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PREVENTION OF DENGUE HEMORRHAGIC FEVER (DHF) FOR CHILDREN IN BEKASI REGENCY: INTERACTIVE EDUCATION AND AROMATHERAPY CANDLE MAKING

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) is a serious health issue in Bekasi Regency, particularly among school-aged children. In 2024, DHF cases reached 412, with four fatalities, marking an increase compared to the previous year. This study is based on a health outreach activity consisting of two sessions: interactive education and an aromatherapy candle-making workshop. These sessions aimed to enhance children's understanding of DHF prevention. The activity was conducted in RW 12 Graha Mattel, Bekasi Regency, and involved 77 children aged 4–9 years. The interactive education methods included storytelling, games, and simulations, while the workshop taught aromatherapy candle-making using essential oils from lemongrass and lavender. The pre-test and post-test results showed a significant increase in the children's knowledge. Understanding of DHF prevention increased from 46.7% to 83.6% after the interactive education session, while understanding of the benefits and methods of making aromatherapy candles increased from 14.3% to 75.1% after the workshop. High participation in these activities underscores the success of the interactive and engaging educational approach. This study concludes that interactive learning methods and hands-on practice are effective in improving children's knowledge of DHF prevention and can be applied in other health education programs to create a healthier and more knowledgeable generation.

Keywords: Dengue hemorrhagic fever; interactive education; children's health; health outreach; aromatherapy workshop

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ABSTRAK

Demam Berdarah Dengue (DBD) adalah masalah kesehatan serius di Kabupaten Bekasi, terutama di kalangan anak-anak usia sekolah. Pada tahun 2024, kasus DBD mencapai 412 dengan empat kematian, meningkat dibandingkan tahun sebelumnya. Penelitian ini didasarkan pada kegiatan sosialisasi kesehatan yang terdiri dari dua sesi, yaitu edukasi interaktif dan workshop pembuatan lilin aromaterapi. Kedua sesi ini bertujuan untuk meningkatkan pemahaman anak-anak tentang pencegahan DBD. Kegiatan ini diadakan di RW 12 Graha

Mattel, Kabupaten Bekasi, dan melibatkan 77 anak-anak usia 4-9 tahun. Metode edukasi interaktif meliputi storytelling, permainan, dan simulasi, sementara workshop mengajarkan pembuatan lilin aromaterapi dengan minyak esensial serai dan lavender. Hasil pre-test dan post-test menunjukkan peningkatan signifikan dalam pengetahuan anak-anak. Pemahaman tentang penanggulangan DBD meningkat dari 46,7% menjadi 83,6% setelah sesi edukasi interaktif, dan pemahaman tentang manfaat serta cara membuat lilin aromaterapi meningkat dari 14,3% menjadi 75,1% setelah workshop. Partisipasi yang tinggi dalam kegiatan ini menegaskan keberhasilan pendekatan edukasi yang interaktif dan menarik. Penelitian ini menyimpulkan bahwa metode pembelajaran interaktif dan praktik langsung efektif dalam meningkatkan pengetahuan anak-anak tentang pencegahan DBD dan dapat diterapkan dalam program edukasi kesehatan lainnya untuk menciptakan generasi yang lebih sehat dan berpengetahuan.

***Kata Kunci**: Demam berdarah dengue; edukasi interaktif; kesehatan anak; sosialisasi kesehatan; workshop aromaterapi*

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a significant public health concern in many tropical regions, including Indonesia. The disease, caused by the dengue virus and transmitted primarily by the Aedes Aegypti mosquito, poses a particularly serious threat to children due to their increased vulnerability. In Bekasi Regency, DHF remains a pressing issue, with alarming statistics highlighting the need for targeted prevention efforts. According to the Head of the Bekasi Regency Health Office, Alamsyah, DHF cases in 2024 reached 412 with four fatalities reported by April. This marks a significant rise in fatalities compared to the previous year, which recorded 726 DHF cases (Arfian, 2024).

School-aged children, especially those aged 5-14 years, are identified as a vulnerable group for DHF transmission due to their frequent outdoor activities and limited understanding of disease prevention (Aliyyu, 2023; Rubandiyah & Nugroho, 2018; Tokan, Paschalia, & Artama, 2022). This vulnerability is compounded by a lack of awareness regarding mosquito habitats and preventive measures (Kosasih et al., 2021). These factors underscore the urgent need for effective, child-focused health education initiatives to reduce the prevalence of DHF.

Interactive education methods have proven effective in increasing children's knowledge and awareness of disease prevention (Dsouza et al., 2022). Strategies such as storytelling, educational games, and simulations engage children in enjoyable and meaningful learning experiences, enabling them to grasp complex concepts more effectively (Kosasih et al., 2021). Research by Susanto et al. (2019) further demonstrates that educational games significantly improve children's skills and understanding in preventing DHF. Additionally, hands-on activities like workshops on making aromatherapy candles with essential oils provide practical knowledge and lasting impact. For instance, candles infused with lemongrass and lavender essential oils have been shown to repel mosquitoes effectively, making them a safe and natural preventive measure for families (Guo, Ye, & Wang, 2014; Dewi & Lusiyana, 2020; Liu, 2016; Nkuete et al., 2022).

In response to the persistent DHF issue in Bekasi Regency, President University initiated a social action program aimed at enhancing children's knowledge of DHF prevention. This program combined interactive education with a workshop on making aromatherapy candles using essential oils. Conducted at RW 12 Graha Mattel, Simpangan Village, Bekasi Regency, the program engaged 77 children aged 4-9 years in a series of activities designed to educate and empower them in combating DHF. This initiative also emphasized the

importance of community involvement and practical learning as part of a broader strategy to reduce the prevalence of DHF and promote public health. By equipping children with knowledge and skills, the program aims to foster a more informed and proactive generation capable of addressing the challenges posed by DHF.

METHOD OF IMPLEMENTATIONS

The social action initiative undertaken is part of a series of community service events by President University. The community service location is at RT.1-5/RW 12, Graha Mattel Housing, Simpangan Village, North Cikarang District, Bekasi Regency. This community service is carried out in three stages, as follows:

a. Stage of Preparation

The preparation stage took place from June 24 to July 5, 2024, in collaboration with PT. KUI and the management of RW 12. During these two weeks, three discussions were held at the Graha Mattel Posyandu on June 26, June 28, and July 2, 2024. The discussions concluded that there would be 40 children in attendance. On July 5, 2024, a banner for the event will be installed in RW 12 Graha Mattel Housing. Field observations by 10 representative students were conducted five times on June 26, June 28, July 2, July 4, and July 5.

President University students prepared interactive materials in class, including storytelling about DHF prevention. The aromatherapy candle-making workshop used materials such as red and white candles, lavender and lemongrass essential oils, pans, stoves, and 70 candle molds to match the number of participants.

b. Stage of Implementation

The implementation of the community service (PKM) took place on Saturday, July 6, 2024, in RW 12 Graha Mattel. There are 33 students conducting community service. The target audience for this social action comprised children aged 4 years (PAUD) to 9 years (Grade Three Elementary School). The registered participants included 17 children from RT 01, 26 children from RT 02, 11 children from RT 03, 16 children from RW 04, and 7 children from RW 05. Consequently, the total number of participants for this social action increased to 77 children from the initial 40.

Table 1. Rundown of Activities

Time	Min	Session	Activities
08:30 - 08:50	20’	Opening	Welcome speech
08:51 - 09:00	10’		Opening prayer
09:01 - 09:10	10’	Interactive Education	*Pre-test 1*
09:11 - 09:30	20’		Story telling
09:31 - 09:40	10’		Games
09:41 - 09:45	5’		Break
09:46 - 10:15	30’		DHF Prevention Materials
10:16 - 10:30	15’		*Post-Test 1*
10:31 - 10:35	5’		Transisi
10:36 - 10:45	10’	Workshop Candle Making	*Pre-test 2*
10:46 - 11:05	20’		How to Make Aromatherapy Candle Materials
11:06 - 11:45	40’		Candle Making
11:46 - 11:55	10’		*Post-Test 2*
11:56 - 12:00	5’	Closing	Candle gifting as souvenir

(Source: Processed by the Authors, 2024)

This social action program consisted of four sessions: opening, interactive education, aromatherapy candle-making workshop, and closing (Table 1). The activities lasted for 3 hours and 30 minutes, starting from 08:30 AM to 12:00 PM. One student supervised 5-7 children in each group. During the pre-test and post-test stages, the students in each group directly asked the children they were

monitoring. At the beginning and end of both the interactive education session and the aromatherapy candle-making workshop, pre-tests and post-tests were conducted to evaluate the effectiveness of the material delivery during this social action.

c. Stage of Evaluation

The evaluation stage was conducted using pre-tests and post-tests during both sessions. Each pre-test and post-test comprised five questions (Q1-Q5) relevant to each session. Data collection was gained from each supervisor of the children's group by asking them directly. Every group consisted of 5 to 7 children.

Table 2. Analysis of Pre-Test and Post-Test Session

Pre-test and Post-test of Session		
Questions	**Answered (77)**	**Percentages (%)**
Q1 :		
Q2 :		
Q3 :		
Q4 :		
Q5 :		

(Source: Processed by the Authors, 2024)

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RESULTS AND DISCUSSION

a. Interactive Education

As stated in the previous section, the activity is carried out by implementing interactive education methods. The primary objectives of the interactive education session were to assess the children's initial understanding of DHF, provide comprehensive education on DHF prevention, and evaluate the effectiveness of these educational interventions

The interactive counseling on DHF prevention began with the administration of a pre-test to the children to evaluate their initial understanding of Dengue Hemorrhagic Fever (DHF). The purpose of this pre-test was to identify the children's basic knowledge about DHF, including its definition, modes of transmission, and prevention methods.

The pre-test consisted of five questions and revealed that out of the 77 participating children, only 46.7% had a good understanding of DHF. This highlights a significant knowledge gap, especially considering that 55.8% of the children were unaware of mosquito habitats, and only 14.2% knew how to prevent mosquito bites (Table 3).

Table 3. Pre-test Interactive Education

Pre-test Interactive Education		
Questions	**Answered (77)**	**Percentages (%)**
Q1 : "Do you know about dengue fever?"	*57*	*74%*
Q2 : "What animal causes dengue fever?"	*54*	*70,1%*
Q3 : "What kind of places do mosquitoes like?"	*43*	*55,8%*
Q4 : "What are the symptoms of dengue fever?"	*15*	*19,4%*
Q5 : "How can you prevent mosquito bites?"	*11*	*14,2%*
Average		*46,7%*

(Source: Processed by the Authors, 2024)

After the pre-test, the event continued with an in-depth interactive education session on DHF. The presentation material included detailed explanations about the causes of DHF, symptoms to watch out for, and the importance of maintaining environmental cleanliness to prevent the breeding of Aedes aegypti mosquitoes, which are the primary vectors of this disease.

This interactive education session also involved various engaging activities such as educational games, simulations, and group discussions aimed at strengthening the children's understanding of DHF. Through an interactive and enjoyable approach, it was hoped that the children would more easily absorb the information and apply DHF prevention measures in their daily lives.

Figure 1. DHF Prevention Materials
(Source: Taken by the Authors, 2024)

Additionally, this session concluded with a post-test to measure the extent of the children's knowledge improvement after attending the socialization. The results of this post-test were used to evaluate the effectiveness of the socialization program and to provide feedback for future program improvements. Consequently, it is hoped that the incidence of DHF in the area can be reduced through increased awareness and understanding of the disease among the community, especially children.

Figure 2. Increased Participation of Children After the Presentation of Materials
(Source: Taken by the Authors, 2024)

After the interactive education session, a post-test was conducted to measure the increase in the children's knowledge. The post-test results showed a significant improvement in the children's understanding of DHF, with 83.6% of the children demonstrating a better grasp of the disease (Table 4). This improvement indicates that the socialization and interactive education sessions effectively enhanced the children's awareness and knowledge about DHF.

Children who initially had little understanding of how DHF spreads and how to prevent it became more knowledgeable about the importance of maintaining a clean environment, recognizing DHF symptoms, and taking appropriate preventive measures after the socialization session. Through enjoyable and interactive educational activities, they were also motivated to share this information with their families and friends, thereby extending the positive impact of the socialization program throughout their community.

Table 4. Post-test Interactive Education

Post-test Interactive Education		
Questions	**Answered (77)**	**Percentages (%)**
Q1 : "Do you know about dengue fever?"	*69*	*89,6%*
Q2 : "What animal causes dengue fever?"	*74*	*96,1%*
Q3 : "What kind of places do mosquitoes like?"	*60*	*77,9%*
Q4 : "What are the symptoms of dengue fever?"	*56*	*72,7%*
Q5 : "How can you prevent mosquito bites?"	*63*	*81,8%*
Average		*83,6%*

(Source: Processed by the Authors, 2024)

These encouraging results highlight the importance of an interactive and enjoyable educational approach in conveying health information to children. With the right

methods, children are not only able to grasp the material effectively but are also motivated to apply the knowledge in their daily lives, helping to reduce the risk of DHF spread in their surroundings.

b. Aromatherapy Candle-Making Workshop

The second session was the aromatherapy candle-making workshop. Similar to the previous session, a pre-test was conducted before the workshop to assess whether the children were already aware of the benefits of aromatherapy candles. This pre-test consisted of five questions, which can be seen in Table 5.

Table 5. Pre-test Aromatherapy Candle-Making Workshop

Pre-test Workshop		
Questions	**Answered (77)**	**Percentages (%)**
Q1 : "What oil do mosquitoes dislike?"	*9*	*11,7%*
Q2 : "What is the function of aromatherapy candles?"	*21*	*27,2%*
Q3 : "What ingredients are used to make aromatherapy candles?"	*11*	*14,3%*
Q4 : "How do you mix aromatherapy with candles?"	*8*	*10,4%*
Q5 : "What do mosquitoes dislike most about aromatherapy candles?"	*6*	*7,8%*
Average		*14,3%*

(Source: Processed by the Authors, 2024)

The pre-test results indicated that the children's knowledge about aromatherapy candles was very limited. The question regarding the function of aromatherapy candles (Q2) had the highest percentage of correct answers at 27.2%, while the questions about mosquito-repelling oils (Q1) and ingredients for making aromatherapy candles (Q3) were only correctly answered by 11.7% and 14.3% of the children, respectively. Other questions, such as how to mix aromatherapy with candles (Q4) and what mosquitoes dislike the most about aromatherapy candles (Q5), had even lower percentages of correct answers, at 10.4% and 7.8%, respectively. The average percentage of correct answers for all questions was only 14.3%, indicating a need for further education on this topic.

After the pre-test, the first 10 minutes of the workshop session were used by the students to explain the benefits of aromatherapy candles and essential oils to the children. The students explained that aromatherapy candles could help repel mosquitoes and create a more comfortable and relaxing atmosphere. In the following 10 minutes, a demonstration of the aromatherapy candle-making process was conducted. The first step was to heat a pan. Once the pan was hot, candles were placed in a tray to melt. After the candles were fully melted, essential aromatherapy oils were added to the mixture and stirred thoroughly. The melted candle mixture was then poured into candle jars along with the wicks. Once the candles solidified, they were ready for use.

After the demonstration, the children, assisted by the students, participated in the aromatherapy candle-making workshop for 40 minutes. This supervision was crucial to ensuring the safety of the children from the dangers of the hot melted wax, with one student supervising 5-7 children. The students ensured that each step of the candle-making process was done carefully and according to the taught procedures. After the workshop, the candles were left to cool and harden.

Figure 3. Aromatherapy Candle-Making Workshop
(Source: Taken by the Authors, 2024)

During the workshop, the children were very enthusiastic and excited to make their own aromatherapy candles. They also had the opportunity to experiment with various essential oil scents provided. Once the candles were made and had hardened, the children took their aromatherapy candles home as souvenirs and to use as part of dengue fever prevention efforts (Figure 4). Through this session, it was hoped that the children would not only understand how to make aromatherapy candles but also appreciate their benefits in dengue fever prevention and maintaining environmental health.

Gambar 4. Aromatherapy Candles as Souvenirs
(Source: Taken by the Authors, 2024)

After the workshop, the children took a post-test assessment to gauge how much their knowledge had increased following the aromatherapy candle-making session. The post-test results showed a significant improvement in the children's understanding of the topic. The question about oils that repel mosquitoes (Q1) was correctly answered by 54.5% of the children, up from just 11.7% in the pre-test. The percentage of correct answers for the question regarding the function of aromatherapy candles (Q2) also increased dramatically to 68.8% compared to 27.2% in the pre-test.

The children's knowledge about the ingredients for making aromatherapy candles (Q3) showed an even greater increase, with 72.7% answering correctly on the post-test compared to 14.3% on the pre-test. The question regarding how to mix aromatherapy with candles (Q4) demonstrated an outstanding improvement, from 10.4% in the pre-test to 88.3% in the post-test. Finally, the question about what mosquitoes dislike most about aromatherapy candles (Q5), which had previously been answered correctly by only 7.8% of the children, saw a significant rise to 90.9% in the post-test.

Table 6. Post-test Aromatherapy Candle-Making Workshop

Post-test Workshop		
Questions	**Answered (77)**	**Percentages (%)**
Q1 : "What oil do mosquitoes dislike?"	*42*	*54,5%*
Q2 : "What is the function of aromatherapy candles?"	*53*	*68,8%*
Q3 : "What ingredients are used to make aromatherapy candles?"	*56*	*72,7%*
Q4 : "How do you mix aromatherapy with candles?"	*68*	*88,3%*
Q5 : "What do mosquitoes dislike most about aromatherapy candles?"	*70*	*90,9%*
Average		*75,1*

(Source: Processed by the Authors, 2024)

The average percentage of correct answers for all questions on the post-test reached

75.1%, indicating that the workshop was highly effective in enhancing the children's understanding of aromatherapy candles and their benefits (Table 6). Through this activity, the children not only learned how to make aromatherapy candles but also grasped the importance of these candles in dengue fever prevention and maintaining environmental health.

c. Discussion

This discussion emphasizes that effective promotional strategies, such as banner placement, play a crucial role in attracting attention and increasing children's participation in health education activities. In this case, the installation of banners successfully increased the number of participating children from 40 to 77, representing a 92.5% increase. According to marketing theory by Kotler & Keller (2016), one of the main functions of marketing is to build awareness and interest in a product or activity through various promotional tools. Banners, as visual promotional tools, are essential in capturing attention and quickly and clearly conveying information to the target audience.

Furthermore, data from the pre-tests and post-tests show a significant improvement in children's understanding of the health topic after attending the educational sessions. The pre-tests in both sessions had percentages below 50 percent. In the Interactive Education session, the initial pre-test percentage was 46.7%. After the children were given storytelling and "Prevention of DHF" materials, the post-test showed a significant increase to 83.6%, with a percentage increase of 36.9%.

Table 7. Post-test Aromatherapy Candle-Making Workshop

Session	Pre-test	Post-test	The Increase
Interactive Education	*46,7%*	*83,6%*	*36,9%*
Aromatherapy Candle-Making Workshop	*14,3%*	*75,1%*	*60,8%*

(Source: Processed by the Authors, 2024)

The Aromatherapy Candle-Making Workshop session demonstrated the highest percentage increase. In the pre-test, only 14.3% of children knew about the benefits and uses of aromatherapy candles. After the workshop, the post-test showed an increase to 75.1%, representing a 60.8% rise. This indicates that the workshop was highly effective in enhancing the children's understanding of aromatherapy candles.

This data shows that both sessions successfully improved the children's understanding of the topics taught, with the Aromatherapy Candle-Making Workshop providing the most significant increase. These findings align with those of Dallagiacoma et al. (2022) and Meintjes (2023), which suggest that the use of digital and audio-visual tools, along with interactive craft techniques, can enhance health literacy and children's participation. Paulovich (2015) emphasized the importance of visual communication in health education for children, helping them to better understand health information. Zhang et al. (2024) noted that health education programs involving video and peer education could increase health literacy and knowledge about infectious diseases among school children.

Other studies, such as those conducted by Bélanger-Gravel et al. (2021) and Srour (2021), support the finding that health campaigns targeting children through participatory methods can lead to positive behavioral changes, especially among vulnerable children. Kruitwagen van de Gaar (2017) found that the 'Water Campaign' targeted at elementary school children significantly reduced sugary drink consumption in two multi-ethnic regions in Rotterdam. Research by Bélanger-Gravel et al. (2021) on the WIXX campaign in Quebec also showed a positive impact on children's physical activity, particularly among socially disadvantaged girls. Srour (2021) and Alok, Nessa, and Ahil (2020) highlighted the importance of child-centered health promotion to produce positive health behavior changes, especially for vulnerable children. A study by

Bradley et al. (2020) demonstrated that a national health marketing campaign successfully reduced sugar intake in children during the campaign period.

Overall, this study through social action confirms that a combination of effective visual promotional strategies and interactive educational methods can significantly increase children's participation and understanding in health campaigns. This approach is not only relevant in the context of disease prevention, such as dengue fever, but also has the potential to be applied in various other health education programs, thereby fostering a healthier and more informed generation.

CONCLUSION

The community service program by President University in RW 12 Graha Mattel, Simpangan Village, Bekasi Regency, successfully enhanced children's knowledge and awareness regarding the prevention of Dengue Hemorrhagic Fever (DHF). This program achieved significant improvements in understanding through its interactive education sessions and hands-on workshops. The interactive education session increased children's understanding from 46.7% to 83.6%, while the aromatherapy candle-making workshop demonstrated an even greater improvement, with knowledge levels rising from 14.3% to 75.1%. These results highlight the effectiveness of the program in delivering impactful health education to children.

The success of this initiative can be attributed to the use of engaging, interactive learning methods. These not only conveyed vital health information effectively but also provided practical benefits, such as teaching children how to make mosquito-repellent candles using natural ingredients like lavender and lemongrass essential oils. This hands-on activity equipped participants with a valuable skill while promoting safe and effective DHF prevention practices.

Additionally, the program's high participation rate underscored the importance of effective promotional strategies, such as banner placement, in capturing attention and increasing engagement. The approach demonstrated that visual promotion plays a vital role in drawing participants to health education initiatives.

While the program achieved notable success, there remains room for further improvement in addressing specific aspects of DHF prevention. Expanding similar programs to other vulnerable communities and involving more stakeholders could enhance the reach and impact of such initiatives. With continued effort and collaboration, these programs can play a significant role in reducing the prevalence of DHF and improving public health outcomes in the future.

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