



Risk Factors of Dengue Hemorrhagic Fever

Ivan Elisabeth Purba¹, Donal Nababan^{1*}, Adiansyah¹, Eddy Surya Kaban²

¹ Program Magister Kesehatan Masyarakat, Direktorat Pascasarjana Universitas Sari Mutiara, Medan, Indonesia.

² Medan City Health Service, Medan, Indonesia.

Received: July 28, 2023

Revised: August 3, 2023

Accepted: October 25, 2023

Published: October 31, 2023

Corresponding Author:

Donal Nababan

nababan_donal@yahoo.com

DOI: [10.29303/jppipa.v9i10.4882](https://doi.org/10.29303/jppipa.v9i10.4882)

© 2023 The Authors. This open access article is distributed under a (CC-BY License)



Abstract: The purpose of this study was to determine what risk factors caused the incidence of dengue hemorrhagic fever in Simpang Selayang Village, Kecamatan Medan Tuntungan in 2022. The method used in this study is a survey method with quantitative research conducted by distributing questionnaires and direct interviews with respondents using a case control approach. Data analysis used multiple logistic regression with a sample of 33 case respondents and 33 control respondents. The results showed that the influential variables were attitude, application of 3M Plus, habit of hanging clothes, and larva free rate on the incidence of dengue fever. The results showed that the influential variables were attitude ($p = 0.046$), the application of 3M Plus ($p = 0.026$), the habit of hanging clothes ($p = 0.001$), larvae-free rate ($p = 0.037$) on the incidence of dengue fever in Simpang Selayang Village, Medan Tuntungan District in 2022 and the variables that had no effect were knowledge ($p = 0.325$) and use of mosquito repellent ($p = 0.314$). From the results of this study, it can be concluded that the most influential variable on the incidence of dengue fever is the habit of hanging clothes which has the greatest Exp.B value, which is 9.754 times greater.

Keywords: Dengue hemorrhagic fever; Flicker free; Hanging clothes; Medan Tuntungan Sub-District

Introduction

Indonesia as one of the tropical countries in the world with high air humidity triggers the breeding of mosquitoes such as *Aedes aegypti* which is one of the vectors of dengue hemorrhagic fever, so it is easily transmitted through the bite of the *Aedes aegypti* mosquito. It causes health problems because there are many endemic areas, so the number of sufferers is increasing and the spread is expanding to other areas with increasing mobility and population density. *Aedes aegypti* is widely distributed in tropical and subtropical areas. In Indonesia, these mosquitoes are widespread both at home and in public places (Kemenkes RI, 2017).

In 2020 there were 108,303 cases, this number decreased compared to 2019 which was 138,127 cases, the number of deaths due to Dengue Hemorrhagic Fever (DHF) in 2020 also decreased compared to 2019 from 919 to 747 deaths (Kemenkes RI, 2020). To report of the Data and Information Center in 2021 dengue hemorrhagic fever in Indonesia totaled 51,048 cases, and deaths due

to dengue hemorrhagic fever were 472 cases, the number of districts/cities infected 456 from 34 provinces, the highest dengue cases were in the age group 15-44 years. The number of dengue suspects from the Early Alert and Response System (SKDR) report is 64,000 suspects (Kemenkes RI, 2021).

Based on data from the Medan City Health Office in 2015 there were 1359 cases of dengue hemorrhagic fever with 11 deaths, in 2016 there were 1783 cases of dengue hemorrhagic fever with 11 deaths, in 2017 there were 1214 cases of dengue hemorrhagic fever with 11 deaths, in 2018 there were 1490 cases of dengue hemorrhagic fever with 13 deaths, in 2019 there were 1068 cases with 6 deaths, while based on data on cases of dengue hemorrhagic fever in Medan City in 2020 there were 441 cases of dengue hemorrhagic fever with 3 deaths (Dinas Kesehatan Kota Medan, 2020).

Ardianti et al. (2018) and Sinaga et al. (2019) showed that there was a relationship between hanging clothes and the incidence of dengue hemorrhagic fever. Sutriyawan et al. (2022) showed that 52.7% of

How to Cite:

Purba, I. E., Nababan, D., Adiansyah, & Kaban, E. S. (2023). Risk Factors of Dengue Hemorrhagic Fever. *Jurnal Penelitian Pendidikan IPA*, 9(10), 8131-8139. <https://doi.org/10.29303/jppipa.v9i10.4882>

respondents had taken 3M plus actions (draining behavior, closing behavior and recycling behavior, sprinkling larvicide/abate powder, using mosquito repellent, raising larvae-eating fish using mosquito repellent while sleeping and planting mosquito repellent plants). Sari (2020) revealed that there is a relationship between knowledge, attitude, and level of education in the prevention of DHF using the 3M principles. Azizah et al. (2017) shows that there is a relationship between respondents' knowledge and the behavior of PSN 3M Plus in the community of Sendangmulyo Village, Semarang.

In 2015 there were 32 cases of dengue hemorrhagic fever, in 2016 there were 48 cases of dengue hemorrhagic fever, in 2017 there were 18 cases of dengue hemorrhagic fever, in 2018 there were 97 cases of dengue hemorrhagic fever, in 2019 there were 9 cases of dengue hemorrhagic fever, and in 2020 there were 33 cases of dengue hemorrhagic fever and made Medan Tuntungan sub-district the 5 sub-districts with the highest dengue hemorrhagic fever cases in Medan City (Dinas Kesehatan Kota Medan, 2020).

Based on this background, researchers are interested in examining the risk factors for the incidence of dengue hemorrhagic fever in Simpang Selayang Village, Medan Tuntungan District in 2022.

Method

Types of Research

The method used in this study is a survey method conducted by distributing questionnaires and interviews to respondents directly with a case-control approach. Case-control research is a research design that compares the case group and control group to determine the proportion of events based on the presence or absence of exposure. This research design is known as a retrospective, namely the design by looking back from an incident related to the incidence of pain under study.

Research Location and Time

This research was conducted in Simpang Selayang Village, Medan Tuntungan Sub-district in April-July 2022.

Population and Sample

The population and sample in this study were all patients with DHF recorded in the medical records in the working area of the Simalingkar Health Center, Simpang Selayang sub-district, were 33 cases with a ratio of 1: 1 consisting of a case population of 33

respondents and a control population of 33 respondents. So, the population in this study was 66 respondents.

Method of Collecting Data

Primary data were obtained from interviews using structured questionnaires to obtain data on research subjects including Knowledge, Attitude, Eradication of mosquito nests and the implementation of 3 M plus, Habits of hanging clothes, and use of mosquito repellent. The calculation of the larva-free number is carried out using the ABJ formula. Secondary data were obtained from the Simaligkar Health Center in the form of the Simaligkar Health Center profile and the health profile of the Medan City Health Office.

Data Analysis Method

Univariate analysis was conducted to explain or describe each research variable. Bivariate analysis was carried out to see whether there was an influence of knowledge, attitude, mosquito nest eradication and implementation of 3 M plus, the habit of hanging clothes, use of mosquito repellent, and larva-free rate on the incidence of DHF by using chi-square analysis technique with 95% confidence degree $\alpha = 0.05$. The relationship is said to be meaningful if $P < 0.05$. Meanwhile, multivariate analysis was conducted to determine the most dominant factor influencing the incidence of DHF which was assessed from Exp (β).

Result and Discussion

Result

The Effect of Knowledge on the Incidence of DHF

The Effect of Knowledge on the Incidence of Dengue Hemorrhagic Fever in Simpang Selayang Village, Medan Tuntungan District in 2022 can be seen in the Table 1. Based on the Table 1, the results of the cross-tabulation between Knowledge of the incidence of dengue hemorrhagic fever obtained data from 34 respondents with good categories as many as 15 respondents (44.1%) who were not sick with dengue hemorrhagic fever and 19 respondents (55.9%) who were sick with dengue fever. dengue. Meanwhile, of the 32 respondents in the unfavorable category, 18 respondents (56.3%) were not sick with dengue hemorrhagic fever and 14 respondents (43.8%) were sick with dengue hemorrhagic fever. The results of the chi-square test obtained a value of $X^2 > 0.05$ ($p = 0.325$) which means that there is no influence of knowledge on the incidence of dengue hemorrhagic fever.

Table 1. Cross Tabulation between Knowledge of the Incidence of Dengue Hemorrhagic Fever

Independent Variable	The incidence of dengue hemorrhagic fever				Amount		p. value	OR 95% CI
	Painless		Sick		n	%		
	n	%	n	%				
Knowledge								
Well	15	44.1	19	55.9	34	100	0.325	0.614 (0.232-1.624)
Not good	18	56.3	14	43.8	32	100		
Amount	33	50	33	50	66	100		

The Influence of Attitude on the Incidence of DHF

The Effect of Attitude on the Incidence of Dengue Hemorrhagic Fever in Simpang Selayang Village, Medan Tuntungan District in 2022 can be seen in the Table 2. Based on the Table 2, data were obtained from 28 respondents with good categories as many as 18 respondents (64.3%) were not sick with dengue hemorrhagic fever, and 10 respondents (35.7%) who

were sick with dengue hemorrhagic fever. Meanwhile, from 38 respondents in the unfavorable category, 15 respondents (39.5%) were not sick with dengue hemorrhagic fever and 23 respondents (60.5%) were sick with dengue hemorrhagic fever. The results of the chi-square test obtained the value of $X^2 < 0.05$ means that there is an effect between attitudes toward the incidence of dengue hemorrhagic fever.

Table 2. Cross-tabulation between Attitudes to the Incidence of Dengue Hemorrhagic Fever

Independent Variable	The incidence of dengue hemorrhagic fever				Amount		p. value	OR 95% CI
	Painless		Sick		n	%		
	n	%	n	%				
Attitude								
Well	18	64.3	10	35.7	28	100	0.046	2.760 (1.005-7.580)
Not good	15	39.5	23	60.5	38	100		
Amount	33	50	33	50	66	100		

The Effect of 3M Plus Application on the Incidence of DHF

The Effect of 3M Plus Implementation on the Incidence of Dengue Hemorrhagic Fever in Simpang Selayang Village, Medan Tuntungan District in 2022 can be seen in the Table 3. Based on the Table 3, data were obtained from 29 respondents with good categories as many as 19 respondents (65.5%) were not sick with dengue hemorrhagic fever, and 10 respondents (34.5%)

who were sick with dengue hemorrhagic fever. Meanwhile, from 37 respondents in the unfavorable category, 14 respondents (37.8%) were not sick with dengue hemorrhagic fever and 23 respondents (62.2%) were sick with dengue hemorrhagic fever. The results of the chi-square test obtained the value of $X^2 < 0.05$ means that there is an effect between the application of 3M Plus to the incidence of dengue hemorrhagic fever.

Table 3. Cross-Tabulation between the Application of 3M Plus to the Incidence of Dengue Hemorrhagic Fever

Independent Variable	The incidence of dengue hemorrhagic fever				Amount		p. value	OR 95% CI
	Painless		Sick		n	%		
	n	%	n	%				
3M Plus Deployment								
Well	19	65.5	10	34.5	29	100	0.026	3.121 (1.133- 8.603)
Not good	14	37.8	23	62.2	37	100		
Amount	33	50	33	50	66	100		

The Influence of Hanging Clothes Habits on the Incidence of DHF

The Influence of the Habit of Hanging Clothes on the Incidence of Dengue Hemorrhagic Fever in Simpang Selayang Village, Medan Tuntungan District in 2022 can be seen in the Table 4. Based on the Table 4, data were obtained from 29 respondents with no category as many as 21 respondents (72.4%) were not sick with dengue hemorrhagic fever and 8 respondents (27.6%) were sick

with dengue hemorrhagic fever. Meanwhile, out of 37 respondents in the yes category, 12 respondents (32.4%) were not sick with dengue hemorrhagic fever and 25 respondents (67.6%) were sick with dengue hemorrhagic fever. The results of the chi-square test obtained the value of $X^2 < 0.05$ means that there is an effect among habit of hanging clothes on the incidence of dengue hemorrhagic fever.

Table 4. Cross Tabulation between the Habit of Hanging Clothes on the Incidence of Dengue Hemorrhagic Fever

Independent Variable	The incidence of dengue hemorrhagic fever				Amount		p. value	OR 95% CI
	Painless		Sick		N	%		
	n	%	n	%				
Habit of Hanging Clothes								
Not	21	72.4	8	27.6	29	100	0.001	5.469 (1.883-15.884)
Yes	12	32.4	25	67.6	37	100		
Amount	33	50	33	50	66	100		

The Effect of Using Mosquito Repellent on the Incidence of DHF

The Effect of Using Mosquito Repellent on the Incidence of Dengue Hemorrhagic Fever in Simpang Selayang Village, Medan Tuntungan District is shown in Table 5. Based on the Table 5, the results of the cross-tabulation between the use of mosquito repellent against the incidence of dengue hemorrhagic fever obtained data from 26 respondents with good categories as many as 11 respondents (42.3%) who were not sick with

dengue hemorrhagic fever and 15 respondents (57.7%) who were sick. dengue hemorrhagic fever. Meanwhile, of the 40 respondents in the unfavorable category, 22 respondents (55%) were not sick with dengue hemorrhagic fever and 18 respondents (45%) were sick with dengue hemorrhagic fever. The results of the chi-square test obtained a value of $X^2 > 0.05$ means that there is no effect between the use of mosquito repellent on the incidence of dengue hemorrhagic fever.

Table 5. Cross Tabulation between Use of Mosquito Repellent against Dengue Hemorrhagic Fever

Independent Variable	The incidence of dengue hemorrhagic fever				Amount		p. value	OR 95% CI
	Painless		Sick		n	%		
	n	%	n	%				
Use of Mosquito Repellent								
Well	11	42.3	15	18	26	100	0.314	0.6 (0.221-1.626)
Not good	22	55	57.7	45	40	100		
Amount	33	50	33	50	66	100		

Effect of larva-free rate on the incidence of DHF

The effect of larva-free rate on the incidence of dengue hemorrhagic fever in Simpang Selayang Village, Medan Tuntungan District in 2022 can be seen in the Table 6. Based on the Table 6, the results of the cross-tabulation between the larvae-free rate and the incidence of dengue hemorrhagic fever in Simpang Selayang Village, Medan Tuntungan District, in 2022, obtained data from 22 respondents with good categories as many as 15 respondents (68.2%) who were not sick with dengue fever and 7 respondents. respondents (31.8%)

were sick with dengue hemorrhagic fever. Meanwhile, of the 44 respondents in the unfavorable category, 18 respondents (40.9%) were not sick with dengue hemorrhagic fever and 26 respondents (59.1%) were sick with dengue hemorrhagic fever. The results of the chi-square test obtained the value of $X^2 < 0.05$ ($p = 0.037$), meaning that there is an influence between the larval-free rate on the incidence of dengue hemorrhagic fever in Simpang Selayang Village, Medan Tuntungan District in 2022.

Table 6. Cross-Tabulation between Larvae-Free Rates and Incidence of Dengue Hemorrhagic Fever

Independent Variable	The incidence of dengue hemorrhagic fever				Amount		p. value	OR 95% CI
	Painless		Sick		n	%		
	n	%	n	%				
Flick Free Number								
Well	15	68.2	7	31.8	22	100	0.037	3.095 (1.051-9.113)
Not good	18	40.9	26	59.1	44	100		
Amount	33	50	33	50	66	100		

Discussion

The Effect of Knowledge on the Incidence of DHF

A lack of basic knowledge about Dengue Hemorrhagic Fever can affect the attitudes and actions of the community in preventing Dengue Hemorrhagic Fever because knowledge is a very important part of the

formation of a person's attitude. If the socialization carried out by the relevant agencies to the community is disseminated evenly, the knowledge of eradicating mosquito nests will be better. Knowledge is a very important domain in shaping one's actions. Lack of knowledge can negatively affect the actions to be taken

and vice versa. Behavior that is based on knowledge will be more lasting than behavior that is not based on knowledge. A person's knowledge can be obtained from various information submitted by teachers, parents, health workers, friends, mass media, electronic media, and so on. The results of this study found that good knowledge about environmental sanitation was obtained by respondents from health workers and other information media, such as advertisements on TV, newspapers, radio, and so on.

There are various factors that can affect knowledge, including education, work, socio-cultural and economic, environment, experience, and age. Someone with high formal education will have higher knowledge than people with low formal education, and therefore will be better able to understand the meaning and importance of health. Such as advertisements on TV, in newspapers, radio, and so on. There are various factors that can affect knowledge, including education, work, socio-cultural and economic, environment, experience, and age. Someone with high formal education will have higher knowledge than people with low formal education, and therefore will be better able to understand the meaning and importance of health. Such as advertisements on TV, in newspapers, radio, and so on. There are various factors that can affect knowledge, including education, work, socio-cultural and economic, environment, experience, and age. Someone with high formal education will have higher knowledge than people with low formal education, and therefore will be better able to understand the meaning and importance of health.

This study is in line with the research of Tansil et al. (2021) research showed that there was no significant effect between knowledge and the incidence of Bleeding Beam. In this study, everyone's knowledge is different, this is because knowledge is the result of learning, experience, and thinking that has been obtained by itself and has nothing to do with the incidence of dengue fever. Pantouw et al. (2017) in their research conducted in Tuminting Sub-district showed that there was no significant effect on the eradication of Dengue Fever.

Husna et al. (2020) shows that knowledge has no effect on the incidence of dengue fever in the working area of the Way Kandis Public Health Center, Bandar Lampung. This study is also in line with Sholihah et al. (2020) research conducted in Kupang City his research showed that there was no influence of knowledge on the incidence of Dengue Fever.

Arsyad et al. (2020) research conducted in the working area of the Tarus Health Center showed that there was a relationship between knowledge and the incidence of Dengue Fever. This research is also not in line with the research conducted by Pandaibesi (2017)

showing that there is an influence of knowledge on the incidence of Dengue Fever in Medan Sunggal District.

The Influence of Attitude on the Incidence of DHF

Notoadmodjo revealed that someone who behaves well can realize good actions in order to improve the attitude of being good action or action that requires real support or a supportive situation. Attitudes are not acquired from birth, but attitudes can be formed by the existence of social interactions carried out by someone. In these interactions, it can lead to reciprocity that influences each other between one person and another in social actions and behavior with their environment. Attitude is closely related to the level of knowledge of a person's insight. A person's attitude towards an object shows that person's knowledge of related objects.

A positive attitude towards environmental sanitation in the prevention and control of DHF will also have a good impact on the prevention and control of DHF which is then manifested by the low risk of DHF. Attitude is a tendency to respond positively or negatively to certain people, objects, and situations. That is, a positive attitude will encourage someone to behave as expected and a negative attitude will encourage someone to behave as expected.

This research is in line with Arsyad et al. (2020) which shows that there is an influence between attitude and the incidence of dengue fever. Rismawati et al. (2017) show that there is an influence between attitudes and the incidence of dengue fever in Wonokusumo Surabaya. Pandaibesi (2017) showed that there was an influence of community attitudes on the incidence of dengue hemorrhagic fever in Medan Sunggal District. A person's attitude will affect the behavioral tendency to act, attitude is an emotional reaction to social stimuli. The attitude of respondents who are not good can lead to a lack of participation in the prevention of dengue hemorrhagic fever.

Pantouw et al. (2017) showed that there was a significant effect between attitudes and the eradication of Dengue Fever. This research is also in line with the research of Mangindaan et al. (2019) that there is a significant influence between the attitude toward eradicating mosquito nests and cases of dengue hemorrhagic fever in Watudambo Village, Kauditan District. However, this study is not in line with the research conducted by Novrita et al. (2017) in their research in the Work Area of the Celikah Health Center, Ogan Komering Ilir Regency, which showed that there was no influence between attitude and the incidence of Dengue Fever.

The Effect of 3M Plus Application on the Incidence of DHF

PSN 3M Plus behavior is a healthy life behavior that aims to control mosquito breeding places and efforts to avoid contact with *Aedes* which is a DHF vector. If this behavior is carried out properly, it can break the chain of transmission of DHF so that the expected result is that the incidence of DHF can decrease. The practice of draining the TPA, closing the TPA, and burying used goods, or commonly known as 3M Plus, is an effort to eradicate dengue mosquito advice (PSN) launched by the government. As has been shown in several studies, the practice of 3M Plus is a protective factor against the incidence of DHF. If 3M is implemented by the entire community, the population of *Aedes aegypti* mosquitoes can be reduced as low as possible, so that dengue transmission does not occur again. The willingness and level of discipline to drain the TPA in the community really needs to be improved, given that water cleanliness is not only for human health but also for creating a clean environment. Environmental cleanliness is expected to suppress the occurrence of various diseases that arise as a result of an unsanitary environment.

Periatama et al. (2022) explained that there was a significant effect between the application of 3M Plus and the incidence of Dengue Fever. Sutriyawan et al. (2022) explained that the application of 3M Plus had an effect on the incidence of Dengue Fever in Indramayu Regency. Priesley et al. (2018) revealed that there was an effect of implementing 3M Plus on the incidence of Dengue Fever in Andalas Village. Rahmawati et al. (2018) in the Work Area of the Kayen Health Center, Pati Regency that in their research there is an influence between the application of 3M Plus at home and the incidence of Dengue Hemorrhagic Fever.

Tamza et al. (2013) shows that there is an effect between the application of 3M Plus and the incidence of Dengue Hemorrhagic Fever. However, this study is not in line with the research conducted by Husna et al. (2016) showed that there was no significant effect between the application of 3M Plus and the incidence of Dengue Fever in Semarang City.

The Influence of Hanging Clothes on the Incidence of DHF

The clothes hanging behind the cupboard or behind the door should be folded and stored in the cupboard, because the *Aedes aegypti* mosquito likes to perch and rest in dark places and hanging cloth. Mosquitoes are more attracted to bright light, clothing, human body temperature, and warm and humid conditions. The habit of hanging clothes in the house is an indication of being a resting pleasure for the *Aedes aegypti* mosquito. PSN and 3M activities are added by avoiding the habit of hanging clothes in the room, which is an activity that must be carried out to control the *Aedes aegypti* mosquito

population, so that the transmission of dengue disease can be prevented and reduced. There are still many people who have the habit of hanging clothes in their homes after use. Usually hung behind the bedroom door or on the wardrobe door even on the walls of the room in the house for example on the walls of the room, family room and sometimes behind the bathroom door and some leave clothes scattered on the bed. Clothes that are often hung up are a favorite place for mosquitoes to perch and rest. To prevent this, the clothes that have been worn should be placed in a closed dirty clothes place and the clothes that have not been worn folded and tidied up in the closet.

Because the *Aedes aegypti* mosquito likes to perch on clothes hanging in the room to rest after sucking human blood. Family room and sometimes behind the bathroom door and some leave clothes scattered on the bed. Clothes that are often hung up are a favorite place for mosquitoes to perch and rest. To prevent this, the clothes that have been worn should be placed in a closed dirty clothes place, and the clothes that have not been worn folded and tidied up in the closet.

This study is in line with research conducted by Apriyani et al. (2022) that the habit of hanging clothes has a significant effect on dengue hemorrhagic fever in the Working Area of the Air Putih Health Center, Samarinda. This study is also in line with research conducted by Ayun et al. (2017) that there is a significant influence between the habit of hanging clothes and incidence of dengue hemorrhagic fever in the working area of the Sekaran Health Center, Gunungpati District, Semarang City.

Novrita et al. (2017) in his research in the Work Area of the Celikah Health Center, Ogan Komering Ilir Regency, showed that there was an influence between the habit of hanging clothes and the incidence of dengue fever. In addition, this research is also in line with Akbar et al. (2019) in their research showing that there is an influence of the habit of hanging clothes on the incidence of dengue hemorrhagic fever so that the habit of hanging clothes is one of the risk factors for the incidence of dengue hemorrhagic fever in Indramayu Regency. Respondents who are exposed to dengue hemorrhagic fever have a risk of 3,470 times in respondents who have the habit of hanging clothes than those who do not have the habit of hanging clothes.

Sinaga et al. (2019) in their research showed that there was an influence between the habit of hanging clothes and the incidence of Dengue Hemorrhagic Fever in the working area of the Medan Johor Health Center. However, this study is not in line with Hidayat et al. (2017) showing that there is no effect between the habit of hanging clothes and the incidence of Danguge

Hemorrhagic Fever on Balang Lompo Island, Pangkep Regency.

The Effect of Using Mosquito Repellent on the Incidence of DHF

Respondents should use mosquito repellent while sleeping. Because mosquito repellent is effective for preventing mosquito bites while sleeping. This study is in line with the research conducted by Marbun (2021) in his research which showed that there was no significant effect between the habit of using mosquito repellent and the incidence of dengue hemorrhagic fever in children in Serdang Bedagai Regency. Novrita et al. (2017) in his research in the Work Area of the Celikah Health Center, Ogan Komering Ilir Regency showed that there was no effect between the use of mosquito repellent and the incidence of Dengue Fever.

Ayun et al. (2017) in their research explained that there was no significant effect between the habit of using mosquito repellent and the incidence of dengue fever the working area of the Sekaran Health Center, Gunungpati District, Semarang City. This study is also in line with Sholihah et al. (2020) research conducted in Kupang City showed that there was no significant effect between the use of mosquito repellent and the incidence of dengue fever.

Putri (2018) shows that there is an influence between the use of mosquito repellent and the incidence of Dengue Hemorrhagic Fever, in this study respondents who have a habit of not using mosquito repellents have a 2.07 times risk compared to subjects who have the habit of using mosquito repellents to get a fever dengue blood. This study is also not in line with Sinaga et al. (2019) showing that there is an influence between the use of mosquito repellent and the incidence of Dengue Hemorrhagic Fever in the working area of the Medan Johor Health Center.

Effect of Larva Free Rate on the Incidence of DHF

This study is in line with research conducted by Novitasari et al. (2018). This research was conducted in the Kayen Health Center Work Area, Pati Regency, in his research, it showed that there was an influence of the larva free rate with the incidence of Dengue Fever. In his research, it was found that the percentage of houses with larvae had a 3.2 times higher risk factor for dengue hemorrhagic fever compared to the control group without larvae in their homes. Ardianti et al. (2018) in their research conducted in the work area of the Harapan Raya Health Center, showed that there was an influence of the larva-free rate with the incidence of Dengue Fever.

Hidayat et al. (2017) showed that there was an influence between the larva-free rate and the incidence of Dengue Fever. The density of larvae is a risk factor for

the transmission of dengue hemorrhagic fever. The higher the density of *Aedes aegypti* larvae, the higher the public's risk of contracting dengue hemorrhagic fever. This study is also in line with the research of Khadijah et al. (2017) showing that there is an influence between the larva-free rate and the incidence of dengue fever at Sanglah Hospital Denpasar. In the results of his research where the respondent's house was found *Aedes sp.* 2.67 times greater risk of dengue hemorrhagic fever compared to respondents who do not have larvae in their homes.

Nurdin et al. (2018) shows that there is an influence between the larva-free rate and the incidence of dengue fever. Houses with agents have a risk of 1.7 times the incidence of dengue hemorrhagic fever. Sukesri et al. (2020) revealed that there was no influence between the larva-free rate and the incidence of Dengue Hemorrhagic Fever in Sleman Regency.

Conclusion

There was no effect of knowledge ($p = 0.325$) and use of mosquito repellent ($p = 0.314$) on the incidence of dengue hemorrhagic fever in Simpang Selayang Village, Medan Tuntungan District in 2022. There is an influence of attitude ($p = 0.046$), Eradication of Mosquito Nests with the Implementation of 3M Plus ($p = 0.026$), Habit of Hanging Clothes ($p = 0.001$), Larval Free Rate ($p = 0.037$), on the incidence of dengue hemorrhagic fever in Simpang Selayang Village, District Profit Field in 2022. The variable with the greatest influence on the incidence of DHF is the habit of hanging clothes with the largest Exp.B value, which is 9.754. For Simpang Selayang Village, Medan Tuntungan Sub-district, it is expected to increase public awareness about the habit of hanging clothes which is an influential factor in this research, so support activities are carried out so that people change these habits by making healthy home competitions and hanging clothes is one of the assessment elements of these activities so that people are used to not hanging their clothes at home.

Author Contributions

Ivan Elisabeth Purba and Donal Nababan conceptualized the research idea, designed of methodology, management and coordination responsibility, analyzed data, conducted a research and investigation process; Adiansyah and Eddy Surya Kaban conducted literature review and provided critical feedback on the manuscript.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

References

- Akbar, H., & Syaputra, E. M. (2019). Faktor Risiko Kejadian Demam Berdarah Dengue (DBD) di Kabupaten Indramayu. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 2(3), 159-164. <https://doi.org/10.56338/mppki.v2i3.626>
- Apriyani, A., & Yulianus, Y. (2022). Kebiasaan Menggantungkan Pakaian dan Menguras Kontainer sebagai Faktor yang Berhubungan dengan Kejadian Demam Berdarah Dengue di Wilayah Kerja Puskesmas Air Putih Samarinda. *Jurnal Penelitian Kesehatan "SUARA FORIKES" (Journal of Health Research "Forikes Voice")*, 13(1), 225-228. Retrieved from <http://forikes-ejournal.com/index.php/SF/article/download/sf13143/13143>
- Ardianti, W., Lapau, B., & Dewi, O. (2018). Determinan Kejadian Demam Berdarah Dengue (DBD) di Wilayah Kerja Puskesmas Harapan Raya. *Photon: Jurnal Sain dan Kesehatan*, 9(1), 47-56. <https://doi.org/10.37859/jp.v9i1.1057>
- 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>
- Ayun, L. L., & Pawenang, E. T. (2017). Hubungan antara Faktor Lingkungan Fisik dan Perilaku dengan Kejadian Demam Berdarah Dengue (DBD) di Wilayah Kerja Puskesmas Sekaran, Kecamatan Gunungpati, Kota Semarang. *Public Health Perspective Journal*, 2(1), 97-104. Retrieved from <https://journal.unnes.ac.id/nju/index.php/phpj/article/view/11002>
- Azizah, T. N., Shaluhiah, Z., & Syamsulhuda, B. M. (2017). Beberapa Faktor yang Berhubungan dengan Perilaku PSN (3M Plus) sebagai Upaya Pencegahan DBD pada Masyarakat Kelurahan Sendangmulyo, Semarang. *Jurnal Kesehatan Masyarakat (Undip)*, 5(3), 645-652. <https://doi.org/10.14710/jkm.v5i3.17414>
- Dinas Kesehatan Kota Medan. (2020). *Profil Kesehatan Kota Medan tahun 2020*. Medan: Dinas Kesehatan Kota Medan.
- Hidayat, H., & Nasriah, N. (2017). Faktor yang Berhubungan dengan Kejadian DBD di Pulau Balang Lompo Kabupaten Pangkep. *Sulolipu: Media Komunikasi Sivitas Akademika dan Masyarakat*, 17(2), 73-81. <https://doi.org/10.32382/sulolipu.v17i2.853>
- Husna, I., Putri, D. F., Triwahyuni, T., & Kencana, G. B. (2020). Analisis Faktor yang Mempengaruhi Kejadian Demam Berdarah Dengue di Wilayah Kerja Puskesmas Way Kandis Bandar Lampung Tahun 2020. *Jurnal Analis Kesehatan*, 9(1), 9-16. <http://dx.doi.org/10.26630/jak.v9i1.2111>
- Husna, R. N., Wahyuningsih, N. E., & Dharminto, D. (2016). Hubungan Perilaku 3M Plus dengan Kejadian Demam Berdarah Dengue (DBD) Di Kota Semarang (Studi di Kota Semarang Wilayah Atas). *Jurnal Kesehatan Masyarakat (Undip)*, 4(5), 170-177. <https://doi.org/10.14710/jkm.v4i5.14506>
- Kemendes RI. (2017). *Profil Kesehatan Indonesia 2017*. Jakarta: Kemendes RI.
- Kemendes RI. (2020). *Profil Kesehatan Indonesia 2020*. Jakarta: Kemendes RI.
- Kemendes RI. (2021). *Profil Kesehatan Indonesia 2021*. Jakarta: Kemendes RI.
- Khadijah, A. N., & Utama, I. M. G. D. L. (2017). Gambaran Gejala Klinis Demam Berdarah Dengue pada Anak di RSUP Sanglah, Denpasar Selama Bulan Januari-Desember 2013. *EJurnal Media Udayan*, 6(11), 92-97. Retrieved from <https://ojs.unud.ac.id/index.php/eum/article/view/35071>
- Mangindaan, M. A., Kaunang, W. P. J., & Sekeon, S. A. (2019). Hubungan Perilaku Pemberantasan Sarang Nyamuk dengan Kejadian Demam Berdarah Dengue di Desa Watudambo Kecamatan Kauditan. *KESMAS*, 7(5). Retrieved from <https://ejournal.unsrat.ac.id/index.php/kesmas/article/view/22561>
- Marbun, H. C. (2021). *Hubungan Faktor Penjamu dan Lingkungan dengan Kejadian Demam Berdarah Dengue pada Anak di Kabupaten Serdang Bedagai* (Thesis). Universitas Sumatera Utara. Retrieved from <https://repositori.usu.ac.id/handle/123456789/32214>
- Novitasari, L., Yulawati, S., & Wuryanto, A. (2018). Hubungan Faktor Host, Faktor Lingkungan, dan Status Gizi dengan Kejadian Demam Berdarah Dengue di Wilayah Kerja Puskesmas Kayen Kabupaten Pati. *Jurnal Kesehatan Masyarakat*, 6(5), 277-83. <https://doi.org/10.14710/jkm.v6i5.22023>
- Novrita, B., Mutahar, R., & Purnamasari, I. (2017). Analisis Faktor Risiko Kejadian Demam Berdarah Dengue di Wilayah Kerja Puskesmas Celikah Kabupaten Ogan Komering Ilir. *Jurnal Ilmu Kesehatan Masyarakat*, 8(1). Retrieved from <https://ejournal.fkm.unsri.ac.id/index.php/jikm/article/view/227>
- Nurdin A., & Zakiyuddin, Z. (2018). Studi Epidemiologi yang Mempengaruhi Kejadian Demam Berdarah Dengue (DBD) di Kecamatan Johan Pahlawan. *Jurnal Aceh Medika*, 2(1), 77-85. Retrieved from <http://jurnal.abulyatama.ac.id/index.php/acehmedika/article/view/163>

- Pandaibesi, R. (2017). *Hubungan Pengetahuan, Sikap, dan Perilaku Masyarakat dengan Kejadian Demam Berdarah di Kecamatan Medan Sunggal* [Skripsi]. Medan: Universitas Sumatera Utara. Retrieved from <https://repositori.usu.ac.id/handle/123456789/3473>
- Pantouw, R. G., Siagian, I. E., & Lampus, B. S. (2017). Hubungan Pengetahuan dan Sikap Masyarakat dengan Tindakan Pencegahan Penyakit Demam Berdarah Dengue di Kelurahan Tuminting. *Jurnal Kedokteran Komunitas dan Tropik*, 5(1), 217-221. Retrieved from <https://ejournal.unsrat.ac.id/v2/index.php/JKKT/article/view/14832/14402>
- Periatama, S., Lestari, R. M., & Prasida, D. W. (2022). Hubungan Perilaku 3M Plus dengan Kejadian Demam Berdarah Dengue (DBD). *Jurnal Surya Medika (JSM)*, 7(2), 77-81. <https://doi.org/10.33084/jsm.v7i2.3208>
- Priesley, F., Reza, M., & Rusdji, S. R. (2018). Hubungan Perilaku Pemberantasan Sarang Nyamuk dengan Menutup, Menguras, dan Mendaur Ulang Plus (PSN M Plus) terhadap Kejadian Demam Berdarah Dengue (DBD) di Kelurahan Andalas. *Jurnal Kesehatan Andalas*, 7(1), 124-130. <https://doi.org/10.25077/jka.v7i1.790>
- Putri, N. W. (2018). Kejadian Demam Berdarah Dengue dan Kerentanan Larva Nyamuk *Aedes spp* di Kecamatan Lubuk Basung. *Jurnal Endurance: Kajian Ilmiah Problema Kesehatan*, 3(2), 349-357. <https://doi.org/10.22216/jen.v3i2.1229>
- Rahmawati, U., Joko, T., & Nurjazuli, N. (2018). Hubungan antara Praktik 3M dan Faktor Lingkungan Fisik Rumah dengan Kejadian Demam Berdarah Dengue di Wilayah Kerja Puskesmas Kayen Kabupaten Pati. *Jurnal Kesehatan Masyarakat*, 6(6), 378-385. <https://doi.org/10.14710/jkm.v6i6.22209>
- Rismawati, S. N., & Nurmala, I. (2017). Hubungan Perilaku Host dan Environment dengan kejadian DBD di Wonokusumo Surabaya. *Jurnal Berkala Epidemiologi*, 5(3), 383-392. Retrieved from <https://ejournal.unair.ac.id/JBE/article/download/3863/4430>
- Sari, D. E. (2020). Faktor-Faktor yang Berhubungan dengan Upaya Pencegahan Demam Berdarah Dengue (DBD) Menggunakan Prinsip Menguras, Menutup, dan Memanfaatkan Kembali (3M). *Citra Delima*, 3(2), 163-170. <https://doi.org/10.33862/citradelima.v3i2.84>
- Sholihah, N. A., Weraman, P., & Ratu, J. M. (2020). Analisis Spasial dan Pemodelan Faktor Risiko Kejadian Demam Berdarah Dengue Tahun 2016-2018 di Kota Kupang. *Jurnal Kesehatan Masyarakat Indonesia*, 15(1), 52-61. <https://doi.org/10.26714/jkmi.15.1.2020.52-61>
- Sinaga, P., & Hartono, H. (2019). Determinan Kejadian Penyakit Demam Berdarah Dengue (DBD) di Wilayah Kerja Puskesmas Medan Johor. *Jurnal Kesehatan Global*, 2(3), 110-121. <https://doi.org/10.33085/jkg.v2i3.4411>
- Sukezi, T. W., & Astuti, C. T. (2020). Hubungan Angka Bebas Jentik (ABJ) dengan Insidensi Rate Demam Berdarah Dengue (DBD) di Tingkat Kabupaten Sleman Tahun 2013-2017. *Jurnal Kesehatan dan Pengelolaan Lingkungan*, 1(2), 57-63. <https://doi.org/10.12928/jkpl.v1i2.4159>
- Sutriyawan, A., Darmawan, W., Akbar, H., Habibi, J., & Fibrianti, F. (2022). Faktor yang Mempengaruhi Pemberantasan Sarang Nyamuk (PSN) Melalui 3M Plus dalam Upaya Pencegahan Demam Berdarah Dengue (DBD). *Jurnal Ilmu Kesehatan Masyarakat*, 11(01), 23-32. <https://doi.org/10.33221/jikm.v11i01.936>
- Tamza, R. B., Suhartono, S., & Dharminto, D. (2013). Hubungan Faktor Lingkungan dan Perilaku dengan Kejadian Demam Berdarah Dengue (DBD) di Wilayah Kelurahan Perumnas Way Halim Kota Bandar Lampung. *Jurnal Kesehatan Masyarakat*, 2(2). Retrieved from <http://ejournals1.undip.ac.id/index.php/jkm>
- Tansil, M. G., Rampengan, N. H., & Wilar, R. (2021). Faktor Risiko Terjadinya Kejadian Demam Berdarah Dengue pada Anak. *Jurnal Biomedik: JBM*, 13(1), 90-99. <https://doi.org/10.35790/jbm.13.1.2021.31760>