design with a pretest-posttest control group design. The study was conducted at SD Negeri 31 in Jambi City as the experiment group and SD Negeri 02 in Jambi City as the control group in April 2026. The study population consisted of all fifth-grade students at both schools. The sample comprised 68 respondents, consisting of 34 students in the treatment group and 34 students in the control group. The Slovin formula was used for sampling.

The treatment group received education using flashcards through the small group discussion method, while the control group received education using the lecture method. Data collection was conducted using a questionnaire on knowledge and attitudes toward dengue fever prevention, administered before the intervention (pretest) and after the intervention (posttest). Data analysis was performed descriptively and bivariate. The paired t-test was used to determine differences in pretest and posttest scores within the same group, while the Wilcoxon test was used when the data were not normally distributed. The significance level used was 95% ($p < 0.05$).

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RESEARCH RESULTS

Tabel 1. Characteristics of Respondent (N=68)

Variable	Experiment	Control
Age (Mean±SD) (Range) (Years)	(11.21 ± 0.51) (9-10)	(10.91 ± 1.04)
9-10	5/14.7	10/29.4
11-12	29/85.3	24/70.6
Gender (n/%)		
Male	15/44.1	16/47.1
Female	19/55.9	18/52.9

Table 1 shows that the average age of respondents and standard deviation of the experimental group was (11.21 ± 0.51) and in the control group (10.91 ± 1.04) with an age range of (9-10). The majority of respondents were female, totaling 37 students (54.4%), while male respondents numbered 31 students (45.6%).

Table 2. Changes in Knowledge and Attitude Scores for the Treatment Group

Variable	Pre-Test Mean	Post-Test Mean	p-value
Knowledge	9.82	12.12	0.000
Attitude	29.35	30.91	0.004

Table 2. show the statistical test showed a p-value of 0.000 ($p < 0.05$), indicating a significant increase in knowledge following the educational intervention using flashcards. Analysis showed a p-value of 0.004 ($p < 0.05$), indicating that there was an improvement in students' attitudes toward dengue fever prevention after receiving education using flashcards. In the control group, there were no significant differences in students' knowledge and attitudes.

DISCUSSION

The results of the study show that flashcards are effective in improving students' knowledge of dengue fever prevention. This improvement may be due to the fact that flashcards present information in a visual format that is easy for elementary school students to understand. Because students at this stage of cognitive development are in the concrete operational stage, they find it easier to understand information conveyed through images than through verbal explanations alone.

This finding is consistent with other study showing that flashcards can improve short-term memory in

elementary school students (Safitri et al., 2025), as well as a other study finding that flashcards are effective as a health education tool (Wahyuni & Amareta, 2019)

The improvement in students' attitudes following the intervention indicates that flashcards not only enhance cognitive aspects but also influence affective aspects. According other study attitude formation is influenced by an individual's knowledge. The better a person's knowledge, the greater the likelihood of developing a positive attitude toward a particular health behavior ((Notoatmodjo, 2014),

Nevertheless, the results of the between-group analysis indicate that the improvement in attitudes was not yet significantly different from that of the control group. This may be due to the relatively short duration of the intervention, the influence of the family environment, and students' pre-existing habits.

CONCLUSION

Flashcards are an effective tool for improving knowledge and attitudes regarding the prevention of dengue fever (DF) among elementary school

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students. There was a significant improvement in students' knowledge and attitudes after they received education using flashcards compared to the lecture method.

SUGGESTION

Schools are encouraged to utilize flashcards as an alternative educational tool for health education in the school setting, teachers can use interactive visual aids to increase students' interest in learning and their understanding of health, community health centers and health agencies can develop health promotion programs based on visual aids for school-aged children and future researchers are encouraged to develop more innovative educational media and conduct studies with larger sample sizes.

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The effectiveness of flash cards as a tool for educating elementary school students on the prevention of dengue hemorrhagic fever (DHF)

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