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MORALITY BEFORE KNOWLEDGE

Community behavior in dengue hemorrhagic fever (DHF) mosquito breeding site eradication efforts

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ABSTRACT

Background: Dengue Hemorrhagic Fever (DHF) is a mosquito-borne viral disease that has spread rapidly. It is widely distributed across tropical regions, with local risk variations influenced by rainfall, temperature, and urbanization. The incidence of dengue has increased dramatically worldwide over the past few decades. **Methods**: This research employs a descriptive design with the use of accidental sampling as the sampling technique. **Findings:** Most people in the Public Health Center area have basic knowledge about the dangers of DHF and the risk factors for its transmission. However, there is variation in the level of understanding, with some individuals being less aware of the connection between mosquito breeding sites and the risk of DHF. **Conclusion**: The community has a good level of knowledge and a positive attitude, but demonstrates poor levels of action. It is recommended that community members actively participate in DHF Mosquito Breeding Site Eradication/*Pemberantasan Sarang Nyamuk Demam Berdarah* (PSN DBD) efforts, as respondents still show inadequate preventive actions. As for the Mandai Public Health Center, it is advised to enhance educational outreach regarding the implementation of DHF mosquito breeding site eradication activities. **Novelty/Originality of this article:** The novelty of this research lies in providing an overview of community behavior in the eradication of dengue mosquito breeding sites. It includes an assessment of technology-based behavioral adaptations and an analysis of community-based behavior along with social engagement. The study also examines the influence of social and economic factors on DHF mosquito breeding site eradication practices, evaluates various counseling and educational methods, and investigates long-term behavioral changes and their impacts. Additionally, it explores the use of geospatial data for identifying high-risk areas and assesses community satisfaction and motivation related to DHF mosquito breeding site eradication efforts.

KEYWORDS: community behavior; dengue hemorrhagic fever; education.

1. Introduction

Dengue Hemorrhagic Fever (DHF) is spread across more than 100 countries worldwide, and forty percent of the global population—approximately 3 billion people—live in areas at risk of contracting DHF. Each year, up to 400 million people are infected with dengue, about 100 million fall ill due to the infection, and 22,000 die from DHF. In Southeast Asia, especially Indonesia, DHF cases are frequently reported.

Based on DHF cases in Indonesia, there were 68,407 cases reported in 2017, marking a significant decrease from 204,171 cases in 2016. The provinces with the highest number of cases were three provinces on the island of Java, West Java with a total of 10,016 cases, East Java with 7,838 cases, and Central Java with 7,400 cases. Meanwhile, the lowest number of cases was reported in Maluku Province, with 37 cases (Kemenkes, 2018). Dengue Hemorrhagic Fever (DHF) is a disease with the potential to cause extraordinary outbreaks.

DHF can affect all age groups, especially children. This disease is also prone to causing death. To date, DHF remains a significant health problem in South Sumatra Province.

DHF continues to be a public health issue, causing both social and economic impacts. Social losses include panic within families, death of family members, and reduced life expectancy in the community. The direct economic impact consists of considerable medical costs, while the indirect impact involves loss of work time and other expenses beyond treatment costs, such as transportation and accommodation during hospitalization (Kemenkes RI, 2016).

Vector control methods aim to reduce risk factors by minimizing vector breeding habitats, lowering vector density, reducing contact between vectors and humans, and breaking the chain of disease transmission. Dengue control can be carried out through physical, biological, and chemical means. Physically, dengue control focuses on environmental management through Mosquito Breeding Site Eradication (PSN) using the Drain, Cover, Bury/*Menguras, Menutup, Mengubur* (3M) Plus movement, which includes activities such as draining, covering, and burying water containers, along with other additional control measures (Cahyo et al., 205; Listyorini, 2016; Liestyana, 2019). Biologically, dengue control can involve the use of predators such as larva-eating fish and bacteria. Chemically, dengue control involves the use of larvicides to kill mosquito larvae. One of the vector control methods for dengue is physical control through "*PSN 3M Plus*" (Tuti & Rahayu, 2018). In efforts to eradicate the vector, the community can actively participate in a simultaneous movement for Mosquito Breeding Site Eradication. The PSN movement can be carried out through the 3M Plus approach, which includes draining water containers at least once a week or treating them with *Abate* powder to kill Aedes aegypti larvae, tightly covering water containers to prevent Aedes aegypti mosquitoes from laying eggs, and burying used items such as old tires and cans that can collect rainwater. As is known, the *Aedes Aegypti* mosquito is a domestic mosquito that lives very close to residential areas (Nahdah, 2016; Nugroho, 2010). Therefore, efforts to eradicate and prevent the spread of DHF are aimed at eliminating the breeding sites of Aedes aegypti mosquitoes within residential environments (Nur et al., 2015).

2. Methods

The type of research used is descriptive research, which aims to explain or describe a condition, event, object, person, or anything related to variables that can be described either quantitatively or qualitatively (Arikunto, 2006, 2013; Maryuliana et al., 2016).

3. Results and Discussion

3.1 Respondents' characteristics

Based on Table 4.1 above, the characteristics of the research respondents by age show that the youngest respondent was 20 years old and the oldest was 60 years old. Respondents were grouped into three age categories according to the Indonesian Ministry of Health (2009), 12–25 years, 26–45 years, and 46–65 years. Of the respondents, 8.3% were in the 12–25 years age group, 70.8% were in the 26–45 years group, and 20.8% were in the 46–65 years group. Regarding gender, 42 respondents (43.8%) were male and 54 respondents (56.2%) were female. Based on education level, 17.7% of respondents had a low education level (never attended school or did not complete elementary school), 69.8% had a moderate education level (junior high/high school), and 12.5% had a high education level (university).

Table 1. Distribution of characteristics of research respondents

Description	Frequency	Percentage (%)
Age		
12-25 years old	8	8.3%

26-45 years old	68	70.8%
46-65 years old	20	20.8%
Total	96	100%
Gender		
Male	42	43.8%
Female	54	56.2%
Total	96	100%
Education		
Low Education	17	17.7%
Moderate Education	67	69.8%
High Education	12	12.5%
Total	96	100%

3.2 Respondents' knowledge

Based on Table 2 above, the respondents' knowledge about mosquito breeding sites is as follows, 87 respondents (90.6%) have knowledge about mosquito breeding sites, 84.4% know how often water tubs should be cleaned, 81.2% understand the meaning of the 3M program, 85.4% know how to carry out mosquito breeding site eradication, 70.8% understand the most effective methods for preventing and eradicating dengue mosquito breeding sites, 62.5% know what should be eliminated in mosquito breeding site eradication, 55.2% know what *Abate* powder is, 68.7% are aware of the benefits of mosquito repellent lotion, 50% know what should be used to avoid dengue mosquito bites during sleep, and 66.6% know the benefits of keeping guppy fish or *Betta* fish.

Table 2. Frequency and percentage distribution of respondents' knowledge on each knowledge question regarding mosquito nest eradication for dengue fever

No	Statement Items	Knowledge	
		N	%
1	Knowing mosquito breeding sites	87	90,6
2	Knowing how many times the bathtub should be cleaned	81	84,4
3	Knowing what 3M stands for	78	81,2
4	Know how to do mosquito nest control (PSN)	82	85,4
5	Understand the most effective ways to prevent and eradicate dengue mosquito nests	68	70,8
6	Knowing what to eradicate in mosquito nest eradication	60	62,5
7	Understand what *abate* powder is	53	55,2
8	Know the benefits of mosquito repellent lotion	66	68,7
9	Understand what to use to avoid dengue mosquito bites while sleeping	48	50
10	Knowing the benefits of keeping *tempalo*/hickey fish.	64	66,6

Based on Table 3 above, the frequency distribution results of respondents' knowledge about Dengue Mosquito Breeding Site Eradication (PSN DBD) 3M Plus at the 4 Ulu Public Health Center, Palembang City, in 2021 are as follows: 20 respondents (20.8%) were categorized as having poor knowledge, 33 respondents (34.4%) had moderate knowledge, and 43 respondents (44.8%) had good knowledge.

Table 3. Frequency distribution of respondents' knowledge on dengue mosquito breeding site eradication

No	Knowledge	Frequency	Percentage (%)
1	Bad	20	20.8%
2	Fair	33	34.4%
3	Good	43	44.8%
Total		96	100%

3.3 Respondent's attitude

Most respondents demonstrated a positive attitude toward efforts to eradicate dengue mosquito breeding sites, such as the 3M method (draining, covering, and burying) (Budiman & Riyanto, 2013; Fitri, 2019; Harahap, 2012; Hardayati et al., 2011), the use of *abate* powder, and keeping larva-eating fish. However, there were varying levels of doubt and disagreement, particularly concerning the frequency of water container draining and individual protection measures, such as the use of mosquito repellent lotion. Further education is still needed to strengthen public understanding and promote consistent dengue prevention behavior in the community.

Table 4. Frequency and percentage distribution of respondents' attitudes on each statement regarding dengue mosquito breeding site eradication

No	Statement Items	Attitude									
		SS		S		RR		TS		STS	
		N	%	N	%	N	%	N	%	N	%
1	Dengue fever can be prevented by eradicating mosquito breeding sites	15	16	79	82	0	0	2	2	0	0
2	The PSN movement is carried out using the 3M method (draining, covering, burying)	8	8	79	82	2	2	7	7	0	0
3	To prevent dengue fever, water containers should be regularly drained once a week	12	13	59	61	4	4	21	22	0	0
4	To prevent dengue fever, water containers can be tightly covered	8	8	44	46	5	5	39	41	0	0
5	To prevent dengue fever, items that can collect water should be buried	9	9	43	45	8	8	36	38	0	0
6	The safest and most effective way to prevent dengue fever is by eradicating mosquito breeding sites (PSN).	7	7	45	47	10	10	34	35	0	0
7	Keeping guppy fish (ikan *tempalo*) or *Betta* fish (ikan cupang) is also part of PSN DBD because they can eat mosquito larvae.	10	10	54	56	12	13	20	21	0	0
8	To prevent dengue fever, *Abate* powder is applied to water storage containers.	6	6	58	60	11	11	20	21	0	0
9	Draining water tubs every two weeks reflects the attitude towards Mosquito Breeding Site Eradication (PSN).	10	10	50	52	8	8	28	29	1	1
10	Mosquito repellent lotion functions to protect oneself.	5	5	47	49	7	7	35	36	2	2

*Additional note: SS stands for strongly sgree, S for agree, RR for undecided, TS for disagree, and STS for strongly disagree.

Table 5. Frequency distribution of respondents' attitudes toward 3m plus dengue mosquito breeding site eradication (PSN DBD)

No	Attitude	Frequency	Percentage (%)
1	Negative	42	43.8%
2	Positive	54	56.3%
Total		96	100%

Based on Table 5, the data shows that community attitudes toward 3M Plus Dengue Mosquito Breeding Site Eradication (PSN DBD) at the Mandai Public Health Center are as follows: 43.8% of respondents exhibited a negative attitude, while 56.3% demonstrated a positive attitude.

3.4 Respondent's actions

Based on Table 6 above, 90.6% of respondents reported regularly draining water storage containers at home, while 9.8% did not. The percentage of respondents who cleaned, burned, or disposed of used items that could serve as mosquito breeding sites was 42.7%, with 57.3% not performing this action. Additionally, 73% of respondents covered water storage containers at home, whereas 27% did not. Only 18.7% reported covering windows, ventilation holes, or doors with mosquito screens, while 81.2% did not. Lastly, none of the respondents (0%) kept *tempalo* or *Betta* fish to consume mosquito larvae.

Table 6. frequency and percentage distribution of respondents' actions for each action statement regarding the 3M Plus Dengue Mosquito Breeding Site Eradication (PSN DBD)

No	Statement Items	Action			
		Yes		No	
		N	%	N	%
1	Regularly drain or clean water storage containers at home	87	90.6%	9	9.8%
2	Regularly clean, bury, or burn used items that could become mosquito breeding sites	41	42.7%	55	57.3%
3.	Always keep water storage containers at home tightly covered	70	73%	26	27%
4	Always cover windows, ventilation holes, and doors with mosquito screens	18	18.7%	78	81.2%
5	Keeping *Tempalo* fish/*Betta* fish to eat mosquito larvae.	0	0%	96	100%

Based on Table 7 above, it is shown that the community's actions toward Dengue Hemorrhagic Fever Mosquito Nest Eradication (PSN DBD) 3M Plus at Mandai Public Health Center were categorized as poor in 67 respondents (69.8%) and good in 29 respondents (30.2%).

Table 7. Frequency distribution of respondents' actions in Dengue Hemorrhagic Fever Mosquito Nest Eradication (PSN DBD) 3M Plus at Mandai Public Health Center

No	Action	Frequency	Percentage (%)
1	Not Good	67	69.8%
2	Good	29	30.2%
Total		96	100%

3.5 Discussion

Aligns with a study by Kristanto et al. (2020) in Sukoharjo, Central Java, which reported that 95.7% of respondents had good knowledge of DHF Mosquito Breeding Site Eradication. Similarly, research by Kurniawan & Agustini (2018) in Cigasong, Majalengka Regency, showed that 53.5% of respondents had good knowledge. However, this study differs from

the findings of Ganie (2009) in Padang Bulan, where the majority of respondents (54.5%) were categorized as having moderate knowledge of the 3M implementation. These discrepancies may be attributed to differences in sample size and population characteristics; for instance, Ganie's study had a higher proportion of respondents with moderate knowledge. Educational level is a critical factor in accessing information, and higher education tends to correlate with better knowledge acquisition. As shown in Table 1, the majority of respondents had a moderate education level, having completed junior or senior high school, totaling 57 respondents (59.4%).

Attitude is defined as a pattern of behavior, a tendency or anticipatory readiness, a predisposition to adjust in social situations, or simply put. It is a response to conditioned social stimuli, as explained by the psychologist W.J. Thomas, cited by Notoadmodjo (2007). Based on a study conducted at the 4 Ulu Public Health Center in Palembang, a total of 96 community respondents were surveyed. The research, carried out using questionnaires at Mandai Public Health Center and presented in Table 4.6, showed that 56.3% of respondents had a positive attitude toward the PSN DBD 3M Plus program. This result is consistent with the findings of Hasyim (2016) in Surau Gadang Village, which reported that the majority of the community held a positive attitude toward Dengue Hemorrhagic Fever mosquito nest eradication, accounting for 52%.

Based on the research conducted at Mandai Public Health Center, a total of 96 community respondents were surveyed. The study, which utilized questionnaires at Mandai Public Health Center, as shown in Table 7, revealed that 69.8% of respondents exhibited poor practices regarding the Dengue Hemorrhagic Fever Mosquito Nest Eradication (PSN DBD) 3M Plus program. This finding aligns with the study by Tursinawati et al. (2016) in Kalipancur Village, Semarang, which reported that 74.8% of respondents demonstrated inadequate practices toward DHF mosquito breeding site eradication. Similarly, research by Sinaga et al. (2023) in Aji Jahe Village, Karo Regency, found that 95.0% of respondents had poor practices. Conversely, the results differ from the study by Praditya (2014) in Kebon Village, Central Jakarta, which reported that out of 201 respondents, 107 (53.2%) exhibited good practices.

4. Conclusions

Respondents' knowledge regarding the efforts to eradicate Dengue Hemorrhagic Fever mosquito breeding sites, particularly the implementation of the 3M Plus strategy (which includes the use of larvicide powder, maintaining fish that eat larvae, installing mosquito screens, using mosquito nets, and other measures), aims to assess the extent to which respondents are aware of the presence of dengue in their environment and their understanding of the methods to prevent its spread. Based on interviews conducted using questionnaires, a total of 96 respondents participated, as shown in Table 3, where 43 respondents (44.8%) demonstrated good knowledge of DHF mosquito breeding site eradication 3M Plus.

Author Contribution
The author's contributions to this study include formulating the research problem and objectives, designing the study and methodology, collecting data, analyzing the data, interpreting and discussing the findings, writing the report and publication, presenting the results to relevant stakeholders, as well as coordinating and collaborating throughout the research process.

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Conflicts of Interest

The author declare no conflict of interest.

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