

## **Determinants of Dengue Hemorrhagic Fever Incidence Based on Social Behavior of the Community in Kotamobagu City**

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### **Abstract**

Dengue Hemorrhagic Fever (DHF) is a disease caused by the dengue virus, which is transmitted through the bite of the *Aedes aegypti* mosquito. This disease is a serious public health problem, particularly in tropical and subtropical countries. Social behavior has a significant impact on the incidence of DHF. Communities that are active in maintaining environmental cleanliness and taking preventive measures have lower potential to contract DHF. The purpose of this study was to analyze the relationship between 3M practices at home and the habit of hanging clothes and the incidence of dengue fever. This was an analytical observational study with a case-control study design. The study population comprised all people living in the Kotamobagu City area. The sample in this study consisted of case and control samples. The sample size of this study was 49. For control samples (which do not have DHF), the case: control ratio was 1:2, so the sample size for each case group was 49 people and the control group was 98 people. Therefore, the total sample size was 147 toddlers. The sampling technique used was Simple random sampling. Data analysis was performed using the chi-squared test. The results of the analysis showed a relationship between 3M practices at home ( $p=0.004$ ;  $OR=3.068$ ) and the habit of hanging clothes ( $p=0.008$ ;  $OR=2.826$ ) and the incidence of dengue fever in Kotamobagu City. Effective prevention efforts require changes in social behavior through education, community involvement, the use of technology, effective communication campaigns, and government support. By understanding the social behavior of the community and the factors that influence it, a more effective and sustainable dengue fever prevention program can be designed.

**Keywords:** Dengue Hemorrhagic Fever (DHF), Social behavior of society

### **INTRODUCTION**

Dengue Hemorrhagic Fever (DHF) is a global health concern in developing countries. The Centers for Disease Control and Prevention (CDC) reported that approximately 2.5 billion people, or 40% of the world's population, live in areas at risk of dengue fever transmission. The World Health Organization (WHO) estimates that 50 to 100 million infections occur annually, including 500,000 cases of dengue fever and 22,000 deaths (WHO, 2012). Dengue fever is endemic in more than 100 countries in Africa, America, the Eastern Mediterranean, Southeast Asia, the Western Pacific, France, Croatia, and several other countries in Europe (WHO, 2014).

The World Health Organization (WHO) estimates that more than 50 million cases of dengue fever occur each year and nearly half of the world's population lives in dengue-endemic areas. Potential risk factors (geography, environment, and socioeconomic status) are important because they can affect the incidence of dengue fever. The government must take appropriate action to control dengue fever (Cao et al., 2017). Data from around the world show that Asia ranks first in the number of dengue fever sufferers annually. In Southeast Asia, it reaches 1.3 billion or 52% of the 2.5 billion people worldwide are at risk of dengue fever. It is estimated that there are 100 million cases of Dengue Hemorrhagic Fever (DHF) and 500,000 cases of DHF requiring hospitalization, with 90% of patients being children under 15 years of age, and the number of deaths from DHF reaching 5% with an estimated 25,000 deaths each year. From 1968 to 2011, the WHO recorded Indonesia as the country with the highest number of DHF cases in Southeast Asia (WHO, 2012).

Dengue fever remains a public health problem in Indonesia. Based on the report of the Research and Development Center of the Ministry of Health of the Republic of Indonesia, the number of dengue fever cases recorded in Indonesia in 2015 was 129, 650, an increase from 99,499 cases in 2014 (Ministry of Health of the Republic of Indonesia, 2015). The trend of

DHF disease in Indonesia is classified as fluctuating but has a tendency to increase; in 2015, the IR number of DHF disease in Indonesia exceeded the national target ( $\leq 49$ ). This shows that there is a need to evaluate the DHF control program that has been running so far to prevent an increase in DHF cases in the following years (Ministry of Health of the Republic of Indonesia, 2017).

Based on data from the Indonesian Ministry of Health in 2016, the highest number of DHF cases occurred in West Java Province (36, 631), followed by East Java Province (24, 005), DKI Jakarta Province (20, 423), Bali Province (20, 329), and East Kalimantan Province (10, 712). The incidence rate of DHF in West Java Province was 77.31 per 100,000 people, the number of deaths was 270, and the case fatality rate was 0.74% in 2016 (Ministry of Health of the Republic of Indonesia, 2017).

In 2022, Kotamobagu experienced an increase in Dengue Hemorrhagic Fever (DHF) cases due to increased rainfall intensity. DHF is a disease transmitted by the female *Aedes aegypti* mosquito that attacks the human circulatory system. A total of 124 cases of Dengue Fever were reported in the Kotamobagu City area of North Sulawesi in 2023.

Community integration for controlling dengue fever requires knowledge, attitudes, and practices. This study is in accordance with what was found in the Caribbean region of Colombia, where the occurrence of dengue fever is caused by a lack of knowledge, low education, and attitudes towards controlling dengue fever (Diaz-Quijano et al., 2018). Public knowledge and attitudes can affect the incidence of Dengue Hemorrhagic Fever (DHF). The higher the public knowledge, the lower is the incidence of DHF. A lack of public knowledge and attitudes can be a factor in the failure of DHF eradication. This study aimed to determine the relationship between knowledge and attitudes and the incidence of dengue fever in Kotamobagu City.

## METHODS

This study was an analytical observational study using a case-control study design with a retrospective approach. The study was conducted in the Kotamobagu City area. The study population comprised all people living in the Kotamobagu City area. The sample in this study consisted of case and control samples. The sample size of this study was 49. For control samples (non-DHF), determined by the ratio of cases:controls = 1:2, the sample size for each case group was 49 people and the control group was 98 people. Therefore, the total sample size was 147 toddlers. The sampling technique used was Simple random sampling. Data analysis was performed using the chi-squared test.

## FINDINGS AND DISCUSSIONS

### Findings

**Table 1. Determinants of Dengue Fever Incidence Based on Community Social Behavior (Case Study in Kotamobagu City Area)**

Behavior	Dengue Hemorrhagic Fever				Total		OR (95% CI)	<i>p-value</i>
	Case		Control		N	%		
	n	%	n	%				
<b>Practice 3M at Home</b>								
Poor	35	71.4	44	44.9	79	53.7	3,068 1,469-6,409	0.004
Good	14	28.6	54	55.1	68	46.3		
Total	49	100	98	100	147	100		
<b>Hanging Clothes Habit</b>								
Yes	35	71.4	46	46.9	81	55.1	2,826	0.008

No	14	28.6	52	53.1	66	44.9	1,354-5,899
Total	49	100	98	100	147	100	

Source: Primary Data, 2023

Based on the results of the statistical test of the 3M practice factor at home, the value obtained was (OR = 3.068; 95% CI, 1.469-6.409 p = 0.004) this means that with poor 3M practice at home, there is a 3.068 times greater risk of contracting dengue fever compared to respondents who practice 3M well at home. In addition, the OR value = 3.068 (OR > 1), indicating that the practice of 3M at home is a risk factor and is related to the incidence of dengue fever in Kotamobagu City. The habit of hanging clothes factor obtained a value (OR = 2.826; 95% CI, 1.354-5.899 p = 0.008), indicating that with the habit of hanging clothes, there is a 2.826 times greater risk of contracting dengue fever compared to respondents who do not have the habit of hanging clothes. In addition, the OR value = 2.826 (OR > 1), indicating that the habit of hanging clothes is a risk factor and is related to the incidence of dengue fever in Kotamobagu City.

### Discussions

The results of the statistical test in this study showed a significant relationship between the practice of 3M at home and the incidence of Dengue Hemorrhagic Fever (DHF). The practice of 3M at home is a risk factor for Dengue Hemorrhagic Fever (DHF) in Kotamobagu City. Respondents who contracted Dengue Hemorrhagic Fever (DHF) were at risk 3.068 times for respondents who did not practice 3M at home (poor) compared to those who often practiced 3M at home (good). This study is in line with Kartini's 2016 study, which stated that 3M was related to the incidence of Dengue Hemorrhagic Fever (DHF) in Madiun City (Kartini Puri Ratna, 2016). This is also in line with the research of Rahmawati et al. in 2018 in the Kayen Health Center Working Area, Pati Regency (Rahmawati Ulfah & Joko Tri, 2018).

Mosquito nest eradication 3M Plus behavior is a healthy lifestyle behavior that aims to control mosquito breeding places and efforts to avoid contact with Aedes, a vector of dengue fever. If this behavior is carried out properly, it can break the chain of dengue fever transmission such that the expected result is that the number of dengue fever cases can decrease. The practice of draining landfills, closing landfills, and burying used goods, commonly known as 3M Plus, is an effort initiated by the government to eradicate mosquito breeding nests for dengue fever. As has been shown in several studies, 3M Plus is a protective factor against dengue fever. If 3M is implemented by the entire community, the population of Aedes aegypti mosquitoes can be suppressed as much as possible, so that dengue fever transmission does not occur again. The willingness and level of discipline to drain landfills in the community needs to be improved, considering that water cleanliness is not only for human health but also for creating clean environmental conditions. With environmental cleanliness, it is hoped that it can suppress the occurrence of various diseases that arise in an unclean environment.

The habit of hanging clothes inside the house is an indication of the resting pleasure of Aedes aegypti mosquitoes. Mosquito nest eradication and 3M activities added by avoiding the habit of hanging clothes in the room are activities that must be carried out to control the population of Aedes aegypti mosquitoes, so that the transmission of DHF can be prevented and reduced (Deswara Primadatu, 2012). Aedes aegypti mosquitoes usually perch or rest in houses, especially in dark places or on hanging clothes (Ministry of Health of the Republic of Indonesia, 2004).

The results of the statistical test in this study showed a significant relationship between the habit of hanging clothes and incidence of Dengue Hemorrhagic Fever (DHF). The habit of hanging clothes is a risk factor for the incidence of Dengue Hemorrhagic Fever (DHF) in Kotamobagu. Respondents who contracted Dengue Hemorrhagic Fever (DHF) were at risk 2.826 times for respondents who had the habit of hanging clothes than those who did not have

the habit of hanging clothes in the house. This study is in line with the study by Ayun et al. in 2017, which showed that samples who had the habit of hanging clothes in their rooms had a 7.933 times greater risk of suffering from DHF than those who did not have the habit of hanging clothes in their rooms (Luluk Lidya Ayun and Eram Tunggul, 2016). This study is also in line with the research of Mahardika (2009), who stated that there is a relationship between the habit of hanging clothes and the incidence of DHF in the Cepiring Health Center Work Area, Cepiring District, and Kendal Regency.

Many people still have the habit of hanging clothes in their homes after use, usually behind the bedroom door, on the wardrobe door, or even on the walls of rooms in the house, such as on the bedroom wall, family room, and sometimes behind the bathroom door, and some leave clothes scattered on the bed. Clothes that are often hung are places where mosquitoes prefer to perch and rest. To prevent this, it is better to put clothes that have been worn in closed dirty clothes and clothes that have not been worn are folded and tidied up in the wardrobe. *Aedes aegypti* mosquitoes prefer to perch on clothes hanging in the room to rest after sucking human blood.

## CONCLUSIONS

The determinant factors of dengue fever incidence are based on the social behavior of people who practice 3M at home and the habit of hanging clothes.

## SUGGESTIONS

It is hoped that there will be cooperation between the health agencies and the community in implementing this. Routine early detection of dengue fever, implementing preventive, promotive, and curative efforts to eliminate dengue fever. In addition, effective prevention efforts require changes in social behavior through education, community involvement, use of technology, effective communication campaigns, and government support.

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