Nurse Point Journal of Nursing
Email: nursepointjournal@gmail.com Vol. 01, No. 01, May 2025

The environmental sanitation knowledge related to the Dengue Hemorrhagic Fever (DHF) incident in the coastal area of Mataram City, Indonesia: A cross-sectional study

Hendra Gustiawan[1], *Sukardin[2], Rahmani Ramli[3]

[1,2,3] Nursing Study Program, College of Health Sciences, Mataram, Indonesia

Article Info

Article history:
Received: 08 May 2025
Revised: 20 May 2025
Accepted: 27 May 2025

Keywords:
DHF;
Environmental sanitation knowledge; Mataram City; Cross-sectional Study;

Article type:
Research article

Abstract

Background: Dengue hemorrhagic fever (DHF) is an infectious disease caused by the dengue virus, transmitted by the Aedes aegypti mosquito. This illness poses a significant public health threat, particularly in tropical and subtropical regions such as Indonesia. Poor environmental sanitation can promote the breeding of the disease vector, leading to an increase in DHF cases. As a result, public awareness and understanding of sanitation practices are essential for preventing and controlling this disease.

Purpose: This study aims to investigate the relationship between knowledge of environmental sanitation and the incidence of Dengue Fever in the coastal areas of Mataram City.

Methods: This study adopted a quantitative approach with a cross-sectional design, collecting data at a singular point in time. A structured questionnaire was employed to observe and measure variables within the target population. Two hundred thirteen respondents were selected through systematic random sampling, adhering to clearly defined inclusion and exclusion criteria. The primary instruments utilized in this research included a survey sheet and a validated questionnaire.

Results: The findings from the Spearman rank correlation test revealed a statistically significant relationship between environmental sanitation and the incidence of dengue hemorrhagic fever (DHF), as indicated by a p-value of 0.000 ($p < 0.05$). The correlation coefficient ($r = 0.320$) demonstrates a moderate positive association between these two variables.

Conclusion and recommendation: This study reveals a statistically significant association between environmental sanitation conditions and the incidence of dengue hemorrhagic fever (DHF), indicating a moderate positive correlation ($r = 0.320$; $p < 0.05$). These findings underscore the importance of environmental hygiene as a crucial factor in the transmission dynamics of DHF within the population examined.

***Corresponding Author:**
Sukardin
Nursing Study Program, College of Health Science (STIKES) Mataram, Indonesia
Email: kardinsakti@yahoo.co.id

1. Introduction

Dengue Hemorrhagic Fever (DHF) has seen a dramatic rise globally, with the World Health Organization reporting over 12 million cases in 2024 alone, nearly double the number from the previous year. Among Southeast Asian countries, Indonesia consistently ranks among the top for dengue incidence and fatality rates (Guzman et al., 2010; WHO, 2023). Indonesia is among the most impacted countries, particularly its coastal cities like Mataram in West Nusa Tenggara. This region boasts climatic conditions that are highly favorable for the proliferation of Aedes aegypti mosquitoes, the primary vectors for the dengue virus (Ismail et al., 2024; WMP, 2024). Mataram experiences cyclical outbreaks of DHF, a situation often exacerbated by factors such as rapid urbanization, dense population clusters, and inadequate sanitation practices (Ismail et al., 2024; WHO, 2021).

The city's coastal environment characterized by stagnant water, poor waste management, and proximity to riverbanks creates ideal breeding sites for mosquitoes, elevating DHF risk. The city's coastal geography contributes significantly to this issue, with numerous stagnant water bodies, insufficient waste management systems, and proximity to riverbanks creating ideal breeding habitats for mosquitoes. These factors heighten the risk of DHF transmission and complicate efforts to manage and control outbreaks. Seasonal rainfall and rising temperatures can further exacerbate the situation, leading to surges in mosquito populations and increased dengue infections. Therefore, mitigating DHF in Mataram requires improving urban planning, effective waste management practices, and enhanced public health education to raise local awareness regarding prevention measures (Ismail et al., 2024; WHO, 2021).

The knowledge, attitudes, and practices (KAP) of the community regarding environmental sanitation are critical factors influencing the incidence of Dengue Hemorrhagic Fever (DHF). A study conducted in Mataram City found that a lack of awareness and understanding of DHF prevention measures among residents contributes significantly to the ongoing transmission of the disease. This highlights the necessity for targeted educational interventions aimed at enhancing community engagement in vector control efforts (Arsyad et al., 2020; Ismail et al., 2024; Purnomo et al., 2016).

Additionally, socio-demographic factors play a significant role in the effectiveness of environmental sanitation initiatives. Research indicates that an individual's education level, occupation, and income can impact their capacity to implement and sustain proper sanitation practices. In coastal areas, where communities often grapple with economic and infrastructural challenges, these factors can impede the adoption of effective DHF prevention strategies (Herdianti et al., 2021; Ismail et al., 2024).

Despite the increasing body of research on Dengue Hemorrhagic Fever (DHF) in Indonesia, significant gaps remain in our understanding of how knowledge of environmental sanitation influences disease transmission, especially in coastal urban areas like Mataram City. While many existing studies concentrate on factors such as entomological indices, clinical manifestations of the disease, and broader urban health risks, there is a noticeable lack of investigation into how localized community knowledge and sanitation practices contribute to the epidemiology of DHF in these high-risk coastal environments (Alvira et al., 2020; Arsyad et al., 2020; Yulianti & Hidayani, 2022).

In Mataram City, where rapid urbanization and climatic conditions foster a favorable breeding environment for Aedes mosquitoes, understanding community awareness and practices related to sanitation can provide vital insights (Alvira et al., 2020). Improved knowledge of local sanitation issues, including waste management, water storage, and drainage

systems, can directly impact the effectiveness of DHF prevention strategies (Arsyad et al., 2020; Purnomo et al., 2016; Yulianti & Hidayani, 2022). Additionally, examining the social determinants that shape community behaviors around sanitation may unveil underlying factors that either exacerbate or alleviate the risk of DHF transmission in this vulnerable population (Ismail et al., 2024; Kesetyaningsih et al., 2023). Therefore, a more focused exploration of these elements is essential for developing comprehensive public health interventions tailored to coastal urban communities' unique challenges in the fight against DHF.

2. Methods

2.1 Research design

This study utilized a quantitative cross-sectional design to investigate the relationship between environmental sanitation knowledge and the incidence of Dengue Hemorrhagic Fever (DHF) in the coastal areas of Mataram City, Indonesia. Mataram is noted for its densely populated coastal settlements and climate conditions that promote Aedes mosquito breeding, making it an essential location for analyzing community-level risk factors associated with DHF.

2.2 Setting and samples

The research was conducted in the coastal areas of Mataram City, targeting all residents who live along the coast. The study focused on 457 heads of households from these coastal regions. The sample size was determined using Slovin's formula with a 5% margin of error, which resulted in a sample of 213 respondents (Majdina et al., 2024). These respondents were selected through simple random sampling to ensure that each household had an equal participation opportunity. Additionally, purposive sampling techniques were employed based on specific inclusion criteria set by the researchers, which included families residing in the coastal areas of Mataram City who could communicate effectively and were willing to engage in the study.

2.3 Measurement and data collection

This study utilized a structured questionnaire as the primary instrument for data collection. The questionnaire was designed based on relevant literature and guidelines from the Ministry of Health of Indonesia and the World Health Organization (WHO) concerning dengue prevention and environmental sanitation (Gall et al., 2016). It included the following components: Demographic data: Information on age, gender, education level, occupation, and length of residence in the area.

Knowledge of Environmental Sanitation: A series of 10 multiple-choice and true/false questions assessing the respondents' understanding of: Mosquito breeding sources, waste and water management, and prevention practices (e.g., 3M Plus: Drain, Cover, Reuse + Mosquito repellent use). For Incidence of DHF: A self-reported history of DHF within the household over the past 12 months, which was verified where possible through local health records. Each response in the knowledge section was scored as follows: 1 point for a correct answer and 0 points for incorrect or unknown answers. The total score ranged from 0 to 10, with knowledge levels categorized as: High: 8–10, Moderate: 5–7, and Low: 0–4. The questionnaire underwent content validation by public health experts and epidemiologists. A pilot test was conducted on 30 households outside the main study area to assess reliability, with a Cronbach’s alpha coefficient of 0.78, indicating acceptable internal consistency (Kline, 1999).

2.4. Data collection procedure

Data were gathered through face-to-face interviews conducted by trained enumerators during home visits. Each session commenced with obtaining informed consent and providing a brief overview of the study's purpose. Data collection occurred over two weeks, from January 1 to January 15, 2025. Respondents were assured of confidentiality, and their participation was entirely voluntary.

2.5 Data analysis

The data were analyzed using descriptive and inferential statistics, utilizing version 29 of the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were employed to summarize respondent demographics and their levels of knowledge regarding environmental sanitation. To assess the relationship between knowledge of ecological sanitation and the incidence of dengue hemorrhagic fever (DHF), Spearman's rank-order correlation coefficient (Spearman's rho) was applied.

2.6 Ethical considerations.

Before the commencement of the research, eligible respondents received a detailed explanation of the study's intent and purpose, the benefits of participation, and assurances regarding the confidentiality of their responses. Alternatively, respondents can review the explanation sheet provided by the researcher. If they choose to participate, they must sign the informed consent form (World Medical Association, 2014).

3. Results

3.1. Sociodemographic characteristics of the study participants

Table 1. Demographic characteristics of the sample

Variables	Numbers (n)	Percentage (%)
Gender		
Male	125	59
Female	88	41
Total	213	100
Age (Years)		
20 35 years old	126	59
36 – 50 Years old	58	27
50- 59 years old	17	8
>/= 60 years old	12	6
Total	213	100
Level of Education		
Low	125	59
Moderate	66	31
High	22	10
Total	213	100
Occupation		
Employed	163	77
Unemployed	50	23
Total	213	100

The study involved 213 heads of households living in the coastal regions of Mataram City. Male respondents accounted for 59% (n = 125), while females comprised 41% (n = 88). The majority of participants (59%) were aged between 20 and 35 years, with the next largest group being those aged 36 to 50 years (27%), followed by 51 to 59 years (8%), and those aged 60 years and above (6%). Educational attainment was predominantly low, with 59% reporting limited formal education, 31% possessing moderate education levels, and only 10% achieving high levels of education. Most participants (77%) indicated they were employed, whereas 23% were unemployed. These demographic insights reveal a young, working-age population with limited educational backgrounds, which may influence their environmental health literacy and practices related to dengue prevention.

3.2. The analysis of the Relationship between Environmental Sanitation Knowledge and the Incidence of Dengue Hemorrhagic Fever (DHF) in the Coastal Area of Mataram City.

Table 2. Analysis of the Relationship between Environmental Sanitation Knowledge and the Incidence of Dengue Hemorrhagic Fever (DHF) in the Coastal Area of Mataram City.

Incidence of Dengue Hemorrhagic Fever (DHF) * Environmental Sanitation Knowledge					
		Environmental Sanitation Knowledge			Total
		High	Moderate	Low	
Incidence of DHF	Ever experienced DHF	114	30	51	195
	Never experienced DHF	0	6	12	18
	Total	114	36	63	213

Correlations				
			Kejadian dbd	Tingkat pengetahuan
Spearman's rho	Kejadian dbd	Correlation Coefficient	1.000	.320**
		Sig. (2-tailed)	.	.000
		N	213	213
	Tingkat pengetahuan	Correlation Coefficient	.320**	1.000
		Sig. (2-tailed)	.000	.
		N	213	213
**. Correlation is significant at the 0.01 level (2-tailed).				

The results from the cross-tabulation in Table 4.8 reveal that out of the respondents who had experienced dengue fever, 18 individuals were identified, 12 of whom had insufficient knowledge, and 6 had sufficient knowledge.

Referring to Table 2, the analysis indicates a significant relationship between knowledge of environmental sanitation and dengue fever (DBD) incidence in the Coastal Area of Mataram City. The hypothesis is supported based on the decision criterion that if the Sig. (2-tailed) If the value is less than 0.05, a correlation exists; if it is greater than 0.05, no correlation exists.

The data shows a Sig. (2-tailed) The value of 0.000 confirms a significant relationship between the environmental sanitation variable and the incidence of dengue fever. Furthermore, the strength of this relationship is indicated by a Correlation Coefficient of 0.320, suggesting a moderate correlation between the two factors.

4. Discussion

4.1. Analysis of the distribution of respondents concerning incidents of dengue hemorrhagic fever (DHF).

The findings indicate that specific individuals do not consistently empty their water storage tanks or baths every week and are less equipped to manage items that could serve as potential breeding sites for mosquitoes. Dengue fever (DHF) is a prevalent disease that occurs annually and can lead to rapid fatalities. It can trigger an Extraordinary Event (KLB) or an epidemic, as noted by the Ministry of Health of the Republic of Indonesia (2017).

The local health department reported a significant rise in dengue fever (DBD) cases during the first quarter of 2024. Between January and March 2024, 223 recorded dengue fever patients received care at health facilities and hospital in West Nusa Tenggara Province (NTB) (Alfian et al., 2023). This situation highlights the intricate link between environmental sanitation and the proliferation and reproduction of mosquitoes. Poor ecological sanitation can lead to various illnesses, one of which is DBD, caused by the Aedes aegypti mosquito, which breeds in unsanitary conditions and can reproduce in any containers that retain water, especially during the rainy season (Apriyani et al., 2016).

Research conducted by Natasya Febrianti Sugianto Putri (2023) found a significant association between housing conditions and the occurrence of dengue fever (DBD). Specifically, there was a notable connection between water storage conditions and the incidence of dengue fever. Moreover, a significant relationship was identified between waste disposal systems and the incidence of dengue fever (Febrianti et al., 2023). The research paper indicates a significant relationship between ventilation and the incidence of dengue hemorrhagic fever (DHF), with an odds ratio of 5.949 for homes lacking wire gauze in ventilation. This suggests that inadequate ventilation increases DHF risk. While the findings align with other studies emphasizing the importance of mosquito nets, the paper highlights that many homes in Medan do not utilize such preventive measures, contributing to higher DHF cases. Thus, proper ventilation practices are crucial in reducing DHF incidence (Nasmita et al., 2020).

The findings of this study align with the research conducted by Harisnal (2019), indicating a significant relationship between behaviour and the incidence of dengue hemorrhagic fever (DHF). Additionally, the results support Munawir's (2018) research, which similarly concludes that there is a notable connection between behaviour and the occurrence of DHF. Furthermore, previous research by Wijirahayu & Sukesi (2019) highlighted that the uniformity in the type of housing among respondents created data homogeneity regarding temperature and humidity, resulting in no discernible relationship between living conditions and DHF cases in the region (Wijirahayu & Sukesi, 2019). In contrast, Harisnal's research (2019) emphasises a significant association between behaviour and dengue fever (DHF) incidence (Harisnal, 2019).

4.2. Analysis of the distribution of respondents based on their knowledge of environmental sanitation.

Based on respondents' understanding of environmental sanitation, 114 individuals demonstrated good knowledge (54%), 36 had sufficient knowledge (16%), and 63 exhibited insufficient knowledge (30%). Knowledge is a form of human comprehension acquired through learning, reasoning, reflection, and intuition after perceiving a specific subject. It plays a significant role in shaping behaviour, particularly in preventing dengue fever, where knowledge is essential for developing appropriate behavioural practices. Actions grounded in knowledge will likely be more enduring than those lacking a foundation.

This knowledge pertains to community awareness and understanding of strategies to prevent and control Dengue Hemorrhagic Fever, ultimately aimed at reducing the incidence of dengue cases. Adequate community knowledge about implementing dengue prevention measures, from planning to execution, is essential (Notoatmojo, 2010).

Effective waste management can be achieved by establishing a temporary waste disposal site at home, which can then be transported to a final waste disposal site after a few days, following environmental health principles. Improper waste disposal can lead to various health issues within the community (Oluwagbayide et al., 2024)

Environmental sanitation is closely linked to the growth and reproduction of mosquitoes. Poor sanitation can result in the proliferation of several diseases, including dengue fever, which is transmitted by the Aedes aegypti mosquito. This mosquito thrives in unsanitary environments and can breed in containers or other objects that collect water during rainfall (Niksan et al., 2025).

Inadequate community practices and environmental conditions that fail to meet health standards are significant risk factors for spreading environmentally based diseases, including dengue fever. The World Health Organisation (WHO) indicates that clean water storage, the availability of waste disposal sites, and the modification of larval habitats are crucial factors related to the breeding sites of the Aedes aegypti vector (Kementrian Kesehatan Republik Indonesia, 2017).

4.3. Analysis of the Relationship between Environmental Sanitation Knowledge and the Incidence of Dengue Hemorrhagic Fever (DHF) in Mataram City's Coastal Area

The research findings indicate a significant relationship between knowledge of environmental sanitation and the incidence of Dengue Hemorrhagic Fever (DHF) in the coastal area of Mataram City. The decision-making criterion is based on the significance (Sig.) value: a Sig. (2-tailed) A value of less than 0.05 indicates a correlation, while a value greater than 0.05 suggests no correlation exists. According to the presented data, the Sig. (2-tailed) The value is 0.000, which is less than 0.05, confirming a significant relationship between environmental sanitation and the incidence of DHF. Additionally, the strength of this relationship is demonstrated by a Correlation Coefficient of 0.320, indicating a moderately strong association.

During the research period, it was observed that individuals living in coastal regions continue to engage in littering, and there are uncovered and improperly managed water sources and drainage systems. Furthermore, interviews revealed that many people still dry their clothes indoors for extended periods, which can accelerate the breeding of mosquitoes. Environmental sanitation plays a crucial role in the rising cases of dengue fever, as densely populated areas

facilitate the transmission of the virus by Aedes mosquitoes. The higher the population density, the easier it is for these mosquitoes to spread the virus.

Environmental sanitation encompasses the management of solid waste, the quality of drinking water supplies, and the overall condition of the living environment (Apriyani et al., 2016). From this perspective, it can be inferred that environmental sanitation is a key aspect of environmental health. It involves intentionally promoting a clean lifestyle to prevent human exposure to dirt and hazardous waste, safeguarding and enhancing human health.

In community practice, sanitation encompasses clean water, waste management, soil pollution control, food safety, and air quality management. This research corroborates Ery Wahyuning Sejati's 2015 study, which established a connection between awareness of dengue fever and the motivation to prevent it at the Kalijambe Srage Health Centre. Similarly, Greis Dawile's 2021 research demonstrated that environmental sanitation significantly influences the incidence of dengue fever in the Padang Bulan Selayang II Health Centre area. This study highlighted the importance of several factors, including the conditions of water reservoirs (p-value 0.028), waste disposal practices (p-value 0.0001), the quality of home environments (p-value 0.0001), and the level of knowledge among respondents (p-value 0.0001).

5. Implication and limitations

The study emphasises that a greater understanding of environmental sanitation is moderately associated with reducing dengue hemorrhagic fever (DHF). This highlights the crucial role of community education in efforts to prevent dengue. Health promotion programs focused on increasing public awareness, especially in vulnerable coastal regions, could significantly reduce the local disease burden.

However, the study's design limits the ability to draw causal conclusions. Although a correlation was found, a definitive cause-and-effect relationship between sanitation knowledge and DHF incidence cannot be established. Additionally, the sample was limited to coastal areas of Mataram City, which may not accurately represent conditions in other geographic or socio-economic contexts. Therefore, the findings should be generalised with caution.

6. Conclusion

This study identified a significant moderate positive correlation between knowledge of environmental sanitation and the incidence of Dengue Hemorrhagic Fever (DHF) among residents of coastal areas in Mataram City. The findings indicate that individuals with a higher understanding of sanitation are less likely to contract DHF, emphasising the critical role of public education in preventing vector-borne diseases. While the study's cross-sectional design limits our ability to establish causal relationships, these results provide valuable insights into the potential advantages of targeted health literacy interventions. By enhancing community-level education regarding environmental health, we could effectively reduce the incidence of DHF and strengthen overall public health resilience in vulnerable coastal populations. This research lays the groundwork for future hypothesis-driven longitudinal studies and intervention trials to explore causal mechanisms and assess the effectiveness of specific sanitation-based interventions.

Acknowledgments

The authors would like to express sincere gratitude to the Health Office of Mataram City and the community leaders in the coastal areas for their valuable support and cooperation during

data collection. We are especially thankful to all the respondents who participated willingly in the survey, providing critical insights into their knowledge and experiences regarding environmental sanitation and DHF. Appreciation is also extended to our colleagues and academic mentors for their constructive feedback throughout the research process.

Author contribution

(HG) Managed data curation to ensure integrity and accessibility, conducted a literature review, contributed to data visualisation, and participated in writing, reviewing, and editing the final document. SKD) Reviewed the manuscript critically for intellectual content and provided final approval for publication. (RR) Responsible for conceptualising the project, developing research methodologies, collecting data, analysing the results, and drafting the manuscript.

Conflict of interest

There is no conflict of interest to declare

References

Alfian, M. R., Bahri, S., Ramli, M., Awalusshaumi, L., Harsiyah, L., Azmi, K., & Andriani, H. (2023). Model epidemik sir dan model jaringan syaraf tiruan demam berdarah dengue di ntb. *Jurnal Silogisme : Kajian Ilmu Matematika Dan Pembelajarannya*, *8*(1), 39–48. https://doi.org/10.24269/silogisme.v8i1.6202

Alvira, N., Satoto, T. B. T., Wibawa, T., Frutos, R., Maguin, S., Kadek, I., & Wardana, A. (2020). Knowledge, Attitudes and Practices on Community with Dengue Haemorrhagic Fever in Mataram, West Nusa Tenggara. *BALABA: JURNAL LITBANG PENGENDALIAN PENYAKIT BERSUMBER BINATANG BANJARNEGARA*, *16*(2), 149–158. https://doi.org/10.22435/blb.v16i2.3165

Arsyad, R. M., Nabuasa, E., & Ndoen, E. M. (2020). Hubungan antara Perilaku Sanitasi Lingkungan dengan Kejadian Demam Berdarah Dengue (DBD) di Wilayah Kerja Puskesmas Tarus. *Media Kesehatan Masyarakat*, *2*(2), 15–23. https://doi.org/10.35508/MKM.V2I2.2498

Febrianti, N., Sakufa, A., Nur, K., Kesehatan Masyarakat, P., & Bhakti Husada Mulia Madiun, S. (2023). Relationship of environmental sanitation with dengue hemorrhagic fever (Dhf) at working area Mojopurno Health Center. *Jurnal Ilmu Kesehatan*, *11*(2), 99–107.

Gall, C., Schmidt, S., Schittkowski, M. P., Antal, A., Ambrus, G. G., Paulus, W., Dannhauer, M., Michalik, R., Mante, A., Bola, M., Lux, A., Kropf, S., Brandt, S. A., & Sabel, B. A. (2016). Alternating current stimulation for vision restoration after optic nerve damage: A randomized clinical trial. *PLoS ONE*, *11*(6), 1–19. https://doi.org/10.1371/journal.pone.0156134

Guzman, M. G., Halstead, S. B., Artsob, H., Buchy, P., Farrar, J., Gubler, D. J., Hunsperger, E., Kroeger, A., Margolis, H. S., Martí-nez, E., Nathan, M. B., Pelegrino, J. L., Simmons, C., Yoksan, S., & Peeling, R. W. (2010). Dengue: A continuing global threat. *Nature Reviews Microbiology*, *8*(12), S7–S16. https://doi.org/10.1038/nrmicro2460

Harisnal. (2019). Faktor-faktor yang berhubungan dengan kejadian demam berdarah dengue (DHF) di kelurahan Campago Ipuh Kota Bukit Tinggi tahun 2018. *Menara Ilmu: Jurnal Penelitian Dan Kajian Ilmiah*, *XIII*(6), 124. https://jurnal.umsb.ac.id/index.php/menarailmu/article/view/1397

Herdianti, H., Nurhayati, Y., & Susanna, D. (2021). The Relationship between Enviromental Sanitation and the Risk of Dengue Hemorrhagic Fever in Batam, Riau Island. *The 8th*

International Conference on Public Health, 290–297. https://doi.org/10.26911/icphepidemiology.fp.08.2021.06

Ismail, N. A., Haikhah, J., Fauziah, E. T., Prabasunu, M. A., Rahma, F. H., Siswanto, S., & Widyasari, V. (2024). Investigation of risk factors for household-based dengue virus infection in Borobudur Subdistrict, Magelang, Indonesia. *Germs*, *14*(3), 277–286. https://doi.org/10.18683/germs.2024.1438

Kementrian Kesehatan Republik Indonesia. (2017). *Situasi demam berdarah dengue di Indonesia*.

Kesetyaningsih, T. W., Kusbaryanto, & Widayani, P. (2023). Dengue hemorrhagic fever prediction in coastal area using geographically weighted regression. *International Journal of Public Health Science (IJPHS)*, *13*(2).

Kline, R. B. (1999). Book Review: Psychometric theory (3rd ed.). *Journal of Psychoeducational Assessment*, *17*(3), 275–280. https://doi.org/10.1177/073428299901700307

Majdina, N. I., Pratikno, B., & Tripena, A. (2024). Penentuan ukuran sampel menggunakan rumus bernoulli dan slovin: konsep dan aplikasinya. *Jurnal Ilmiah Matematika Dan Pendidikan Matematika*, *16*(2). https://doi.org/10.20884/1.jmp.2024.16.1.11230

Nasmita, V. M., Nurmaini, & Siregar, F. A. (2020). Relationship between ventilation, light intensity and conditions for water reservoirs in the house with the occurrence of dengue hemorrhagic fever. *International Journal of Public Health and Clinical Sciences*, *7*(3), 10–17. http://publichealthmy.org/ejournal/ojs2/index.php/ijphcs/article/download/1196/719

Niksan, I. M., Priyatno, A. D., Suryani, L., & Yusnilasari, Y. (2025). Environmental Sanitation Analysis of Dengue Fever Disease. *Lentera Perawat*, *6*(1), 182–188. https://doi.org/10.52235/lp.v6i1.414

Notoatmojo. (2010). *Konsep prilaku kesehatan, promosi kesehatan; theori dan aplikasi*. Rineka Cipta.

Oluwagbayide, S. D., Abulude, F. O., Akinnusotu, A., & Arifalo, K. M. (2024). The Relationship between Waste Management Practices and Human Health: New Perspective and Consequences. *Indonesian Journal of Innovation and Applied Sciences*. https://doi.org/10.47540/ijias.v4i1.1080

Purnomo, K. I., Setiawan, K. H., Giri, M. K. W., & Wibowo, I. A. (2016). Factors associated mosquito larvae eradication and early management of dengue hemorrhagic fever among poor community in lokapaksa Village, Buleleng, Bali. *International Conference on Public Heallth*. https://doi.org/10.26911/theicph.2016.031

WHO. (2021). *Ending the burden of dengue infection: Indonesia launched the 2021-2025 National Strategic Plan for Dengue Control Programme*.

WHO. (2023). *Dengue and severe dengue*.

Wijirahayu, S., & Sukesi, T. W. (2019). Hubungan kondisi lingkungan fisik dengan kejadian demam berdarah dengue di wilayah kerja puskesmas Kalasan kabupaten Sleman. *Jurnal Kesehatan Lingkungan Indonesia*, *18*(1), 19. https://doi.org/10.14710/jkli.18.1.19-24

WMP. (2024). *Indonesia's nationwide effort to stop dengue*. https://www.worldmosquitoprogram.org/en/news-stories/stories/indonesias-nationwide-effort-stop-dengue

World Medical Association. (2014). World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *The Journal of the American College of Dentists*, *81*(3), 14–18. https://doi.org/10.1093/acprof:oso/9780199241323.003.0025

Yulianti, & Hidayani, W. R. (2022). The Relationship between Environmental Sanitation and the Incidence of Dengue Hemorrhagic Fever (DHF) in Indonesia. *Journal of Public Health Sciences*, *1*(02), 71–88. https://doi.org/10.56741/jphs.v1i02.83