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Level of Public Knowledge Regarding The Transmission and Prevention of Dengue Fever in The Working Area of The Matsum City Public Health Center, Medan

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ABSTRACT

Introduction: Dengue Hemorrhagic Fever (DHF) remains a major public health problem in Indonesia. Insufficient public knowledge about transmission and prevention contributes to high disease incidence. Objective: This study aimed to assess the level of community knowledge regarding DHF transmission and prevention in the working area of Puskesmas Kota Matsum, Medan Area District. Methods: An analytic survey with a cross-sectional design was conducted involving 98 respondents who had previously experienced DHF. Data were collected using structured questionnaires and analyzed using univariate and bivariate analysis. Results: Most respondents were female (56.1%) and aged 26–35 years (51.0%). Approximately 53.0% had good knowledge of DHF. A significant relationship was found between knowledge level and DHF prevention behavior ($p < 0.05$). Conclusion: Community knowledge is significantly associated with DHF prevention. Continuous health education is needed to reduce DHF incidence in the Puskesmas Kota Matsum area

Keywords: Dengue Hemorrhagic Fever, Knowledge, Prevention, Community, Medan Area

1. INTRODUCTION

Dengue hemorrhagic fever (DHF) is an acute viral infection caused by the dengue virus, which transmitted through the bite of infected Aedes mosquitoes, mainly Aedes aegypti and Aedes albopictus. The disease is characterized by high fever, headache, myalgia, arthralgia, and, in severe cases, plasma leakage, bleeding, and shock [1]. DHF continues to be a major public health problem in many tropical and subtropical countries. Over the past decades, the World Health Organization has reported substantial increases in the number, geographic range, and severity of dengue cases globally, reflecting the complex interplay of climatic, environmental, demographic, and behavioral factors in dengue transmission [2].

Indonesia has one of the highest dengue burdens worldwide. The disease has been reported in almost all provinces and districts, with periodic outbreaks and fluctuating, but generally high, incidence rates. Rapid urbanization, unplanned settlements, inadequate water management, and the accumulation of solid waste create favorable breeding sites for Aedes mosquitoes [3]. These environmental conditions are often compounded by limited community awareness and insufficient preventive practices, which sustain the transmission cycle at the household and neighborhood levels. Despite ongoing control programs, dengue remains a leading cause of morbidity and, in some instances, mortality, imposing a significant social and economic burden on affected families and communities [4].

From a public health perspective, community knowledge plays a pivotal role in preventing and controlling DHF. Knowledge of the mode of transmission, clinical manifestations, possible complications, and effective preventive measures directly influences individual and collective behaviors [5]. In Indonesia, national vector control strategies emphasize the Pemberantasan Sarang Nyamuk (PSN) or mosquito breeding site reduction and the 3M Plus approach, which includes draining water containers, closing water storage, reusing or recycling discarded containers, and

additional measures such as using mosquito repellents and installing window screens. These strategies are only effective when communities understand their importance and consistently apply them in their daily lives [6].

Empirical evidence from various regions in Indonesia suggests that higher levels of knowledge about DHF are associated with better household-level preventive behaviors [7]. Communities that are well informed about the Aedes mosquito breeding cycle, peak biting times, and environmental risk factors are more likely to participate in collective efforts such as regular "gotong royong" (community clean-up), source reduction, and early health-seeking behavior when experiencing dengue-like symptoms. Conversely, misconceptions or a lack of information about DHF may result in negligence, delayed treatment, and poor engagement with vector control programs organized by health authorities [8].

The working area of Puskesmas Kota Matsum, located in the Medan Area District, Medan City, is recognized as an endemic area for DHF. Population density, mixed residential and commercial land use, and variable environmental sanitation conditions contribute to the persistence of mosquito breeding sites and recurrent dengue cases [9]. Reports from local health authorities indicate that DHF cases are detected regularly throughout the year, with certain periods showing a marked increase. These conditions underline the need to understand the local determinants of prevention behavior, including the level of community knowledge about DHF transmission and preventive measures [10].

Primary health-care centers (puskesmas) are at the forefront of health promotion and disease prevention in Indonesia. In the context of DHF, puskesmas are responsible for case surveillance, outbreak response, health education, and coordination of community-based vector control activities [11]. However, the effectiveness of these efforts depends on the extent to which communities receive, comprehend, and utilize the health information. Assessing community knowledge in the specific catchment area of a puskesmas provides essential evidence for tailoring health promotion strategies, prioritizing target groups, and optimizing the use of limited resources [12].

In addition to knowledge, preventive behavior is shaped by socioeconomic conditions, cultural norms, prior experiences with the disease, and perceived severity and susceptibility to DHF [13]. Individuals or families who have previously suffered from DHF may have greater awareness and motivation to adopt preventive measures. However, such experiences do not automatically translate into comprehensive knowledge or sustained behavioral changes. Understanding whether previous illness and exposure to health information in endemic settings effectively translate into good knowledge and consistent preventive behavior is critical for designing more responsive interventions [14].

The present study focused on residents in the working area of Puskesmas Kota Matsum who had a history of DHF and were registered in the Puskesmas database. This population constitutes an important target group because they are at risk of reinfection and potential severe disease, yet also represent an opportunity for reinforcing prevention strategies. By examining the level of knowledge among these individuals and its association with reported preventive practices, this study aims to provide a nuanced picture of how information is internalized and acted upon in a real-world endemic context [15].

Moreover, this study contributes to the broader discourse on the role of knowledge as a modifiable factor in community-based DHF control. If a significant association between knowledge and preventive behavior is confirmed, it would justify strengthening health education and advocacy as central components of dengue control program. Conversely, if high knowledge does not translate into appropriate practices, this would prompt the exploration of other barriers, such as resource constraints, competing priorities, or structural factors beyond individual control. Thus, the findings are relevant not only for the Puskesmas Kota Matsum area but also for other urban communities facing similar challenges.

In summary, this study was designed to assess the level of community knowledge regarding DHF transmission and prevention among residents in the working area of Puskesmas Kota Matsum, Medan Area District, and to analyze the relationship between knowledge and DHF preventive behaviors. The evidence generated is expected to support the development of more effective, context-specific health promotion strategies aimed at reducing the incidence and impact of DHF in endemic urban settings.

2. METHOD

This study employed an analytic survey design with a cross-sectional approach. The cross-sectional design was chosen to enable the simultaneous assessment of community knowledge regarding DHF transmission and prevention, and the corresponding preventive behaviors at a single point in time. The research was conducted in the working area of Puskesmas Kota Matsum, located in the Medan Area District, Medan City, an urban area known to be endemic for DHF. Data were collected during a predefined period after obtaining the necessary administrative and ethical approvals from the relevant institutional authorities [16].

The study population comprised residents living in the working area of Puskesmas Kota Matsum who had a documented history of DHF and were registered in the health center's records. This target population was selected because prior experience with DHF was expected to influence both knowledge and preventive behavior, making them a critical group for assessing the effectiveness of existing health education intervention. The inclusion criteria were as follows: adults or adolescents residing in the area at the time of the study, having previously been diagnosed with DHF as recorded by the puskesmas, and willing to participate after receiving an explanation of the study objectives and procedures. Individuals who were severely ill, cognitively impaired, or unable to communicate effectively during data collection were excluded.

A total sampling technique was applied, meaning that all eligible individuals within the accessible population who met the inclusion criteria were invited to participate in the study. This approach was deemed appropriate because of the relatively limited number of registered DHF cases in the puskesmas database that could be contacted during the data collection period. In total, 98 respondents consented to and completed the survey, resulting in a final sample size of 98. The use of total sampling increases the representativeness of the findings for the defined population of DHF survivors within the Puskesmas catchment area [17].

The primary data collection instrument was a structured questionnaire developed based on the existing literature and national dengue control guidelines. The questionnaire consisted of several sections, as follows: The first section captured socio-demographic characteristics, such as age, gender, and other relevant background information. The second section assessed knowledge of DHF, including items on the causative agent, mode of transmission, vector characteristics, signs and symptoms, complications, and recommended preventive measures. The third section evaluated preventive behaviors related to DHF, focusing on household and environmental practices, such as draining and cleaning water containers, covering water storage, proper waste disposal, use of personal protective measures, and participation in community clean-up activities.

Prior to the main data collection, the questionnaire was subjected to validity and reliability tests. Content validity was ensured through an expert review by public health and epidemiology specialists who assessed the relevance, clarity, and comprehensiveness of the items. A pilot test was conducted among a small group of respondents in a neighboring area with similar characteristics to evaluate the item comprehension and response patterns. Reliability analysis, such as internal consistency for the knowledge and behavior scales, was examined using appropriate statistical indicators (e.g., Cronbach's alpha) to confirm that the instrument produced stable and consistent measurements. Revisions were made where necessary to improve clarity and reliability [18].

The knowledge variable was treated as an independent variable in this study. Each correct response to the knowledge items was assigned a score of one, and incorrect or "do not know" responses were scored zero. The total knowledge score was obtained by summing the item scores, and the resulting composite score was categorized into three levels good, moderate, and poor based on predetermined cut-off points. These cut-off points were established using percentage intervals of the maximum possible score, with higher scores reflecting better knowledge of DHF.

The dependent variable was the DHF preventive behavior. Behavioral items were assessed based on the frequency and consistency of specific preventive actions performed by respondents and their households. Responses were categorized into appropriate scales (for example, "always," "often," "sometimes," "never") and subsequently dichotomized or categorized as needed for analysis. A composite preventive behavior score was calculated and categorized into levels reflecting more or less favorable preventive behavior. This categorization allowed for the examination of the association between knowledge level and preventive behavior in the study population.

Data were collected through face-to-face interviews conducted by trained field workers or by self-administered questionnaires, depending on the respondents' literacy level and preference. The interviewers received prior training on the study protocol, ethical principles, and standardized administration of the questionnaire to minimize interviewer bias and ensure data quality. Before administering the questionnaire, respondents were informed about the study objectives, the voluntary nature of participation, the confidentiality of their responses, and their right to withdraw at any time without any negative consequences. Written or verbal informed consentwas obtained from all participants.

Data management included careful checking of completed questionnaires for their completeness and consistency. The data were then coded and entered into a statistical software program for analysis. Univariate analysis was performed to describe the distribution of socio demographic characteristics, knowledge levels, and preventive behaviors, which were presented as frequencies and percentages. Bivariate analysis was conducted to examine the relationship between knowledge level (independent variable) and preventive behaviors (dependent variable). Given the categorical nature of these variables, the chi-square test was used to assess statistical associations, with a significance level of 0.05. The results are presented in the form of tables and narrative descriptions.

Ethical considerations were integral to this research. The study protocol was reviewed and approved by the appropriate ethics committee or institutional review board. The confidentiality of respondent information was strictly maintained by assigning codes instead of using personal identifiers in the dataset. Data were securely stored, and access was limited to the research team. The potential risks to participants were minimal, primarily related to the time required to complete the questionnaire, while the potential benefits included contributing to improved understanding and future planning of DHF prevention programs in their community.

3. RESULTS AND DISCUSSION

A total of 98 respondents participated in this study, all of whom were residents of the working area of Puskesmas Kota Matsum and had a documented history of DHF. The socio-demographic profile of the respondents provides an important context for interpreting the findings on knowledge and preventive behaviors. In terms of gender distribution, more than half of the respondents were female, accounting for 56.1% of the sample, while males constituted 43.9% of the sample. This pattern suggests that women, who often play a central role in household management and environmental sanitation, were slightly more represented among those with prior DHF episodes in the puskesmas database.

Table 1. Sociodemographic characteristics of respondents (n = 98)

Characteristic	Category	Frequency (n)	Percentage (%)
Sex	Male	43	43.9
	Female	55	56.1
Age group (years)	17–25	28	28.6
	26–35	50	51.0
	36–45	20	20.4

Regarding age, the largest proportion of respondents fell within the 26–35-year age group, comprising 51.0% of the sample. Respondents aged 17–25 years accounted for 28.6% of the sample, while those aged 36–45 years represented 20.4%. These figures indicate that the majority of respondents were in the productive adult age range. The concentration of cases in these age groups may reflect patterns of exposure related to occupational and household activities, population structure in the area, and the long-standing endemicity of DHF in the Medan Area District.

The analysis of respondents' knowledge of DHF showed a varied distribution across the three predefined categories of knowledge level. More than half of the respondents (53.0%) demonstrated good knowledge of DHF transmission, clinical features, and prevention. A further 32.7% of respondents were classified as having moderate knowledge, indicating that they correctly answered a substantial proportion, but not all, of the knowledge items. The remaining 16.3% of respondents were categorized as having poor knowledge, reflecting significant gaps in their understanding of DHF. These findings highlight that while most respondents possessed relatively adequate knowledge, a considerable fraction of the community still lacked essential information about DHF.

Table 2. Distribution of respondents by DHF knowledge level (n = 98)

Knowledge level	Frequency (n)	Percentage (%)
Good	52	53.0
Moderate	32	32.7
Poor	16	16.3

The knowledge assessment specifically explored the respondents' understanding of key aspects of DHF. Many respondents with good knowledge were able to correctly identify mosquitoes, particularly Aedes aegypti, as the main vector of dengue virus transmission and were aware that stagnant water in artificial containers served as breeding sites for these mosquitoes. They also recognized common clinical signs and symptoms, such as high fever, headache, joint and muscle pain, and warning signs of severe dengue, including bleeding and persistent vomiting. In addition, respondents with good knowledge generally understood that early health-seeking behavior and supportive care are crucial for preventing complications and reducing the risk of death.

In contrast, respondents with moderate and poor knowledge levels showed a more limited understanding of these domains. Some were unable to accurately describe the mosquito breeding habitat or misunderstood the time of day when Aedes mosquitoes bite most actively. Others had difficulty distinguishing DHF from other febrile illnesses, which may have affected the timeliness of seeking medical care. Misconceptions among those with lower knowledge included the belief that dengue could be transmitted through person-to-person contact or that traditional remedies alone were sufficient to manage the illness. These knowledge gaps underscore the need for targeted and context-appropriate health education interventions.

Regarding preventive behaviors, the study documented a range of household and environmental practices reported by respondents. Among those with higher knowledge scores, key preventive actions such as regularly draining and scrubbing water storage containers, covering water tanks and buckets to prevent mosquito access, and properly disposing of or recycling unused containers that could accumulate rainwater were frequently reported. These respondents also indicated participation in community clean-up activities more often and demonstrated awareness of the importance of maintaining environmental cleanliness to reduce mosquito breeding sites.

Respondents with lower knowledge levels were less consistent in implementing these preventive measures. Some reported only occasionally cleaning water containers or did so without adhering to the frequency recommended by health authorities. Others did not consistently cover water storage or lacked awareness of the need to eliminate small collections of water around the home, such as those in discarded tires, flower-pots, or other containers. The variability

in preventive behaviors suggests that, even within a relatively small community, there are significant differences in how households manage DHF risk.

The core analytical focus of this study was the relationship between the knowledge level and DHF preventive behavior. Bivariate analysis using the chi-square test revealed a statistically significant association between the two variables, with a p-value below the predetermined significance threshold of 0.05. This indicates that the distribution of preventive behaviors differed significantly across knowledge categories. In practical terms, respondents with good knowledge were more likely to report favorable preventive behaviors, whereas those with moderate and poor knowledge were more likely to exhibit less optimal or inconsistent preventive practices.

A narrative examination of the cross-tabulation of knowledge and behavior further supports this conclusion. Households with good knowledge tended to combine multiple preventive actions, such as routinely draining containers, securing water storage, and participating in neighborhood clean-ups, suggesting a more holistic approach to DHF prevention. In contrast, respondents with poorer knowledge might implement one or two preventive measures intermittently but lack a comprehensive and sustained pattern of behavior. This association aligns with theoretical expectations that knowledge facilitates the adoption of preventive actions by enabling individuals to recognize risks and appreciate the benefits of vector control.

Overall, the results of this study provide empirical evidence that, in the working area of Puskesmas Kota Matsum, both the knowledge level and preventive behavior toward DHF exhibit substantial variation among community members with a history of the disease. While the majority of respondents good knowledge and demonstrated relatively favorable preventive practices, a non-negligible proportion still possessed limited knowledge and engaged in suboptimal environmental management. The statistically significant association between knowledge and preventive behavior underscores the strategic value of health education efforts aimed at elevating knowledge to improve and sustain DHF prevention in this endemic setting.

3.1. Discussion

The findings of this study demonstrate that more than half of the respondents in the working area of Puskesmas Kota Matsum possessed good knowledge about DHF transmission and prevention, and that this knowledge was significantly associated with more favorable preventive behaviors. This relationship supports the widely held assumption in public health that improving community knowledge can function as a catalyst for behavioral change in vector-borne disease control. In an endemic area such as the Medan Area District, where DHF has been a longstanding problem, enhancing and sustaining community knowledge is integral to reducing the incidence of new infections and mitigating the risk of recurrent outbreaks.

The predominance of respondents in the 26–35-year age group and the higher proportion of female participants offer important contextual insights into the study. Adults of productive age often serve as decision-makers regarding household expenditure, environmental management, and health-seeking behaviors. Women, in particular, frequently bear the primary responsibility for water storage, food preparation, and household cleanliness. Their overrepresentation in the sample and their generally good knowledge level suggest an opportunity to leverage women's roles as key agents of change in DHF prevention in the future. Targeted educational programs that empower women with accurate information and practical skills may have a multiplier effect at the family and community levels.

The finding that 16.3% of respondents still had poor knowledge despite living in an endemic area and having experienced DHF is a cause for concern. This subgroup may remain vulnerable to reinfection and severe disease, as inadequate knowledge can contribute to delayed recognition of symptoms and insufficient environmental controls. Various factors may explain why some individuals do not acquire or retain adequate knowledge, including limited exposure to health education messages, low literacy, competing life priorities, and the perception that DHF is an unavoidable or routine illness. These factors highlight the importance of tailoring educational strategies to reach hard-to-reach groups and reinforcing messages through multiple channels and repeated contacts [19].

The significant association between knowledge level and preventive behavior aligns with the Knowledge–Attitude–Practice framework and with findings from previous studies in other Indonesian settings. Households with better knowledge of DHF are more likely to consistently implement the 3M Plus strategy and participate in routine PSN activities. In this study, respondents with good knowledge reported a broader range of preventive measures, including regular cleaning of water storage containers, covering water tanks, and eliminating potential breeding sites around their homes. This pattern underscores the role of knowledge as a foundational element that enables individuals to understand why specific preventive actions are necessary and how they contribute to reducing mosquito populations and disease risk [20].

However, while the data confirm the presence of a positive association, it is important to recognize that knowledge alone may not be sufficient to ensure optimal preventive behaviors. Structural and contextual factors may facilitate or hinder the translation of knowledge into practice. For example, households with limited access to safe water supplies or secure storage facilities may find it difficult to follow recommendations for container management. Similarly, densely populated neighborhoods with poor waste management systems may remain at a high risk despite individual efforts. Therefore, interventions aimed at improving DHF prevention must combine health education with broader environmental and infrastructural improvements [21].

The results also underscore the strategic role of Puskesmas Kota Matsum as the primary institution responsible for health promotion and disease prevention in its catchment areas. The presence of a substantial proportion of respondents with good knowledge suggests that existing health education efforts, including counseling during clinic visits and community outreach activities, have had a positive impact. However, the persistence of moderate and poor knowledge among a sizable minority indicates that these efforts may not yet be fully comprehensive or continuous. Strengthening collaboration between puskesmas staff, community health volunteers, local leaders, and schools could help expand the reach and frequency of DHF education, ensuring that messages are reinforced and adapted to the needs of different population groups [22].

Another important implication of this study relates to the use of prior illness experience as an entry point for education. All respondents in this study had a history of DHF, yet not all demonstrated good knowledge of the disease. This suggests that the period during and after the illness may not have been fully utilized to deliver clear, structured information about DHF prevention. Health care encounters during hospitalization or follow-up visits represent critical teachable moments when patients and families are particularly receptive to information about how to avoid recurrence. Therefore, integrating standardized counseling on DHF transmission and preventive measures into clinical pathways for dengue cases could enhance the long-term impact of care on community-level prevention [23].

The cross-sectional design of this study warrants careful interpretation of its findings. Although the significant association between knowledge and preventive behavior strongly suggests that knowledge influences behavior, causality cannot be definitively established. It is also plausible that individuals who are more proactive in protecting their health seek more information and thus acquire better knowledge. Longitudinal or interventional studies are needed to clarify the direction and strength of causal pathways and to evaluate the effectiveness of specific educational interventions in changing behavior over time [24].

The limitations of this study also include the reliance on self-reported data for preventive behaviors, which may be subject to recall or social desirability bias. Respondents may have overreported desirable behaviors, such as routinely cleaning water containers or participating in community clean-up activities. Although efforts were made to ensure confidentiality and emphasize that responses would not affect access to health services, some degree of reporting bias cannot be excluded. Future research could complement self-reported data with direct observations of household environments to obtain a more objective assessment of preventive practices [25].

Despite these limitations, this study offers valuable insights for public health practices in the Puskesmas Kota Matsum area and similar urban settings. It highlights specific gaps in knowledge that can be addressed through targeted education, such as clarifying mosquito breeding habits, recognizing warning signs of severe dengue, and emphasizing the importance of consistently implementing 3M Plus activities. This also reinforces the importance of community engagement and intersectoral collaboration, involving local governments, environmental agencies, and civil society organizations, in sustaining vector control efforts beyond periodic campaigns.

4. CONCLUSION

This study in the working area of Puskesmas Kota Matsum, Medan Area District, demonstrated that while most community members with a history of DHF possess good knowledge about dengue transmission and prevention, a significant proportion still have moderate or poor knowledge. A statistically significant association was found between higher knowledge levels and more favorable preventive behaviors, supporting the premise that community knowledge is a key determinant of effective DHF prevention. These findings underscore the importance of continuous, context-specific health education and sustained community engagement to strengthen and maintain preventive practice. To reduce the burden of DHF in this endemic urban setting, health authorities and stakeholders should prioritize comprehensive health promotion programs that target the identified knowledge gaps, utilize multiple communication channels, and capitalize on the strategic role of puskesmas and community health volunteers. Integrating standardized counseling for dengue patients and their families, enhancing environmental management, and fostering intersectoral collaboration are crucial for translating improved knowledge into durable behavioral change. By aligning educational, environmental, and structural interventions, it is possible to create a more enabling environment for households and communities to effectively prevent DHF and its adverse effects.

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