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Factors Influencing the Behavior of Implementing 3M Plus in Efforts to Prevent Dengue Hemorrhagic Fever (DHF) in the Working Area of the Kenali Besar Community Health Center in Jambi City in 2025

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Abstract

Dengue Hemorrhagic Fever (DHF) is still one of the public health problems in Jambi City, especially in the working area of Kenali Besar Community Health Center which shows an increase in cases every year, with a larvae-free rate of 84%, still below the national target of ≥95%. Prevention efforts can be done through the implementation of 3M Plus behavior, but its implementation in the community is still not optimal. The purpose of this study was to determine the factors that influence the behavior of implementing 3M Plus in efforts to prevent Dengue Hemorrhagic Fever (DHF) in the working area of Kenali Besar Community Health Center, Jambi City in 2025. This study used a quantitative method with a Cross Sectional design. The population in this study were people living in the working area of Kenali Besar Community Health Center. The research sample consisted of 95 respondents selected using a multistage sampling technique. Data were collected using a questionnaire and analyzed using the Chi-Square test. The majority of respondents were in the 45-54 year age group (37.9%) and the majority of respondents were female (77.9%). The results of the study showed a significant relationship between knowledge (p-value = 0.01) and attitude (p-value = 0.00) with the behavior of implementing 3M Plus. Meanwhile, the availability of facilities and infrastructure (p-value = 0.60) and the role of health workers (p-value = 0.91) did not show a significant relationship. The better the community's knowledge and attitude, the greater the likelihood they will implement 3M Plus behavior in preventing dengue fever. It is hoped that health workers can improve education, assistance, and community empowerment to strengthen the implementation of 3M Plus in a sustainable manner.

Keywords: Dengue Fever, 3M Plus, Knowledge, Attitude, Facilities and Infrastructure, Role of Health Workers.

INTRODUCTION

Vector-borne diseases are common diseases that can cause outbreaks/extraordinary events that can cause health problems in the community (Republik Indonesia 2017). Dengue Hemorrhagic Fever (DHF) is caused by the dengue virus, which is spread by the Aedes mosquito. Humans can be infected with this virus through the Aedes aegypti and Aedes albopictus vectors (Tarmizi 2024). Dengue Hemorrhagic Fever (DHF) is an environmentally-based disease that has spread to various parts of the world (Periatama, Lestari, and Prasida 2022) Approximately 4 billion people, or nearly half the world's population, live in areas susceptible to dengue fever (DHF). Approximately 100–400 million DHF infections occur annually in tropical and subtropical regions, with the majority occurring in urban or semi-urban areas (Tarmizi 2024). In the Southeast Asia region, the country with the highest number of dengue fever cases is Indonesia, while in the world Indonesia is in second place after Thailand which has the highest number of dengue fever cases (Alfalakh 2023). The Indonesian Health Profile reports that dengue fever cases in Indonesia reached 143,266 in 2022, resulting in 1,237 deaths. This represents an increase compared to 2021, when there were 73,518 cases and 705 deaths (Indonesia 2017). Meanwhile, in 2023, the number of dengue fever cases decreased by 114,720 cases with 894 deaths (Kemenkes RI 2023). According to the Central Statistics Agency (BPS) of Jambi Province, the prevalence of Dengue Hemorrhagic Fever (DHF) cases in Jambi City experienced a significant increase from 2021 to 2024. The prevalence was recorded at 24.88 per 100,000 population in 2021, increasing to 48.10 in 2022, 81.24 in 2023, and reaching 100.46 in 2024. This increase reflects a trend that needs to be watched out for in efforts to control DHF (Provinsi Jambi 2024). Kenali Besar Community Health Center (Puskesmas) is the primary health center with

the highest number of cases in Jambi City. In 2021, the prevalence at Kenali Besar Community Health Center was 29.62 per 100,000 residents, then increased in 2022 to 41.82 per 100,000 residents, and in 2023 to 64.46 per 100,000 residents. In 2024, the prevalence increased again to 146.37 per 100,000 residents. The data above shows that the prevalence in the Kenali Besar Community Health Center's work area has increased significantly year after year.

Dengue Hemorrhagic Fever (DHF) prevention measures are also crucial for dengue fever prevention. In prevention and treatment efforts, there is no cure or vaccine available for dengue fever; therefore, control measures are needed to limit the growth of vectors that cause the disease and prevent an increase in mortality. These measures also require community participation, as they will continually maintain cleanliness and maintain their home and living environments. Dengue fever prevention efforts are inseparable from healthy behavior. According to Lawrence Green, there are three main factors that influence health behavior: predisposing factors, supporting/enabling factors, and reinforcing/motivating factors. Predisposing factors include a person's knowledge, attitudes, and beliefs about the 3M Plus Dengue Hemorrhagic Fever (DHF) prevention method. Knowledge about both DHF and the 3M Plus Dengue Hemorrhagic Fever (DHF) is essential (Nurainiyah, Masyarakat, and Semarang 2025).

The 3M Plus Movement is a mosquito nest eradication (PSN) activity used as a primary strategy in preventing dengue fever. The 3M movement involves draining and cleaning water reservoirs, covering water reservoirs, and recycling used items that can collect rainwater and potentially become mosquito breeding grounds (Kementerian Kesehatan RI 2017). Plus programs include using mosquito repellent, sprinkling larvicide powder, raising fish that eat larvae, and so on (Sety et al. 2024). Based on the results of interviews conducted with environmental health workers at the Kenali Besar Community Health Center, the behavior of implementing 3M Plus by the community is still not being implemented well and from the results of observations that have been carried out in the Kenali Besar Community Health Center work area, mosquito larvae are still found in bathtubs/water reservoirs and used items are found including used bottles, plastic cups, and unused cans that can collect rainwater and have the potential to become breeding grounds for mosquitoes.

Based on the problems above, this study aims to determine the factors that influence the behavior of implementing 3M Plus in efforts to prevent Dengue Hemorrhagic Fever (DHF) in the working area of the Kenali Besar Community Health Center, Jambi City in 2025.

RESEARCH METHODS

This study used a quantitative method with a cross-sectional research design. This study was conducted in the working area of the Kenali Besar Community Health Center, Jambi City from August to September 2025. The population in this study was all residents who resided in the working area of the Kenali Besar Community Health Center, amounting to 12,677 families and a sample of 95 respondents.

The independent variables in this study were knowledge, attitudes, facilities and infrastructure, and the role of health workers, while the dependent variable was the behavior of implementing 3M Plus. The sampling technique used was probability sampling with a multistage sampling method. Data collection in this study was conducted through interviews, questionnaires, and observation sheets. Data analysis used the Chi-square test.

RESULTS AND DISCUSSION

Univariate Analysis

Table 1. Frequency distribution of respondent characteristics in the Kenali Besar Community Health Center work area in 2025

Characteristics	n	%
Age		
25-34	9	9.5
35-44	32	33.7
45-54	36	37.9
55-64	18	18.9
Gender		
Man	21	22.1
Woman	74	77.9
KK's last education		
Graduated from elementary school	5	5.3
Graduated from junior high school	17	17.9
Graduated from high school/Islamic high school	50	52.6
Graduated from Diploma 3/Bachelor's/Master's degree	23	24.2
Mother's last education		
Didn't finish elementary school	1	1.1
Graduated from elementary school	7	7.4
Graduated from junior high school	20	21.1
Graduated from high school/Islamic high school	45	47.4
Graduated from Diploma 3/Bachelor's/Master's degree	22	23.2
KK Jobs		
Laborer	32	33.7
Trader	11	11.6
Self-employed	16	16.8
Teacher	10	10.5
Private employees	18	18.9
Civil Servants/Armed Forces	8	8.4
Mother's Job		
Doesn't work	67	70.5
Laborer	7	7.4
Trader	10	10.5
Self-employed	1	1.1
Teacher	7	7.4
Private employees	1	1.1
Civil Servants/Armed Forces	2	2.1

Based on the table above shows the distribution of respondents based on the characteristics of respondents, that the majority of respondents in the 45-54 year age group are 36 respondents (37.9%), and the majority of respondents' gender is female, 74 respondents (77.9%), most of the last education of the KK and the last education of the mother is high school / MA with a total of 50 respondents (52.6%) and 45 respondents (47.4%), the KK's occupation as a laborer with a total of 32 respondents (33.7%), and most of the mothers do not work, namely 67 respondents (70.5%).

Frequency distribution of research variables

Table 2. Frequency distribution of respondents based on research variables conducted in the Kenali Besar Community Health Center work area in 2025

Variables	Category	n	(%)
3M Plus Implementation Behavior	Not good	48	50.5
	Good	47	49.5
Knowledge	Not good	46	48.4
	Good	49	51.6
Attitude	Negative	40	42.1
	Positive	55	57.9
Facilities and infrastructure	Incomplete	43	45.3
	Complete	52	54.7
The Role of Health Workers	Not good	47	49.5
	Good	48	50.5

Based on table 2. above, it shows that the majority of respondents in the 3M Plus implementation behavior variable have bad behavior, there are 48 respondents (50.5%), while those who have good behavior are 47 respondents (49.5%). In the knowledge variable, the majority of respondents have good knowledge, there are 49 respondents (51.6%), while respondents who have poor knowledge are 46 respondents (48.4%). In the attitude variable, the majority of respondents have a positive attitude, there are 55 respondents (57.9%), while respondents who have a negative attitude are 40 respondents (42.1%). In the facilities and infrastructure variable, the majority of respondents have complete facilities and infrastructure, there are 52 respondents (54.7%), while respondents who have incomplete facilities and infrastructure are 43 respondents (45.3%). In the health worker role variable, the majority of respondents assess the role of health workers as good, there are 48 respondents (50.5%), while respondents who assess the role of health workers as bad are 47 respondents (49.5%).

Bivariate Analysis

The Relationship Between Knowledge and 3M Plus Implementation Behavior

Table 3. Relationship between knowledge and 3M Plus implementation behavior

Knowledge	3M Plus Implementation Behavior				Total		PR (95%CI)	*P-value*
	No Good		Good					
	n	%	n	%	n	%		
Not good	29	63.0	17	37.0	46	100	1.626 (1.071-2.464)	0.018
Good	19	38.8	30	61.2	49	100		

The data above shows that 46 respondents had poor knowledge, 29 of whom (63.0%) exhibited poor behavior. Meanwhile, of the 49 respondents with good knowledge, 19 (38.8%) exhibited poor behavior in implementing 3M Plus.

Based on the results of statistical tests using Chi-Square analysis, a p-value of 0.018 ($p<0.05$) was obtained, indicating a significant relationship between knowledge and behavior in implementing 3M Plus. PR 1.626 with 95% CI = 1.071-2.464, which means that respondents with poor knowledge are 1.626 times more likely to engage in bad behavior in implementing 3M Plus compared to respondents with good knowledge.

The Relationship Between Attitude and Behavior in Implementing 3M Plus

Table 4. Relationship between Attitude and 3M Plus implementation behavior

Attitude	3M Plus Implementation Behavior				Total		PR (95%CI)	*P-value*
	No Good		Good					
	n	%	n	%	n	%		
Negative	27	67.5	13	32.5	40	100	1,768 (1,186-2,635)	0.005
Positive	21	32.8	34	61.8	55	100		

Based on the data above, the results show that there are 40 respondents who have negative attitudes, of which 27 respondents (67.5%) have bad behavior. Meanwhile, there are 55 respondents who have positive attitudes, of which 21 respondents (32.8%) have bad behavior. A p-value of 0.005 (p <0.05) is obtained, indicating a significant relationship between attitudes and behavior in implementing 3M Plus. PR 1.768 (CI 95% = 1.186-2.635), which means that respondents with negative attitudes are 1.768 times more likely to engage in bad behavior in implementing 3M Plus behavior compared to respondents with positive attitudes.

The Relationship between Facilities and Infrastructure and the Behavior of Implementing 3M Plus

Table 5. Relationship between facilities and infrastructure and 3M Plus implementation behavior

Attitude	3M Plus Implementation Behavior				Total		PR (95%CI)	*P-value*
	No Good		Good					
	n	%	n	%	n	%		
Incomplete	23	53.5	20	46.5	43	100	1.113 (0.748-1.654)	0.600
Complete	25	48.1	27	51.9	52	100		

Based on the data above, the results show that respondents who have incomplete facilities and infrastructure are 43 respondents, of which 23 respondents (53.5%) have bad behavior. Meanwhile, respondents with complete facilities and infrastructure are 52 respondents, of which 25 respondents (48.1%) have bad behavior. A p-value of 0.600 (p>0.05) is obtained, which means there is no significant relationship between the availability of facilities and infrastructure and the behavior of implementing 3M Plus. PR 1.113 (CI 95% = 0.748-1.654), which means that respondents who have incomplete facilities and infrastructure tend to have a 1.113 times greater risk of bad behavior, but statistically this relationship is not significant.

The Relationship between the Role of Health Workers and the Behavior of Implementing 3M Plus

Table 6. Relationship between the role of health workers and the behavior of implementing 3M Plus

Attitude	3M Plus Implementation Behavior				Total		PR (95%CI)	*P-value*
	No Good		Good					
	n	%	n	%	n	%		
Not good	24	51.1	23	48.9	47	100	1.021 (0.686-1.520)	0.917
Good	24	50.0	24	50.0	48	100		

Based on the data above, it shows that 47 respondents considered the role of health workers to be bad, of which 24 respondents (51.1%) had bad behavior in implementing 3M Plus. Meanwhile, 48 respondents considered the role of health workers to be good, of which 24 respondents (50.0%) had bad behavior. A p-value of 0.917 (p>0.05) was obtained, indicating that there was no significant relationship between the role of health workers and the behavior in implementing 3M Plus. The PR value was 1.021 (95% CI = 0.686-1.520), which means that respondents who considered the role of health workers to be bad only had a 1.021 times greater risk of bad behavior compared to respondents who considered health workers to be good. However, this relationship was not statistically significant so that the role of health workers did not directly influence the behavior in implementing 3M Plus in the community in the Kenali Besar Community Health Center work area.

Discussion

The Relationship Between Knowledge and 3M Plus Implementation Behavior

The results of this study obtained a p-value of 0.018 <0.05, this indicates a significant relationship between knowledge and the behavior of implementing 3M Plus in efforts to prevent Dengue Hemorrhagic Fever (DHF). Based on the results of the statistical test, the PR value was obtained = 1.626 (1.073-2.464), which means that respondents with poor knowledge will have a 1.626 times greater risk of implementing 3M Plus improperly compared to respondents with good knowledge. This result is in line with research conducted by Ratna, et al. In 2022, the P-value was obtained at 0.000, indicating a significant relationship between knowledge and PSN 3M Plus (Kurniawati, Sutriyawan, and Rahmawati 2022). These results are also in line with research conducted by Shintia et al. in 2023 with a p-value of 0.001, which states that there is a significant relationship between knowledge and dengue fever prevention measures (Wirna and Nursia 2023). Someone who has poor knowledge will be associated with a low willingness to implement 3M Plus behavior.

Knowledge is the result of knowing everything that comes from experience and information from people around you and other mass media regarding dengue fever and prevention (Widyaning, B.M, and Widjanarko 2018). According to Notoatmodjo (2016), knowledge is an important domain in shaping a person's actions, where a person with low knowledge will find it more difficult to implement preventative behavior in practice (Syahrul et al. 2024). In addition, some respondents still have good knowledge, as seen from the answers of respondents who know the importance of burying used items to prevent them from becoming mosquito nests (84.2%) and the function of abate (larvicide) as a mosquito larvae killer (82.1%). Based on the interviews conducted, it is likely that high knowledge on these indicators is influenced by respondents' relatively high education, namely high school level, and direct experience in the community in dealing with dengue fever cases in the environment. In addition to receiving information from health workers, they also get information obtained from the mass media or social media. Good knowledge is expected to continue to be improved so that clean and healthy living habits are formed in everyday life. Continuously improving 3M Plus behavior will help the community maintain environmental cleanliness and reduce the risk of transmission of Dengue Hemorrhagic Fever (DHF).

The Relationship Between Attitude and Behavior in Implementing 3M Plus

The results of this study obtained a p-value of 0.005 <0.05, this indicates that there is a significant relationship between attitudes and behavior in implementing 3M Plus in efforts to prevent Dengue Hemorrhagic Fever (DHF). The results of interviews with respondents showed that most respondents had a negative attitude and did not implement 3M Plus properly. Based on the results of the analysis, the PR value was obtained = 1.768 (1.186-2.635), which means that respondents with negative attitudes will be 1.768 times more at risk of having poor 3M Plus implementation behavior compared to respondents who have positive attitudes. This result is in line with research conducted by Lilis, et al. in 2025 which stated that there was a significant relationship between attitudes and efforts to prevent DHF (p-value = 0.004) (Lilis Meyrinda, Elwan Candra, and Zanzibar 2025). The results of research conducted by Devara et al. in 2022 also stated that there was a significant relationship between attitudes and 3M Plus actions (p-value = 0.017) (Alya Danisa, Ridwan, and Anwar 2022).

The results of this study also show a tendency for respondents to have positive attitudes towards the implementation of 3M Plus in the Kenali Besar Community Health Center work area. This is evident from the respondents' answers, which predominantly agreed with several indicators, such as the importance of participating in dengue fever prevention activities (54.7%) and the 3M Plus National Health Monitoring (PSN) activities carried out once a week (47.4%). This indicates that respondents are quite good at understanding the importance of participating in dengue fever prevention activities and the 3M Plus National Health Monitoring (PSN) activities carried out once a week.

Attitude is a person's closed reaction or response to a stimulus or object. The manifestation of attitudes cannot always be seen directly, but can only be interpreted through closed behavior. A closed attitude is not an action or activity, but a predisposition to certain actions. Attitude is a readiness to experience and react to something in a certain environment. If someone has a negative attitude towards PSN 3M Plus, then that person will tend to stay away from or not apply 3M Plus, while someone who has a positive attitude towards PSN 3M Plus has the intention within themselves, and will be more likely to carry out 3M Plus actions (Tuba et al. 2023). According to L. Grenn's theory, attitude is a predisposing factor that can influence a person's behavior. Someone with a positive attitude toward implementing 3M Plus will be more motivated and more likely to behave in accordance with their knowledge. Conversely, a negative attitude will hinder someone from routinely implementing dengue fever prevention behaviors (Sutriyawan et al. 2022). It is hoped that the community's attitude will encourage the formation of real behavior in maintaining environmental cleanliness on a regular basis, so as to reduce the risk of dengue fever transmission in the Kenali Besar Community Health Center work area.

The Relationship between Facilities and Infrastructure and the Behavior of Implementing 3M Plus

The results of the study using statistical tests obtained a p-value of 0.600 > 0.05, this indicates that there is no significant relationship between the availability of facilities and infrastructure with the behavior of implementing 3M Plus in efforts to prevent Dengue Hemorrhagic Fever (DHF) in the working area of the Kenali Besar Community Health Center, Jambi City in 2025. PR = 1.113 (CI 95% = 0.748-1.654) was obtained, which means that respondents who have incomplete facilities and infrastructure tend to have a 1.113 times greater risk of bad behavior, but statistically this relationship is not significant. The results of this study are in line with the research of Rachmawati, et al. in 2021, which showed that physical facilities factors are not always related to DHF prevention measures because behavior is more influenced by factors of attitude, habits, and the role of health workers (Rachmawati, Hidayat, and Sari 2021).

Based on observational data, the availability of facilities and infrastructure does not reflect their effective use. For example, although most respondents have water reservoirs that are easy to drain, many still do not drain them regularly or do not pay attention to other potential mosquito breeding sites. While most respondents have adequate facilities, 3M Plus behavior remains low due to a lack of awareness and community involvement in maintaining environmental cleanliness. Furthermore, even in communities with sufficient knowledge and facilities, actual practice is often inconsistent due to a lack of motivation and supervision. Based on the results above, although not statistically significant, the condition of facilities and infrastructure still has implications for the risk of dengue transmission. Although most respondents have covered and easily drained water reservoirs, many still do not have covered trash bins or abate at home. This condition indicates that the indicator of the availability of facilities and infrastructure does not necessarily reflect their use in daily practice.

Therefore, availability alone is not enough to guarantee changes in preventative behavior. Therefore, it is hoped that there will be increased education and community behavioral development through a behavior change communication approach, active mentoring by health workers and mosquito larvae control cadres to ensure optimal utilization of infrastructure, improvements to public facilities, such as waste collection systems that can potentially become mosquito breeding grounds,

and regular evaluations of facility and infrastructure use, not just availability, to assess the effectiveness of dengue prevention.

The Relationship between the Role of Health Workers and the Behavior of Implementing 3M Plus

The results of this study obtained a p-value of 0.917> 0.05, this indicates that there is no significant relationship between the role of community health workers and the behavior of implementing 3M Plus in efforts to prevent Dengue Hemorrhagic Fever (DHF). A PR value of 1.021 was obtained, (CI 95% = 0.686-1.520), which means that respondents who assessed the role of officers as not good only had a 1.021 times greater risk of behaving badly compared to respondents who assessed health workers as good. However, this relationship was not statistically significant so that the role of health workers did not directly influence the behavior of implementing 3M Plus in the community in the Kenali Besar Community Health Center work area. This result is in line with research conducted by Lifsi Nurainiyah in 2025, which said there was no significant relationship between the support of health workers and the behavior of implementing 3M Plus (p-value = 0.849) (Nurainiyah, Masyarakat, and Semarang 2025). These results are also supported by research conducted by Ahmad et al. in 2022, which stated that there was no significant relationship between the role of health workers and PSN behavior (p-value = 0.199) (Adriansyah et al. 2022).

In the context of health groups, the role of officers is an important component because they have knowledge of local environmental conditions and act as a strengthening or weakening factor in changing community behavior. Officerhealth also has an effect Controlling the Aedes aegypti mosquito, by acting as a facilitator in outreach, providing information regarding the eradication of mosquito nests, and as a supervisor and driver of dengue fever control activities in the community (Zulham Aliwardana Ritonga, Tri Niswati Utami, and Asriwati Asriwati 2024). According to the interview results, the community who said they had never been invited to participate in PSN activities was likely because the respondents were often not at home during counseling activities conducted by health workers. Meanwhile, health workers who were less active in assisting the community in implementing 3M Plus may have been because their field activities were more focused on when DHF cases occurred in the area. Therefore, this finding indicates that although counseling was carried out, the level of community involvement in practical activities (mentoring, mutual cooperation, field activities) was still limited, so that the role of officers in the form of counseling alone did not fully impact the sustainable practice of 3M Plus. Although health workers had provided explanations about DHF and its prevention efforts and the community had understood the information provided, this had not fully encouraged the formation of good behavior in implementing 3M Plus.

CONCLUSIONS

Based on the research that has been conducted regarding the Factors Influencing the Behavior of Implementing 3M Plus in Efforts to Prevent Dengue Hemorrhagic Fever (DHF) in the Kenali Besar Community Health Center Work Area of Jambi City in 2025, the results showed that there was a relationship between knowledge and attitudes with the behavior of implementing 3M Plus, but there was no relationship between facilities and infrastructure with the behavior of implementing 3M Plus

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