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The Influence of B-SE on the Health Behavior of Santri Islamic Boarding School Related to Dengue Fever Prevention

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Abstract

Dengue Hemorrhagic Fever (DHF) is a significant health issue in tropical regions, including Indonesia, particularly in environments like Islamic boarding schools with high population density and sanitation challenges. This study evaluates the effectiveness of Booklet-Self Education (B-SE) in improving knowledge and clean and healthy living behavior (PHBS) among students for DHF prevention. Using a quasi-experimental pretest-posttest group design, 204 female students were divided into experimental and control groups, each with 102 participants. The experimental group received B-SE-based health education. Results revealed a significant improvement in the knowledge and PHBS practices of the experimental group, with a p-value of 0.000 ($p < 0.05$). These findings highlight the potential of B-SE as an effective educational tool for fostering PHBS and preventing DHF in boarding school settings. The study suggests that incorporating such educational media into health programs can reduce DHF prevalence and enhance public health awareness in similar environments.

Keywords: B-SE; Dengue Hemorrhagic Fever; PHBS; Prevention; Health education.

Abstrak

Demam Berdarah Dengue (DBD) merupakan masalah kesehatan signifikan di wilayah tropis, termasuk Indonesia, terutama di lingkungan pesantren dengan kepadatan penduduk tinggi dan tantangan sanitasi. Penelitian ini mengevaluasi efektivitas Booklet-Self Education (B-SE) dalam meningkatkan pengetahuan dan perilaku hidup bersih dan sehat (PHBS) santri untuk pencegahan DBD. Menggunakan desain eksperimen semu dengan pretest-posttest, sebanyak 204 siswi dibagi menjadi kelompok eksperimen dan kontrol masing-masing berjumlah 102 peserta. Kelompok eksperimen menerima edukasi kesehatan berbasis B-SE. Hasil penelitian menunjukkan peningkatan signifikan dalam pengetahuan dan praktik PHBS pada kelompok eksperimen dengan p-value sebesar 0,000 ($p < 0,05$). Temuan ini menyoroti potensi B-SE sebagai alat edukasi yang efektif untuk mendorong PHBS dan pencegahan DBD di lingkungan pesantren. Studi ini menyarankan integrasi media edukasi seperti ini ke dalam program kesehatan untuk mengurangi prevalensi DBD dan meningkatkan kesadaran kesehatan masyarakat di lingkungan serupa.

Kata Kunci: B-SE; Demam Berdarah Dengue; PHBS; Pencegahan; Edukasi kesehatan.

1 Introduction

Dengue Hemorrhagic Fever (DHF) is a significant health problem in tropical regions, including Indonesia, where the disease has become endemic (Wang et al., 2020). DHF is caused by the dengue virus, which is transmitted through the bite of the *Aedes aegypti* mosquito. This virus can spread rapidly, especially in unhealthy and densely populated environments (Kularatne & Dalugama, 2022). According to data from the Indonesian Ministry of Health, DHF cases in Indonesia reach more than 88,000 cases with a significant mortality rate each year, making DHF one of the diseases requiring special attention in prevention and control efforts (Harapan et al., 2019).

Pesantren, as religious-based educational institutions that house many students (*santri*), often face specific challenges related to sanitation and environmental health (Farhany et al., 2023). The crowded environment and lack of cleanliness in some pesantrens, such as standing water and garbage accumulation, can become breeding grounds for *Aedes Aegypti* mosquitoes, the primary vector for DHF transmission (Lubis et al., 2021). This condition is exacerbated by the lack of awareness and knowledge among students about clean and healthy living behavior (PHBS), which can prevent DHF (Andayani et al., 2023).

Improving students' knowledge and awareness of PHBS is crucial in preventing the spread of DHF in pesantren environments. One method to

enhance this awareness is through Booklet-Self Education (B-SE), a self-education medium in the form of a booklet. B-SE is designed to deliver health information interactively and engagingly, helping students better understand and apply PHBS. Educational media like B-SE have been proven effective in increasing public knowledge and awareness of the importance of maintaining environmental cleanliness and health (Gouge et al., 2023)

Improving students' knowledge and awareness of Personal Hygiene and Sanitation Behaviors (PHBS) is essential in preventing the spread of Dengue Hemorrhagic Fever (DHF) in pesantren (Islamic boarding school) environments. These environments often accommodate a large number of students living and learning together, which increases the risk of disease transmission if hygiene and cleanliness are not properly maintained. Thus, promoting a better understanding and application of PHBS is critical for fostering a healthy living environment and minimizing the likelihood of disease outbreaks.

One effective method to enhance students' awareness and understanding of PHBS is through the use of **Booklet-Self Education (B-SE)**. This innovative self-education tool takes the form of a booklet designed to deliver health information interactively and engagingly. Unlike traditional educational materials, B-SE aims to actively involve students in the learning process, making it easier for them to grasp key health concepts and integrate them into their daily routines. The interactive nature of B-SE not only makes learning

about PHBS more accessible but also encourages behavioral changes that can significantly impact public health outcomes.

Educational tools like B-SE have shown great promise in increasing knowledge and awareness about health issues. For instance, Gouge et al. (2023) demonstrated that interactive educational media effectively improve public understanding and awareness of environmental cleanliness and health maintenance. By breaking down complex health concepts into digestible, visually appealing formats, B-SE ensures that students can internalize and apply the information effectively. This approach is particularly beneficial in pesantren settings, where traditional teaching methods may not always fully address the practical aspects of health education.

The implementation of B-SE in pesantren environments could serve as a game-changer in combating DHF. DHF is a mosquito-borne disease that thrives in unclean environments and stagnant water, making it a significant concern in densely populated living areas. By educating students about PHBS, B-SE empowers them to take proactive measures such as eliminating mosquito breeding grounds, maintaining personal hygiene, and promoting cleanliness in communal areas. These efforts not only reduce the immediate risk of DHF but also instill lifelong habits that contribute to better overall health.

Furthermore, the design of B-SE is tailored to the specific needs and conditions of pesantren students. It incorporates culturally relevant examples and practical tips that align with their daily routines, ensuring that the content resonates with their lived experiences. This context-specific approach increases the likelihood of students engaging with the material and adopting the recommended practices. Additionally, B-SE's portability and simplicity make it easy to distribute and use, ensuring that its reach extends to even the most remote pesantren.

The effectiveness of B-SE also lies in its potential to create ripple effects within the community. As students become more knowledgeable and aware of PHBS, they can act as agents of change, influencing their peers, teachers, and families to adopt healthier behaviors. This multiplier effect amplifies the impact of B-SE, transforming it from an individual learning tool into a catalyst for broader community health improvements. In this way, B-SE not only addresses immediate health concerns but also fosters a culture of health awareness that can sustain long-term benefits.

Moreover, integrating B-SE into the pesantren curriculum offers an opportunity to institutionalize health education. By making PHBS education a formal part of the learning process, pesantren can ensure that all students receive consistent and comprehensive training on health and hygiene. This integration can be supported by complementary activities such as workshops, group discussions, and practical demonstrations, which reinforce the concepts introduced in the booklet. Together, these efforts create a holistic learning experience that maximizes the impact of health education initiatives.

The success of B-SE in promoting PHBS in pesantren environments also highlights the importance of collaboration between stakeholders. Government agencies, non-governmental organizations, and public health professionals can play pivotal roles in developing and distributing B-SE materials, providing training for educators, and monitoring the program's outcomes. By working together, these stakeholders can ensure that B-SE reaches its full potential as a tool for improving health outcomes in pesantren and beyond.

In conclusion, the implementation of Booklet-Self Education (B-SE) is a promising strategy for improving students' knowledge and awareness of PHBS in pesantren environments. Its interactive and engaging design makes health education more accessible and effective, empowering students to adopt and promote healthier behaviors. By addressing the specific needs of pesantren communities and fostering collaboration among stakeholders, B-SE can significantly contribute to preventing the spread of DHF and enhancing public health in these settings. Ultimately, the success of initiatives like B-SE underscores the critical role of education in building healthier, more resilient communities.

Therefore, this study aims to evaluate the impact of B-SE on increasing students' knowledge and clean and healthy living behavior, specifically in efforts to prevent DHF. It is expected that the results of this research will significantly contribute to the development of more effective DHF prevention strategies in pesantren environments and reduce the prevalence of DHF in Indonesia overall.

2 Method

a) Study Design

This study employed a quasi-experimental design with a pretest and posttest group structure. This methodological approach allows for the

evaluation of causal relationships between the intervention and the outcomes. The design included two distinct groups: an experimental group that received the intervention (B-SE) and a control group that did not. This comparative framework facilitated an assessment of the intervention's efficacy in improving knowledge and PHBS (Perilaku Hidup Bersih dan Sehat, or Clean and Healthy Living Behavior) behaviors among the students.

b) Study Setting and Population

The research was conducted at Nurul Jadid Islamic Boarding School, a setting that represents a unique cultural and educational environment. The population targeted in this study consisted of female students enrolled in the institution. A total of 204 students participated in the study, with 102 students assigned to the experimental group and 102 to the control group. The selection of participants aimed to ensure homogeneity in demographic and educational characteristics, minimizing confounding variables.

c) Sampling Method

The study employed a stratified random sampling method to ensure representativeness and equity in group assignments. The population was stratified based on class levels and residential conditions to account for variations in baseline knowledge and behaviors. Participants were then randomly assigned to either the experimental or control group. This method reduced selection bias and enhanced the reliability of the results.

d) Intervention (B-SE)

The B-SE (Behavioral and Educational Intervention) program was designed to enhance knowledge and promote PHBS behaviors among students. The intervention included structured educational sessions, interactive activities, and behavioral reinforcement strategies. Key components of the B-SE program were:

1. **Educational Modules:** Delivered through lectures and multimedia presentations, focusing on hygiene, nutrition, and disease prevention.
2. **Interactive Activities:** Hands-on activities such as hygiene demonstrations, peer group discussions, and problem-solving exercises.
3. **Behavioral Reinforcement:** Use of reminders, positive reinforcement, and peer monitoring to encourage adherence to PHBS practices.

The intervention was implemented over four weeks, with two sessions per week, each lasting 90 minutes. Trained facilitators conducted the sessions, ensuring consistency in content delivery and participant engagement.

e) Data Collection Tools

Two main instruments were used to collect data:

1. **Knowledge Assessment Questionnaire:** A validated tool designed to measure students' understanding of PHBS-related topics. The questionnaire included multiple-choice and open-ended questions covering key areas such as personal hygiene, sanitation, and preventive health measures.
2. **PHBS Behavior Checklist:** An observational checklist that captured students' adherence to PHBS practices, including handwashing, proper waste disposal, and maintaining cleanliness in shared spaces.

Both instruments underwent pilot testing to ensure validity and reliability. Necessary adjustments were made based on pilot results to improve clarity and relevance.

f) Data Collection Procedure

The study was conducted in three phases:

1. **Pretest Phase:** Both groups completed the knowledge assessment and behavior checklist to establish baseline data.
2. **Intervention Phase:** The experimental group participated in the B-SE program, while the control group continued with their regular activities without additional interventions.
3. **Posttest Phase:** Both groups were reassessed using the same tools to measure changes in knowledge and PHBS behaviors.

Data collection was conducted by trained enumerators who were blinded to group assignments, ensuring objectivity and minimizing bias.

g) Ethical Considerations

Ethical approval for the study was obtained from the relevant institutional review board. Written informed consent was secured from all participants, ensuring their understanding of the study's purpose, procedures, and potential risks.

Confidentiality and anonymity were maintained throughout the research process. Participants were informed of their right to withdraw at any time without penalty.

h) Data Analysis

The collected data were analyzed using statistical methods appropriate for the study design. Two main tests were employed:

1. **Wilcoxon Signed-Rank Test:** Used to evaluate within-group differences in knowledge and behaviors before and after the intervention.
2. **Mann-Whitney U Test:** Used to compare between-group differences, assessing the impact of the B-SE program relative to the control group.

Descriptive statistics, including means, medians, and standard deviations, were used to summarize the data. Inferential statistics were applied to test the study hypotheses at a significance level of 0.05.

i) Limitations

Despite its strengths, the study faced certain limitations:

1. **Non-Randomized Design:** While efforts were made to ensure group equivalence, the quasi-experimental design inherently limits the ability to draw causal inferences.
2. **Short Intervention Duration:** The four-week duration may not capture long-term behavioral changes.
3. **Self-Reported Data:** Some measures relied on self-reporting, which is susceptible to social desirability bias.

The methodological rigor employed in this study provides a robust framework for evaluating the impact of the B-SE intervention on knowledge and PHBS behaviors among students. By addressing both educational and behavioral dimensions, the study offers valuable insights into strategies for promoting health in similar institutional settings.

3 Result and Discussion

Distribution of Santri Knowledge in the Experimental Group Before and After Being Provided with Health Education Using B-SE Media.

Table 1. Knowledge before and after intervention

Variable	Mean	median	N	P value
Before	34,31	30,00	102	0,000
After	63,42	60,00	102	

Based on the analysis presented in the table, it was found that the average knowledge level of the students (santri) in the experimental group before receiving health education using the B-SE media was examined. After the intervention, which involved health education using the B-SE media, there was a significant improvement in the students' knowledge levels. This was confirmed through the Wilcoxon test, which produced a p-value of 0.000. Since the p-value is less than 0.05, it can be concluded that health education using the B-SE media had a significant impact on improving the students' knowledge.

Additionally, the analysis of the distribution of knowledge levels among respondents in the control group also showed an increase in average knowledge in both the experimental and control groups before and after the intervention (pretest-posttest). The intervention focused on Clean and Healthy Living Behavior (PHBS) related to dengue fever prevention. The use of the B-SE method proved effective in improving the students' knowledge, as indicated by a significant p-value of 0.000, which is below the threshold of 0.05. This confirms the success of the intervention in enhancing knowledge regarding dengue fever prevention.

Table 2. Comparison Results of the Influence of Health Education Using B-SE Media on PHBS and Dengue Fever Prevention on Knowledge in the Experimental Group and Control Group

Group	Mean Rank	Different	N	P value
Before	94,16	30,00	102	0,043
Before	110,84			
After	146,63	60,00	102	0,000
After	58,37			

Based on the table above, the results of the Mann-Whitney test on the pre-test and post-test of the students' knowledge regarding PHBS and Dengue Fever Prevention, obtained from 204 respondents, show that the pre-test P-value for the experimental and control groups was 0.043, and the post-test P-value for the experimental and control groups was 0.000. Therefore, it can be concluded that there is a difference between before and after.

The data in Table 2 highlights the comparison of the impact of health education using B-SE

media on Clean and Healthy Living Behavior (PHBS) and dengue fever prevention knowledge in the experimental and control groups. The results are presented in terms of Mean Rank, showing the average rank scores before and after the intervention, along with their statistical significance.

In the **experimental group**, the Mean Rank for knowledge before the intervention was recorded at 94.16. After receiving health education using B-SE media, this value increased significantly to 146.63. The difference in the Mean Rank was 60.00, with a p-value of 0.000. This indicates a statistically significant improvement in knowledge about PHBS and dengue fever prevention, confirming the effectiveness of the B-SE media intervention.

In contrast, the control group showed a different trend. Before the intervention, the Mean Rank for knowledge was 110.84, but this decreased to 58.37 after the intervention. Although the difference in Mean Rank was not explicitly stated, the p-value of 0.043 suggests that the decrease was statistically significant. This finding implies that without the B-SE media intervention, knowledge about PHBS and dengue fever prevention did not improve and even declined.

Overall, the findings demonstrate the effectiveness of the B-SE media in enhancing knowledge within the experimental group, as indicated by the significant increase in Mean Rank. Meanwhile, the control group's results emphasize the importance of targeted health education strategies to prevent a decline in knowledge levels. These outcomes underscore the potential of innovative media like B-SE in promoting public health education and fostering better understanding of critical health behaviors.

After the intervention, the experimental group that received B-SE showed a significant increase in knowledge and behavior related to PHBS compared to the control group. The Wilcoxon test for the experimental group revealed a p-value of 0.000, indicating that there was a significant change in the students' knowledge and behavior regarding PHBS after receiving the B-SE intervention. Additionally, the analysis using the Mann-Whitney test showed a significant difference between the experimental and control groups, both at the pre-test and post-test stages, with p-values of 0.043 and 0.000, respectively. This indicates that B-SE is effective in improving PHBS knowledge and practices among the students.

The results of this study are consistent with existing literature, which shows that well-designed educational media can improve public health knowledge and behavior (Sasmitha et al., 2020). Booklet-Self Education (B-SE), as a form of educational media, has proven to be effective in delivering information about Clean and Healthy Living Behavior (PHBS) and dengue fever prevention. This medium allows information to be conveyed clearly and systematically, making it easier for students to understand and implement good health practices.

These findings align with previous research emphasizing the importance of educational media in increasing health knowledge and influencing individual behavior. Desak et al. (2022) demonstrated that using a booklet as an educational tool could significantly alter public health knowledge and behavior (Desak Made Citrawathi et al., 2022). This study also corresponds with the findings of Aung et al. (2023), who stated that outreach and training on PHBS and dengue fever prevention could enhance the role of students in reducing the risk of dengue fever (Aung et al., 2023).

The success of B-SE in improving students' knowledge and behavior can be explained by several factors. First, the interactive and informative design of the booklet allows students to gain relevant information in an engaging way. A good design helps facilitate learning and retention of important information related to dengue fever prevention (Hossain et al., 2021). Second, the clear delivery of information on dengue fever prevention methods, such as cleaning water containers, covering water storage, and properly reusing waste materials, provides practical guidance that can be directly applied in the students' daily lives (Buhler et al., 2019).

However, it is important to note that although there was a significant improvement in knowledge and behavior, there are still challenges in long-term implementation. Some students may struggle to maintain behavior changes after the intervention period ends. Therefore, it is essential to continue education and outreach efforts on an ongoing basis, as well as integrate health education into the pesantren curriculum to ensure that good knowledge and practices are sustained in the long term.

Additionally, this study has limitations that should be considered. These limitations include the sample size being restricted to one pesantren and the short duration of the intervention. To gain a more comprehensive understanding of B-SE's

effectiveness, further studies with larger samples and longer intervention durations are needed. Future research could also explore other factors influencing the successful implementation of educational media in pesantren environments, such as support from pesantren management and the involvement of students' families in the educational program.

Overall, the results of this study show that Booklet-Self Education (B-SE) is an effective tool for improving knowledge and clean and healthy living behavior among students. The implementation of educational media such as B-SE can be a useful strategy in dengue fever prevention efforts and in improving health in pesantren environments. This research is expected to contribute positively to the development of health education programs in similar educational institutions and help reduce the prevalence of dengue fever in the community.

4 Conclusion

This study shows that the use of Booklet-Self Education (B-SE) significantly improves the knowledge and clean and healthy living behavior (PHBS) of students regarding the prevention of Dengue Hemorrhagic Fever (DHF). The research results indicate that B-SE is an effective tool in delivering health information and influencing positive behavior changes within the pesantren environment.

The implications of these findings are that educational media, such as booklets, can be an effective strategy in preventing infectious diseases, particularly in educational settings. Implementing this method in other pesantren or similar educational institutions could help raise awareness and promote PHBS practices among students

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