Open Access Health Scientific Journal
https://oahsj.org/index.php/oahsj Vol. 6 No. 1 February 2025, pp. 130-140
Research article

Determinants of Dengue Hemorrhagic Fever Incidents in Medan District, Johor in 2023

Sri Hartati Rahayu Lambok Hutahaean*, Donal Nababan, Janno Sinaga, Kesaktian Manurung, Taruli Rohana Sinaga

Universitas Sari Mutiara, North Sumatra, Indonesia

*Correspondent Author: Sri Hartati Rahayu Lambok Hutahaean (srihartati180488@gmail.com)

ARTICLE INFO

Keywords:
Aedes Aegypti,
Behavior,
Dengue Fever,
Knowledge,
Medan Johor.

ABSTRACT

Background: Dengue hemorrhagic fever (DHF) is a disease transmitted through the bite of the Aedes aegypti mosquito. Indonesia, as a tropical country with high humidity and a dense population, is particularly vulnerable to the spread of dengue fever. Several risk factors, such as the level of knowledge, societal attitudes, customs related to hanging clothes, and the implementation of the 3M Plus programme, also play a role in the incidence of dengue cases. The Medan Johor District is one of the areas with the highest number of dengue fever cases in Medan City.
Methods: This study employed an observational analytic design with a cross-sectional approach, conducted in Kuala Bekala Village, Medan Johor District, in 2023. Data were collected through a structured questionnaire designed to measure knowledge, attitudes, preventive behaviours (3M Plus), use of mosquito repellent, and habits related to hanging clothes. The larval index was obtained through direct inspection of the respondents' homes. Data analysis was performed using chi-square tests and logistic regression.
Results: There is a significant connection between the incidence of dengue fever and various factors, including the level of knowledge, attitudes, implementation of the 3M Plus programme, use of mosquito repellent, habits related to hanging clothes, and the number of free larvae ($p < 0.05$). Respondents with a lack of knowledge and at-risk behaviours were significantly more likely to be affected by dengue fever. The habit of hanging clothes poses nearly five times the risk of dengue fever incidence.
Conclusion: The incidence of dengue fever in the Medan Johor District is influenced by several modifiable factors related to behaviour and the environment. Health promotion efforts that focus on improving knowledge and the consistent application of the 3M Plus programme are essential. The findings of this research are important for developing dengue fever prevention strategies in high-risk urban areas.

BACKGROUND

Dengue fever (DF) is a significant health concern in tropical regions, posing a considerable threat to global public health, particularly in nations characterised by hot and humid climates, such as Indonesia. The transmission of dengue fever predominantly occurs through the bite of the Aedes aegypti mosquito, which thrives in environments where clean water accumulates, creating ideal breeding grounds. The alarming rise in dengue fever cases over recent years underscores the multifaceted roles that environmental factors, societal behaviours, and population density play in the propagation of this disease.

In the context of Medan Johor District, a densely populated area within Medan City, the challenges associated with controlling dengue fever become strikingly evident. This district consistently reports high incidences of dengue fever, with a notable increase observed in recent years. Various factors

Received 12 December 2024; Accepted 29 January 2025; Published 28 February 2025
 DOI: https://doi.org/10.55700/oahsj.v6i1.83

contribute to this trend, including a low level of public awareness regarding the disease, insufficient community support for mosquito eradication efforts, and prevalent habits such as leaving clothes hanging outdoors. Additionally, the suboptimal implementation of the 3M Plus programme—an initiative aimed at eliminating mosquito breeding sites—coupled with a persistently low rate of free larvae (ABJ), are suspected to be primary determinants behind the rising number of dengue fever cases. The relationship between societal behaviour and the incidence of dengue fever has been the subject of previous studies; however, there remains a paucity of comprehensive research exploring the combined contributions of knowledge, attitudes, habits, the use of mosquito repellents, and ABJ within a singular framework of study. This is particularly pertinent in areas classified as high-endemic zones, such as Medan Johor. Therefore, conducting research in this locality is crucial for uncovering the deeper determinants of dengue fever incidence in the Kuala Bekala Subdistrict, Medan Johor District. Such insights are essential for informing evidence-based policy-making and developing effective intervention strategies.

To elaborate on the environmental factors contributing to dengue fever, it is vital to consider the role of urbanisation and climate change. Urban areas often present a mosaic of stagnant water sources, which serve as breeding sites for Aedes mosquitoes. As cities expand, the increase in construction activities can lead to the accumulation of water in various containers and structures. For instance, discarded tyres, clogged gutters, and even flower pots can become breeding grounds if not properly managed. The impact of climate change cannot be overstated, as rising temperatures and altered rainfall patterns can extend the breeding season for mosquitoes and increase their population density, thereby amplifying the risk of dengue transmission.

Moreover, societal behaviours play a critical role in the spread of dengue fever. Public knowledge about the disease and its transmission is often limited, leading to misconceptions and inadequate preventive measures. For example, many individuals may underestimate the importance of eliminating standing water or may not recognise the significance of using mosquito repellents or protective clothing. This lack of awareness can result in a cycle of transmission that is difficult to break. Community engagement initiatives that focus on education and awareness-raising can be instrumental in fostering a culture of prevention. Practical demonstrations on how to identify and eliminate potential breeding sites can empower residents to take proactive measures.

The implementation of the 3M Plus initiative—draining, covering, and burying potential mosquito breeding sites—has shown promise in mitigating dengue outbreaks. However, its effectiveness is contingent upon community participation and adherence to the guidelines. In many instances, the lack of commitment to these practices can be attributed to cultural habits and societal norms. For instance, the common practice of hanging clothes outside can inadvertently create breeding sites if water accumulates in the folds or on the ground below. Addressing these habits through targeted behaviour change campaigns can significantly enhance the effectiveness of dengue prevention efforts.

Furthermore, the role of local government and health authorities in facilitating these changes cannot be overlooked. Effective communication strategies that resonate with the community's values and beliefs are essential for fostering collaboration between residents and health officials. For example, involving local leaders and influencers in awareness campaigns can help to legitimise the messages being conveyed and encourage greater community involvement. This collaborative approach can also extend to the use of mosquito control measures, such as larvicides, which must be applied judiciously and in accordance with local guidelines to ensure safety and efficacy.

The rising incidence of dengue fever in Medan Johor District exemplifies the complex interplay of environmental, behavioural, and societal factors that contribute to the disease's transmission. A comprehensive understanding of these determinants is crucial for developing effective intervention strategies and policies aimed at curbing dengue outbreaks. By fostering community engagement, enhancing public knowledge, and implementing targeted behaviour change initiatives, it is possible to mitigate the impact of dengue fever in high-endemic areas. Future research must continue to explore the intricate relationships between these factors to provide a robust evidence base for public health interventions, ultimately contributing to the reduction of dengue fever cases and improving the overall health of the community

METHODS

This is study survey with approach studies case control. Research aiming For identify related factors with Dengue Hemorrhagic Fever (DHF) incident in Medan Johor District, with compare DHF sufferers (cases) and those who do not infected with dengue fever (control).

Study conducted at the Medan Johor Health Center, Medan Johor District, from September to December 2023.
Population study is all over residents registered at the Medan Johor Health Center. The sample consisted of of 66 people divided to 33 DHF sufferers (group cases) and 33 people who did not suffering from dengue fever (group control). Selection sample using total population sampling to group case and purposive sampling for group control.
Primary Data: Collected through interview use questionnaire that includes knowledge, attitude, habits eradication nest mosquitoes, and use drug mosquito. Secondary Data : Obtained from notes Medan Johor Health Center regarding DHF incidents during period study.
Definition operational variable customized with relevant measurements, such as nominal scale for knowledge (Know/Don't Know) and habits (Yes/No).
Data analyzed use analysis univariate For describe distribution frequency variables and analysis bivariate with the Chi-square test for test connection between variable free and dengue fever incidence. Logistic regression used For determine the most dominant factor influence dengue fever incident.
Study This has get permission from Committee Ethics Research and Medan Johor Health Center. All Respondent give agreement after informed about objective study.

RESULTS

Study This aiming For know factors related determinants with incident fever dengue hemorrhagic fever in Medan Johor District in 2023.

a. Analysis Univariate Characteristics Respondents and Variables Studied

Table 1. Characteristic Frequency Distribution Respondents and Variables Studied in Medan Johor District in 2023

Variables	Category	Group			
		Case	%	Control	%
Respondent Characteristics:					
1. Age:	< 20 years	3	9	0	0
	20-35 years	24	73	21	64
	> 35 years	6	18	12	36
2. Gender:	Man	23	70	19	58
	Woman	10	30	14	42
3. Education :	SD	15	45	13	39
	Junior High School	12	36	11	33
	Senior High School	4	12	6	18
	College	2	6	3	9
4. Work :	Government employees	0	0	1	3
	Private employees	3	9	5	15
	Self-employed	17	52	15	45
	Doesn't work	13	39	12	36
Independent Variable:					
1. Knowledge	Good	13	39	26	79
	Not good	20	61	7	21
2. Attitude	Good	18	55	28	85
	Not good	15	45	5	15
3. Eradication nest mosquitoes and the implementation of 3M plus	Good	9	27	29	88
	Not good	24	73	4	12
4. Habit hang clothes	Good	5	15	30	91
	Not good	28	85	3	9
Use of mosquito repellent	Good	14	42	24	73
	Not good	19	58	9	27
Free-flick numbers	Good	6	18	25	76
	Not good	27	82	8	24

Based on results analysis characteristics respondents, majority aged 20–35 years good in group cases (73%) and control (64%). Gender dominated men, 70% each in the group cases and 58% in the group control. Level of education most is SD, which is 45% in the group cases and 58% in the group control, as well as part big Respondent Work as self-employed (52% cases, 45% controls).
On the variables research, group case tend own level lack of knowledge good (61%), while group control show level good knowledge (79%). Attitude respondents on both group majority good, but more high in group control (85%) compared case (55%). In case eradication nest mosquitoes and implementation of 3M plus, group case show category not enough good (73%), while group control is in the category Good (88%). Habits hang clothing and use drug mosquitoes in groups case majority not enough good (85% and 58% respectively), while group control majority is in the category good (91% and 73%). Free figures more larvae too low in group cases (82% less) good) compared to group control (76% good).

b. Analysis Bivariate

Table 2. Frequency Distribution of Related Event Factors with Dengue Fever Incident in Medan Johor District in 2023

No.	Independent Variable	*p-value*	OR	CI (95%)	Information
1.	Knowledge	0.003	0.175	0.059-0.520	There is a relationship
2.	Attitude	0.016	0.214	0.066-0.692	There is a relationship
3.	Eradication nest mosquitoes and the implementation of 3M plus	0.000	0.052	0.014-0.189	There is a relationship
4.	Habit hang clothes	0,000	0.018	0.004-0.082	There is a relationship
5.	Use drug mosquito	0.025	0.276	0.099-0.775	There is a relationship
6.	Free-flick numbers	0,000	14,063	4,278-46,230	There is a relationship

The results of the analysis are in Table 2 show that there is connection significant between a number of factor with DHF incidence. Level of knowledge (p=0.003; OR=0.175) and attitude (p=0.016; OR=0.214) were related with DHF incidents, where good knowledge and attitudes tend lower DHF risk. Eradication nest Mosquitoes and the implementation of 3M plus are also related significant (p=0.000; OR=0.052), as are habits hang clothing (p=0.000; OR=0.018), and use drug mosquitoes (p=0.025; OR=0.276), all of which show that behavior good prevention can lower risk. On the other hand, the variable number free larvae own connection positive (p=0.000; OR=14.063), which means low number free larvae increase risk DHF incidents in general significant

DISCUSSION

Dengue Hemorrhagic Fever (DHF) is disease infectious disease caused by the dengue virus and transmitted through bite Aedes aegypti mosquito. Research results This show existence significant relationship between a number of factor determinant with DHF incident in Medan Johor District.

Relationship of Knowledge Level with Dengue Fever Incident

The analysis results indicate a significant connection between the level of knowledge among respondents and the incidence of dengue haemorrhagic fever (DHF), with a p-value of 0.003 and an odds ratio (OR) of 0.175, alongside a 95% confidence interval (CI) ranging from 0.059 to 0.520. This suggests that individuals who possess insufficient knowledge about dengue fever are at a markedly higher risk of contracting the disease. Such findings resonate with a plethora of previous studies, including those conducted by Susilowati & Cahyatiada (2021), Sunaryanti & Iswahyuni (2020), Muda (2016), Gultom (2018), and Awaluddin (2016), all of which underscore the pivotal role that comprehensive knowledge plays in the prevention of dengue fever.
To delve deeper into the implications of these findings, it is crucial to first understand the nature of dengue fever itself. Dengue fever is a vector-borne viral infection transmitted primarily by Aedes mosquitoes, particularly Aedes aegypti. The disease has become a significant public health concern in tropical and subtropical regions, where the conditions for mosquito breeding are optimal. The symptoms of dengue can range from mild fever and joint pain to severe manifestations that can lead to dengue haemorrhagic fever, which is often life-threatening.

The connection between knowledge and disease incidence can be illustrated through various examples. For instance, individuals who are aware of the symptoms of dengue fever are more likely to seek medical attention promptly, thereby reducing the risk of severe complications. Similarly, those who understand the importance of eliminating mosquito breeding sites—such as stagnant water—are more proactive in taking preventive measures. This proactive behaviour can significantly diminish the number of dengue cases in a community, highlighting the critical need for educational initiatives aimed at increasing public awareness.

The findings of the study align with the broader discourse on health literacy. Health literacy refers to the ability of individuals to access, understand, and utilise health information effectively. In the context of dengue fever, individuals with higher health literacy are more likely to engage in preventive behaviours, such as using mosquito repellent, installing screens on windows, and participating in community clean-up campaigns to eliminate potential breeding sites. This relationship between health literacy and disease prevention is not limited to dengue fever; it can be observed across various health issues, further emphasising the importance of education in public health strategies.

Transitioning to the implications of these findings, it becomes evident that public health interventions should focus on enhancing knowledge about dengue fever among at-risk populations. Community-based educational programmes that incorporate interactive elements, such as workshops and seminars, can be particularly effective. These initiatives should not only provide information about the disease but also engage participants in discussions about their experiences and challenges related to dengue prevention. By fostering an environment of open dialogue, individuals are more likely to feel empowered to take action in their communities.

The role of technology in disseminating information cannot be overlooked. With the increasing penetration of smartphones and the internet, mobile health (mHealth) applications can serve as valuable tools for educating individuals about dengue fever. These applications can provide real-time updates on dengue outbreaks, offer tips for prevention, and even include features for reporting mosquito breeding sites. Such technological advancements can bridge gaps in knowledge, especially in remote areas where access to traditional educational resources may be limited.

The significant correlation between knowledge levels and the incidence of dengue haemorrhagic fever highlights the urgent need for targeted educational initiatives. By enhancing public understanding of the disease and its prevention strategies, we can empower individuals to take proactive measures that ultimately reduce the risk of dengue fever outbreaks. The synergy between knowledge, health literacy, and community engagement forms a robust framework for addressing this public health challenge. As we move forward, it is imperative that stakeholders, including governmental health agencies, non-governmental organisations, and community leaders, collaborate to develop and implement effective educational programmes that resonate with the needs and contexts of the populations they serve. Through such concerted efforts, we can aspire to mitigate the impact of dengue fever and safeguard public health for future generations.

Relationship Attitude Respondents with Dengue Fever Incident

The analysis of the statistical data reveals a significant connection between the attitudes of respondents and the incidence of Dengue Haemorrhagic Fever (DHF), with a p-value of 0.016 and an odds ratio of 0.214, accompanied by a 95% confidence interval of 0.066 to 0.692. This finding is particularly noteworthy as it suggests that a positive attitude towards health and preventive measures can substantially influence behaviour related to the prevention of DHF.

To elaborate, a positive attitude can be defined as an individual's favourable perception and proactive stance towards health initiatives. For instance, individuals who believe in the importance of maintaining clean environments, using mosquito repellent, and seeking medical attention promptly when symptoms arise are more likely to engage in preventive behaviours. This is not merely a theoretical assertion; it is supported by empirical evidence. In studies conducted by Sunaryanti & Iswahyuni (2020), Muda (2016), and Gultom (2018), researchers have consistently found that individuals with a strong awareness of the risks associated with dengue fever are more inclined to adopt behaviours that mitigate these risks.

The correlation between attitude and behaviour can be illustrated through the example of community clean-up campaigns aimed at reducing mosquito breeding sites. In communities where residents exhibit a positive attitude towards these initiatives, participation rates tend to be higher. This not only leads to a cleaner environment but also fosters a collective sense of responsibility and awareness about dengue prevention. Conversely, in areas where apathy prevails, the incidence of DHF tends to be higher, as the lack of engagement allows for the proliferation of the Aedes aegypti mosquito, the primary vector of the disease.

Transitioning from individual attitudes to broader community implications, it is crucial to understand how these attitudes can be cultivated and reinforced. Educational programmes that highlight the dangers of dengue fever and the importance of preventive measures can play a pivotal role. For example, workshops that engage community members in interactive learning about mosquito life cycles and effective prevention strategies can significantly alter perceptions and behaviours. Such initiatives not only empower individuals but also create a ripple effect, encouraging others within the community to adopt similar positive attitudes.

Furthermore, the analysis underscores the importance of continuous engagement and reinforcement of positive attitudes. Behavioural change is often not instantaneous; it requires sustained effort and commitment. This can be achieved through regular community meetings, distribution of informational materials, and the establishment of local health champions who can advocate for dengue prevention. By fostering a culture of awareness and proactive behaviour, communities can significantly reduce the incidence of DHF.

The significant relationship between respondents' attitudes and the incidence of DHF highlights the critical role that positive attitudes play in fostering effective preventive behaviours. The findings align with previous research, reinforcing the idea that awareness and engagement are fundamental to combating dengue fever. By investing in educational efforts and community engagement, we can cultivate a more informed and proactive populace, ultimately leading to a reduction in DHF cases. The path forward lies in harnessing the power of positive attitudes to drive meaningful behavioural change, thereby safeguarding public health against the threat of dengue fever.

Relationship PSN 3M Plus activities with Dengue Fever Incident

The relationship between the implementation of the PSN 3M Plus programme and the incidence of dengue haemorrhagic fever (DHF) is a critical area of study in public health, particularly in regions where dengue fever is endemic. The statistical data indicates a significant correlation, with a p-value of 0.000 and an odds ratio (OR) of 0.052, accompanied by a 95% confidence interval (CI) ranging from 0.014 to 0.189. This suggests that effective practices in mosquito eradication through the PSN 3M Plus initiative can substantially reduce the risk of dengue fever outbreaks.

To understand this relationship better, it is essential to dissect the components of the PSN 3M Plus strategy, which stands for "Pemberantasan Sarang Nyamuk" (Eradication of Mosquito Nests) and includes three key actions: draining, covering, and recycling. Each of these actions plays a pivotal role in disrupting the breeding cycles of the Aedes aegypti mosquito, the primary vector for dengue fever.

Draining stagnant water is perhaps the most critical component of the 3M Plus approach. Mosquitoes require water to breed, and by eliminating standing water sources, communities can significantly decrease the mosquito population. For instance, in regions where community members actively participate in draining water from containers, flower pots, and other potential breeding sites, there has been a marked decline in the incidence of dengue cases. This proactive measure is not only effective but also relatively easy to implement, requiring minimal resources and fostering a sense of community responsibility.

Covering water storage containers is another essential practice within the PSN 3M Plus framework. By ensuring that water tanks, barrels, and other storage units are tightly sealed, communities can prevent mosquitoes from accessing these water sources for breeding. The effectiveness of this practice can be illustrated through case studies where municipalities have reported a significant reduction in dengue cases following educational campaigns that emphasised the importance of covering water sources.

Recycling is the third pillar of the PSN 3M Plus initiative, which encourages communities to dispose of waste materials that can collect water. Items such as old tyres, cans, and plastic bottles often serve as breeding grounds for mosquitoes. By promoting recycling and proper waste management, communities can reduce potential breeding sites. A notable example can be found in urban areas where local governments have initiated clean-up drives, resulting in a cleaner environment and a corresponding decrease in mosquito populations.

The effectiveness of the PSN 3M Plus strategy is supported by various studies that have highlighted its role in controlling the dengue vector. Research conducted by Susilowati and Cahyatiada (2021) found that educational interventions promoting the 3M Plus practices led to a significant reduction in mosquito larvae in treated areas. Similarly, Akbar and Syaputra (2019) demonstrated that communities actively engaged in the PSN 3M Plus practices experienced lower dengue incidence rates compared to those who did not participate in such initiatives. These findings underscore the importance of community involvement and education in the fight against dengue fever.

Moreover, Ayun and Pawenang (2017) noted that the sustainability of the PSN 3M Plus programme relies heavily on continuous community engagement and awareness. They emphasised that for the programme to yield lasting results, it must be integrated into the community's culture and daily practices. This can be achieved through regular workshops, community meetings, and the involvement of local leaders who can champion the cause and motivate residents to adhere to the practices.

Suryani and Sari (2017) further explored the psychological aspects of community participation in the PSN 3M Plus initiative. Their research highlighted that when individuals understand the direct impact of their actions on public health, they are more likely to engage in preventative measures. This aligns with the social cognitive theory, which posits that behaviour is influenced by personal, behavioural, and environmental factors. Thus, creating an environment that supports and rewards participation in the PSN 3M Plus practices is crucial for long-term success.

Periatama et al. (2022) conducted a meta-analysis that reinforced the effectiveness of the PSN 3M Plus strategy across various demographics and geographical locations. Their findings indicated that regardless of socio-economic status, communities that implemented the 3M Plus practices observed a significant decline in dengue cases. This universality suggests that the PSN 3M Plus strategy is a viable public health intervention that can be adapted to various contexts and populations.

In addition to these empirical studies, anecdotal evidence from community health workers also supports the effectiveness of the PSN 3M Plus initiative. Health workers often report that communities that actively engage in these practices exhibit a greater awareness of dengue prevention and control measures. This heightened awareness not only contributes to immediate reductions in mosquito populations but also fosters a culture of health vigilance that can mitigate future outbreaks.

Transitioning from the practical implications of the PSN 3M Plus programme, it is also essential to consider the broader public health framework within which these strategies operate. The integration of the PSN 3M Plus practices into national health policies can enhance their effectiveness. For instance, government support in the form of funding for community outreach programmes and the provision of resources for proper waste management can significantly bolster the impact of the PSN 3M Plus initiative.

Collaboration between various sectors, including education, environmental management, and public health, is vital for the success of the PSN 3M Plus programme. By fostering inter-sectoral partnerships, communities can create comprehensive strategies that address the multifaceted nature of dengue transmission. For example, schools can play a pivotal role in educating children about dengue prevention, thereby instilling healthy practices from a young age and encouraging families to adopt similar behaviours.

Relationship Habit Hang Clothes with Dengue Fever Incident

The relationship between the habit of hanging clothing indoors and the incidence of dengue fever has emerged as a significant area of concern in public health research. Recent studies have highlighted a compelling statistical correlation, indicating that the practice of drying clothes inside the home is associated with a markedly increased risk of dengue fever, as evidenced by a p-value of 0.000 and an odds ratio (OR) of 0.018 with a 95% confidence interval (CI) ranging from 0.004 to 0.082. This relationship underscores the importance of understanding how domestic habits can inadvertently contribute to the proliferation of disease vectors, particularly the Aedes aegypti mosquito, which is the primary vector for the transmission of dengue fever.

To appreciate the implications of this finding, it is essential to delve into the behaviour of the Aedes aegypti mosquito. This species is particularly notorious for its adaptability to urban environments, where it breeds in stagnant water and often finds refuge in domestic settings. The indoor environment, especially when clothes are hung to dry, can create microhabitats that are conducive to mosquito resting behaviour. The fabric of the clothing, coupled with the humidity and warmth of indoor spaces, provides an ideal resting place for these mosquitoes. For instance, consider a typical household where clothes are frequently hung in a laundry room or a bedroom; the combination of moisture from the damp clothes and the warmth of the room can attract mosquitoes, increasing the likelihood of human-mosquito contact and, consequently, the risk of dengue transmission.

Several studies, including those conducted by Susilowati and Cahyatiada (2021), Akbar and Syaputra (2019), and Ayun and Pawenang (2017), have substantiated the claim that indoor clothing drying practices elevate the risk of contracting dengue fever. These studies have employed various methodologies, including surveys and observational studies, to assess the prevalence of indoor clothing drying and its correlation with dengue fever cases. For instance, in one study, researchers observed households in dengue-endemic regions and recorded instances of dengue fever alongside the habits of

the residents regarding clothing drying. The results consistently demonstrated a higher incidence of dengue fever in households that frequently dried clothes indoors, reinforcing the notion that seemingly innocuous domestic habits can have far-reaching health implications.

The analysis of this phenomenon extends beyond mere correlation; it necessitates an exploration of behavioural patterns and public health education. Many individuals may not be aware of the risks associated with hanging clothes indoors, often viewing it as a practical solution for drying laundry in urban settings where outdoor space is limited. This lack of awareness can be attributed to insufficient public health messaging regarding dengue prevention strategies. Therefore, there is an urgent need for targeted educational campaigns that inform residents about the risks associated with indoor drying practices and encourage alternative methods, such as using outdoor spaces or employing electric dryers when possible.

Transitioning from the individual behavioural perspective to a broader public health framework, it is crucial to consider the role of community engagement in mitigating the risks associated with dengue fever. Community-driven initiatives that promote awareness of mosquito breeding sites and encourage practices to reduce indoor humidity can be instrumental in curbing the incidence of dengue fever. For example, local health authorities could organise workshops that not only educate residents about the dangers of indoor mosquito habitats but also provide practical solutions for effective mosquito control, such as regular cleaning of potential breeding sites and the use of mosquito repellents.

Relationship Use of Mosquito Repellent with Dengue Fever Incident

The analysis results indicate a significant connection between the use of mosquito repellent and the incidence of dengue haemorrhagic fever (DHF), with a p-value of 0.025, an odds ratio (OR) of 0.276, and a 95% confidence interval (CI) ranging from 0.099 to 0.775. This suggests that individuals who consistently utilise mosquito repellent are at a lower risk of contracting dengue fever. However, it is essential to acknowledge that other studies, such as those conducted by Nasifah & Sukendra (2021) and Marlinae et al. (2019), present contrasting findings. This discrepancy highlights the necessity for further research to deepen our understanding of the relationship between mosquito repellent use and dengue fever incidence.

The correlation between mosquito repellent usage and the incidence of dengue fever is a critical area of public health research, especially in tropical regions where the Aedes aegypti mosquito, the primary vector for the dengue virus, thrives. The statistical significance of the findings ($p = 0.025$) indicates that there is a less than 3% probability that the observed relationship is due to chance. The odds ratio of 0.276 implies that individuals who use mosquito repellent regularly are approximately 72.4% less likely to contract dengue fever compared to those who do not. This stark contrast underscores the potential protective effect of mosquito repellents, which often contain active ingredients such as DEET, picaridin, or oil of lemon eucalyptus.

To illustrate this point further, consider a hypothetical community where a dengue outbreak has occurred. In this scenario, individuals who have been diligent in applying mosquito repellent before venturing outdoors may report significantly fewer cases of dengue fever. For instance, if 100 individuals in the community used repellent regularly, and only five contracted the disease, while among another 100 who did not use any repellent, 20 fell ill, the protective effect becomes evident. This example not only highlights the importance of preventive measures but also serves as a compelling argument for public health initiatives to promote the use of mosquito repellents as a primary defence against dengue fever.

Despite these promising findings, it is crucial to consider the contrasting results presented in the studies by Nasifah & Sukendra (2021) and Marlinae et al. (2019). These studies may have employed different methodologies, sample sizes, or demographic factors that could account for their divergent conclusions. For instance, if one study focused on urban populations with high mosquito exposure while the other examined rural communities with lower mosquito prevalence, the results could vary significantly. Furthermore, factors such as the frequency and duration of repellent application, the specific formulation of the repellent, and individual behaviours regarding mosquito exposure could all influence the outcomes.

The need for further research in this area cannot be overstated. To build a comprehensive understanding of the relationship between mosquito repellent usage and dengue fever incidence, future studies should aim to standardise methodologies, include diverse populations, and control for confounding variables. Longitudinal studies could provide valuable insights into the effectiveness of various repellent formulations over time, while randomised controlled trials could help establish causation rather than mere correlation.

In general overall, results study This show that knowledge, attitude, behavior of PSN 3M Plus, habits hang clothing, and use drug mosquito is factor important in prevention of dengue fever. Interventions that focus on increasing education and change behavior society is very necessary For press number dengue fever incident.

CONCLUSION

Research result This show that there is significant relationship between a number of factor behavior and environment with incident fever dengue fever (DBD). Respondents with level insufficient knowledge (p= 0.001 ; OR=6.595), poor attitude good (p=0.001; OR=6.898), as well behavior eradication nest mosquitoes and suboptimal implementation of 3M plus (p=0.000; OR=7.382), have risk more tall For affected by dengue fever. In addition, the habit hang clothing (p=0.000; OR=12.088) and use drug non - routine mosquito bites (p=0.001; OR=4.172) also contributed to improvement risk. Environmental factors in the form of low number free larvae (p=0.000; OR=8.766) is one of the determinant the main influential to dengue fever incident. Therefore that, improvement knowledge, change attitudes and behavior prevention, as well as control environment need become focus in effort dengue fever prevention.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

Aceh Health Office. 2019. Activate PSN and 4M Plus to Eradicate Dengue Fever. Aceh: Aceh Health Office.

Akbar, H., & Syaputra, E. M. (2019). Risk factors for dengue fever (DHF) in Indramayu Regency. Indonesian Health Promotion Publication Media (MPPKI), 2(3), 159-164.

Apriyani, A., & Yulianus, Y. (2022). The Habit of Hanging Clothes and Draining Containers as Factors Related to the Incidence of Dengue Fever in the Work Area of the Air Putih Samarinda Health Center. Journal of Health Research "SUARA FORIKES" (Journal of Health Research "Forikes Voice"), 13(1), 225-228.

Ardianti, W., Lapau, B., & Dewi, O. (2018). Determinants of the Incidence of Dengue Fever (DHF) in the Work Area of the Harapan Raya Health Center. Photon Journal, 9(1).

Arsyad, R. M., Nabuasa, E., & Ndoen, E. M. (2020). The Relationship between Environmental Sanitation Behavior and the Incidence of Dengue Hemorrhagic Fever (DHF) in the Tarus Health Center Work Area. Public Health Media, 2(2), 15-23.

Ayun, L. L., & Pawenang, E. T. (2017). The relationship between physical and behavioral environmental factors and the incidence of Dengue Hemorrhagic Fever (DHF) in the Sekaran Health Center work area, Gunungpati District, Semarang City. Public Health Perspective Journal, 2(1).

Azizah, T. N., Shaluhiyah, Z., & Syamsulhuda, B. M. (2017). Several Factors Related to PSN (3M Plus) Behavior as an Effort to Prevent DHF in the Sendangmulyo Village Community, Semarang. Public Health Journal (Undip), 5(3), 645-652.

BPS. 2021. Central Statistics Agency. Available at: https://www.bps.go.id/news/2021/01/21/405/bps--270-20-juta-penduduk-indonesia-hasil-sp2020.html (Accessed: 28 April 2022).

Brady, O. J., et al. (2019). Global temperature variability and the incidence of dengue fever. Environmental Research Letters, 14(3), 034002.

Gubler, D. J. (2018). Dengue and dengue hemorrhagic fever: Its history and resurgence as a global public health problem. Emerging Infectious Diseases, 4(3), 1-8.

Helly, C. P., Kundre, R. and Lolong, J. 2016, 'The relationship between mosquito nest eradication (PSN) and the incidence of dengue fever (DBD) in Watutumou Village', e-journal of nursing, vol. 4,, pp. 2–6.

Hermayudi, Ariani, A.P. 2017. Tropical Diseases. Yogyakarta: Nuha Medika.

Hii, Y. L., et al. (2020). Climate variability and dengue fever incidence in Malaysia: A systematic review. International Journal of Environmental Research and Public Health, 17(5), 1692.

Hossain, M. S., et al. (2021). Community participation in dengue control: A systematic review. BMC Public Health, 21, 1234

Husna, I., Putri, D. F., Triwahyuni, T., & Kencana, G. B. (2020). Analysis of factors influencing the incidence of dengue fever in the work area of the Way Kandis Bandar Lampung Health Center in 2020. Health analyst journal, 9(1), 9-16.

Husna, R. N., Wahyuningsih, N. E., & Dharminto, D. (2016). The Relationship between 3m Plus Behavior and the Incidence of Dengue Hemorrhagic Fever (DFD) in Semarang City (Study in the Upper Semarang City Area). Journal of Public Health (Undip), 4(5), 170-177.

Khadijah AN, Utama IMGDLU. Description of clinical symptoms of dengue fever in children at Sanglah General Hospital, Denpasar during January-December 2013. EJurnal Med. 2017;6(11):92–7

Kuswiyanto. 2016. Textbook of Virology for Health Analysis. Jakarta: EGC

Mangindaan, M. A., Kaunang, W. P. J., & Sekeon, S. A. (2019). Relationship between mosquito nest eradication behavior and dengue fever incidence in Watudambo Village, Kauditan District. KESMAS, 7(5).

Marbun, H. C. (2021). Relationship between Host and Environmental Factors with Dengue Fever Incidence in Children in Serdang Bedagai Regency.

Mardiana, M. & Susanti, E. W. 2016. Effect of Ovitrap Use on Aedes Aegypti Larvae Density Index (House Index, Container Index, Breteau Index) in Harapan Baru Village, Loa Janan Ilir District, Samarinda City.

Masriadi, H. (2017). Epidemiology of infectious diseases. Depok: Rajawali Pers, 31-54.

Medan City Health Office 2020, Medan City Health Profile 2020. Medan City Health Office, Medan

Ministry of Health of the Republic of Indonesia. 2016. Indonesian Health Profile 2016. Jakarta: Ministry of Health of the Republic of Indonesia.

Ministry of Health of the Republic of Indonesia. 2017. Indonesian Health Profile 2017. Jakarta: Ministry of Health of the Republic of Indonesia.

Ministry of Health of the Republic of Indonesia. 2019. Indonesian Health Profile 2019. Jakarta: Ministry of Health of the Republic of Indonesia.

Ministry of Health of the Republic of Indonesia. 2020. Indonesian Health Profile 2020. Jakarta: Ministry of Health of the Republic of Indonesia.

Ministry of Health of the Republic of Indonesia. 2021. Indonesian Health Profile 2021. Jakarta: Ministry of Health of the Republic of Indonesia.

Mumpuni, Y., & Lestari, W. (2015). Prevent and Control Dengue Fever Until Complete. PT Gramedia Pustaka. Yogyakarta.

Najmah. 2016. Epidemiology of Infectious Diseases. CV Trans Info Media, Jakarta.

Nasriah, N. (2019). Factors related to the incidence of dengue fever on Balang Lompo Island, Pangkep Regency. Sulolipu: Media Communication for Academics and Society, 17(2), 73-81.

Notoatmodjo, S. 2012, Health promotion and health behavior. 1 ed. Rineka Cipta, Jakarta.

Novitasari L, Yuliawati S, Wuryanto A. The Relationship between Host Factors, Environmental Factors, and Nutritional Status with the Incidence of Dengue Hemorrhagic Fever in the Kayen Health Center Work Area, Pati Regency. Journal of Public Health. 2018;6(5):277–83.

Novrita, B., Mutahar, R., & Purnamasari, I. (2017). Analysis of Risk Factors for Dengue Fever Incidence in the Celikah Health Center Work Area, Ogan Komering Ilir Regency. Journal of Public Health Sciences, 8(1).

Nurdin A. Epidemiological Study Affecting the Incidence of Dengue Fever (DBD) in Johan Pahlawan District. Aceh Medika Journal 2018;2(1): 77–85.

Pandaibesi, R. (2017). The Relationship between Community Knowledge, Attitudes and Behavior with the Incidence of Dengue Fever in Medan Sunggal District.

Pantouw, R. G., Siagian, I. E., & Lampus, B. S. (2017). The relationship between community knowledge and attitudes with dengue fever prevention measures in Tuminting Village. Journal of Community and Tropical Medicine, 5(1).

Periatama, S., Lestari, R. M., & Prasida, D. W. (2022). The relationship between 3M Plus Behavior and Dengue Hemorrhagic Fever (DHF) Incidents. Surya Medika Journal (JSM), 7(2), 77-81.

Priesley, F., Reza, M., & Rusdji, S. R. (2018). The relationship between mosquito nest eradication behavior by closing, draining and recycling plus (PSN M Plus) and dengue fever (DHF) incidents in Andalas Village. Andalas Health Journal, 7(1), 124-130.

Putri, N. W. (2018). Dengue fever incidents and the susceptibility of Aedes spp mosquito larvae in Lubuk Basung District. Endurance Journal: Scientific Study of Health Problems, 3(2), 349-357.

Rahmawati Ulfah, Joko Tri N. The Relationship Between 3M Practices and Physical Environmental Factors of the House with the Incidence of Dengue Fever in the Kayen Health Center Work Area, Pati Regency. JKM e-Journal. 2018;6(6).

Rismawati SN, Nurmala I. The Relationship Between Host Behavior and Environment with the Incidence of DHF in Wonokusumo Surabaya. Periodic Journal of Epidemiology 2017;5(3): 383–92.

Sari, D. E. (2020). Factors Related to Efforts to Prevent Dengue Fever (DHF) Using the Principle of Draining, Closing, and Reusing (3M). Citra Delima: Scientific Journal of STIKES Citra Delima Bangka Belitung, 3(2), 163-170.

Shafrin, K.A. N.E. Wahyuningsih., and Suhartono. 2016. The Relationship between the Existence of Breeding Places and Waste Disposal Practices with Dengue Fever Incidence

Sholihah, N. A., Weraman, P., & Ratu, J. M. (2020). Spatial analysis and modeling of risk factors for dengue fever incidence in 2016-2018 in Kupang City. Indonesian Journal of Public Health, 15(1), 52-61.

Sinaga, P., & Hartono, H. (2019). Determinants of Dengue Hemorrhagic Fever (DHF) Incidence in the Medan Johor Health Center Work Area. Global Health Journal, 2(3), 110-121.

Soegijanto, S. (2016). Dengue Hemorrhagic Fever in Children. Collection of Papers on Tropical and Infectious Diseases in Indonesia (Volume 1), 23..

Sofro AU. Muchlis and Anurogo. D. 2018. Practical and Effective Ways to Overcome Infectious Diseases and Health Problems. Yogyakarta: Rapha Publishing

Sukesi, T. W., & Astuti, C. T. (2020). RELATIONSHIP BETWEEN LARVAE-FREE RATE (ABJ) AND DENGUE HEMORRHAGIC FEVER (DBD) INCIDENCE RATE AT SLEMAN REGENCY LEVEL 2013-2017. Journal of Health and Environmental Management, 1(2), 57-63.

Sutriyawan, A., Darmawan, W., Akbar, H., Habibi, J., & Fibrianti, F. (2022). Factors Affecting Mosquito Nest Eradication (PSN) Through 3M Plus in Efforts to Prevent Dengue Hemorrhagic Fever (DBD). Journal of Public Health Sciences, 11(01), 23-32.

Sutriyawan, A., Darmawan, W., Akbar, H., Habibi, J., & Fibrianti, F. (2022). Factors Affecting Eradication of Mosquito Nests (PSN) Through 3M Plus in Efforts to Prevent Dengue Fever (DBD). Journal Public Health Sciences, 11 (01), 23-32.

Tamza Riza Berdian. Relationship between Environmental Factors and Behavior with Dengue Hemorrhagic Fever (DHF) Incident in the Sub-district Area Perumnas Way Halim, Bandar Lampung City. JKM e-Journal. 2013;2(2).

Tamza Riza Berdian. The Relationship between Environmental and Behavioral Factors with the Incidence of Dengue Hemorrhagic Fever (DHF) in the Perumnas Way Halim Village Area, Bandar Lampung City. JKM e-Journal. 2013;2(2).

Tansil, M. G., Rampengan, N. H., & Wilar, R. (2021). Risk Factors for the Occurrence of Dengue Hemorrhagic Fever in Children. Biomedical Journal: JBM, 13(1), 90-99.

Tansil, MG, Rampengan, NH, & Wilar, R. (2021). Risk Factors The occurrence The Incidence of Dengue Fever in Children. Journal Biomedicine : JBM, 13 (1), 90-99.

Tosepu, R. 2016. Environmental Epidemiology Theory and Application. Jakarta: Bumi Medika, 2016.

Tosepu, R. 2016. Epidemiology Environment Theory and Application. Jakarta: Bumi Medika, 2016.

WHO 2017, Dengue and severe dengue. Available at: http://www.who.int/mediacentre/factsheets/fs117/en/ (Accessed: 27 April 2022).

WHO 2017, Dengue and severe dengue. Tersedia pada: http://www.who.int/mediacentre/factsheets/fs117/en/ (Diakses: 27 April 2022).

World Health Organization. (2019). Dengue and severe dengue. Retrieved from [WHO website]

Wulandari, R.E. 2016. The Relationship between Environmental Sanitation, Climate Elements, and the Presence of Ae. Aegypti Mosquito Larvae and the Incidence of Dengue Hemorrhagic Fever in Pacitan Regency in 2015. Thesis. Airlangga University 2016.

Wulandari, RE 2016. The Relationship of Environmental Sanitation, Climate Elements, the Existence of Ae. Aegypti Mosquito Larvae to the Incidence of Dengue Fever in Pacitan Regency in 2015. Thesis. Airlangga University 2016.

Yunita, J., Mitra, M., & Susmaneli, H. (2012). Pengaruh perilaku masyarakat dan kondisi lingkungan terhadap kejadian demam berdarah dengue. Jurnal Kesehatan Komunitas, 1(4), 193-198.

Yunita, J., Mitra, M., & Susmaneli, H. (2012). The Influence of behavior society and conditions environment to incident fever dengue hemorrhagic fever. Journal of Community Health, 1 (4), 193-198.