



## Socio Demography and Physical Environment Factors Against the Incidence of Dengue Hemorrhagic Fever in Delta Pawan District, Ketapang Regency

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### Abstract

Dengue Hemorrhagic Fever is an environmentally-based dangerous disease which is still a world health problem. WHO noted that Indonesia is a country with the highest cases of Dengue Hemorrhagic Fever (DHF) in Southeast Asia (WHO, 2016). In 2019 the cases increased with the number of cases 137.761. West Kalimantan Province is one of the 5<sup>th</sup> highest provinces out of 34 provinces in Indonesia for 2018. Ketapang Regency is in the first place with the highest number of cases in Delta Pawan District. The purpose of this study was to determine the effect of socio demography and physical environment on the incidence of Dengue Hemorrhagic Fever. This study used a case control design. The research sample was 132 respondents (66 cases and 66 controls) respondents obtained by purposive sampling technique. Data collection techniques by interviewing, questionnaires, and observations. Data analysis using chi-square. The results showed that there was a relationship between income ( $p = 0.024$ ), ventilation ( $p = 0.005$ ) and water reservoirs ( $p = 0.023$ ). There was no relationship between population mobility ( $p = 0.601$ ) and house distance ( $p = 0.577$ ) with the incidence of dengue hemorrhagic fever. The conclusion of this study is that the variables associated with the incidence of Dengue Hemorrhagic Fever in the Delta Pawan district of Ketapang regency are income, ventilation and water reservoirs variables. It needs to increase health promotion about the dangers of DHF and the importance of PSN (advocacy, atmosphere building, social support and household empowerment) and improve the performance of jumantik through continuous supervision and facilitation, it is necessary to increase awareness by always closing water reservoirs and using gauze. Through these efforts, it is hoped that there will be an increase in larva free (ABJ) and a decrease in the incidence of Dengue Hemorrhagic Fever (DHF).

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## INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an environmentally-based dangerous disease which is still a global health problem and potentially causes death. This disease is caused by the dengue virus which is transmitted by the *Aedes aegypti* and *Aedes albopictus* mosquitoes. According to data from the World Health Organization (WHO), in 2015 there were 128 countries at risk of being infected with the dengue virus with 96 million cases (World Health Organization, 2016).

The World Health Organization (WHO) noted that Indonesia is the country with the highest DHF cases in Southeast Asia (Kemenkes RI, 2017). Based on data from the 2014-2019 Indonesian Health Profile, cases of Dengue Hemorrhagic Fever in Indonesia tend to fluctuate. West Kalimantan is the province with the number 6 highest DHF cases, amounting to 3.097 cases with an Incidence Rate of 61,92 and CFR of 0,81% (Indonesia Health Profile, 2018).

West Kalimantan Province has 14 cities and regencies, one of which is Ketapang regency which is also the place with the highest number of cases of Dengue Hemorrhagic Fever. It has always been ranked first from 2014 - 2019 and has been designated as KLB (West Kalimantan Health Profile).

Dengue Hemorrhagic Fever is an endemic disease in Ketapang Regency and one must be aware of the occurrence of the spike / outbreak cycle that is getting shorter. Data in 2019, there were 719 cases with 5 deaths (Dinkes Ketapang, 2019).

Ketapang Regency has the highest number of Dengue Hemorrhagic Fever (DHF) cases, it has spread to 18 districts out of 20 districts which are endemic areas. The district with the highest number of cases of dengue hemorrhagic fever was the Delta Pawan district with 375 cases with 5 deaths (Ketapang Health Office, 2019).

Delta Pawan district has three working areas for the Health Center, namely Kedondong Health Center, Mulia Baru Health Center and Sukabangun Health Center. Dengue

hemorrhagic fever data in the working area of the Kedondong Health Center were 226 cases, Mulia Baru Health Center 77 cases, Sukabangun Health Center 72 cases (Dinkes Ketapang, 2019).

The presence of a disease in an area depends on humans who are sensitive to health and environmental conditions that are suitable for the life of disease-causing microorganisms and also the knowledge they have. Socio demographic and environmental factors such as gender, occupation, income, drainage of landfills, gauze installation are factors that can increase the spread of disease and have a significant relationship to the incidence of DHF (Novrita et.al., 2017).

The result of research conducted by (Sunarsih, 2017) is that the population mobilization factor has a significant relationship with the incidence of dengue hemorrhagic fever with a p value below 0,05.

Environmental factors have a considerable influence. Potential places for *Aedes aegypti* mosquito breeding are water reservoirs, such as drums, bathtubs, toilet tubs and buckets. Research by Yunita et al., (2012) states that there is an environmental relationship with the incidence of Dengue Hemorrhagic Fever (DHF).

Based on the results of preliminary studies conducted through observations in Delta Pawan district, it is seen that there are still many open water reservoirs such as jars, drums and others, as well as places that are not water reservoirs such as drinking places for animals, used goods, flowers vases that are still found, coconut shells. Besides that, there were also many residents' houses whose ventilation does not meet the requirements. Based on the results of the larva survey conducted by the health center staff to one of the village locations, from house to house, larvae were still found inside and outside the house. However, these larvae are mostly found outside the home, especially in containers such as used tires, mineral water glass containers and piles of plastic waste.

Other factors that can affect the incidence of Dengue Hemorrhagic Fever (DHF) are seen from socio demographic factors such as age,

gender, education, occupation and population mobility. Research conducted by Handoyo (2015) states that "Socio demographic factors such as population mobility have a relationship with the incidence of DHF with a P value of 0,0001".

Based on the description above, the researchers are interested in conducting further research on the influence of socio demographic factors and physical environment on the incidence of Dengue Hemorrhagic Fever (DHF) in Delta Pawan District Ketapang Regency.

## METHOD

This type of research is observational research with a case control study approach which is an analytical study concerning how risk factors are studied using a retrospective approach. This study examines the relationship between certain diseases (effects) and certain risk factors (Sugiyono, 2016). This research was conducted from July to August. The research location was in the Delta Pawan district which reported the highest incidence of Dengue Hemorrhagic Fever (DHF).

The population in this study were all residents who live in the Delta Pawan district, namely 109653 people. The research sample for the case group was dengue fever sufferers who met the inclusion criteria, namely residing in the Delta Pawan district, Ketapang Regency, one or more family members suffering from dengue fever, suffering from dengue fever between January and December 2019, Willing to be a respondent. Exclusion criteria Suffering from other diseases that can affect the results of the study, for example, typhoid fever, chikung, fever due to flu and others.

The control sample is a house where the family members have never / never had Dengue Hemorrhagic Fever (DHF) with the same number as the case group namely 1:1, 66 cases and 66 controls. The sampling technique was purposive sampling.

Inclusion criteria for the control group Residing in the Delta Pawan district, Ketapang Regency, no family member suffering from

Dengue Hemorrhagic Fever (DHF), Willing to be a respondent.

The dependent variable in this study is the incidence of dengue hemorrhagic fever (DHF), while the independent variables are income, population mobility, ventilation, distance from the house to the TPA (water reservoir). Data were analyzed univariately using a frequency distribution and bivariate using the chi-square test.

## RESULTS AND DISCUSSION

Based on the results of the frequency distribution in table 1, it can be seen that respondents who have less income are 65 (49.2%) and those who are able to earn are 67 (50.8%). Respondents who do mobility are 65 (49.2%) and those who are not as big as 67 (50.8%). Most of the respondents did not have gauze installed on the vent, 76 (57.6%) compared with 56 (42.4%). Respondents with a distance between houses  $\leq 5$  m higher by 89 (67.4%) than those with a distance between houses  $> 5$ m by 43 (32.6). Most of the respondents had an open TPA (water reservoir) of 71 (53.8%) compared to respondents who had a closed landfill 61 (46.2%).

**Table 1.** Frequency Distribution of Socio Demographic and Physical Environment Factors Associated with the Incidence of Dengue Hemorrhagic Fever in Delta Pawan District, Ketapang Regency.

Variable	F	%
Income		
Less	65	49.2
Capable	67	50.8
Mobility		
Yes	65	49.2
No	67	50.8
Ventilation		
Yes, put up gauze	56	42.4
Don't put up gauze	76	57.6
Home Distance		
Not Good ( $\leq 5$ m)	89	67.4
Good ( $> 5$ m)	43	32.6
Water Reservoirs		
Closed	61	46.2
Opened	71	53.8

Based on table 2, income has a significant relationship with the incidence of DHF in the Delta Pawan district of Ketapang regency ( $p = 0.024$ . OR = 2.222). The results of this study indicate that respondents with low incomes are 2.222 times more likely to experience DDD compared to respondents with high income. The results of this study are in line with research conducted by (Hikmah. M, 2015) which states that there is a relationship between income and the incidence of death due to dengue hemorrhagic fever (DHF) at Tugurejo Hospital Semarang with a value of  $p = 0.022$  ( $p < 0.05$ ).

**Table 2.** Bivariate Relationship of Socio demographic Factors and Physical Environment to the incidence of DHF in the Delta Pawan district, Ketapang regency.

Variable	Case	Control	Total	p-value	OR
	F	F	F		
Income					
Less	39	26	65	0.024	2.222
Capable	27	40	67		
Mobility					
Yes	31	34	65	0.601	0.834
No	35	32	67		
Ventilation					
Yes, put up gauze	20	36	56	0.005	0.362
Don't put up gauze.	46	30	76		
Home Distance					
Not Good ( $\leq 5m$ )	46	43	89	0.577	1.230
Good ( $> 5 m$ )	20	23	43		
Water Reservoirs					
Closed	24	37	61	0.023	0.448
Opened	42	29	71		

Based on the results of the study, the family income of the case group and control group respondents was different. The income of the case group is low on average  $< UMK$ , while the income of the control group is high on average  $> UMK$ . Respondents who have low income mostly live in rural areas with low economic status. They earn money by relying on their work as laborers, some are construction workers, robbers and drivers, some are

fishermen and farmers so that the income they receive is relatively small and uncertain.

The income standard used in this study is in accordance with the Ketapang Minimum Wage (UMK) of Rp. 2.860.323 per month. The results of the Chi Square statistical test showed that there was a relationship between income and the incidence of dengue hemorrhagic fever in the Delta Pawan district, Ketapang regency, the value of  $p = 0.024$  ( $p < 0.05$ ).

The results of this study are in line with research conducted by (Hikmah, 2015) which states that there is a relationship between income and the incidence of dengue mortality at Tugurejo Hospital Semarang with a value of  $p = 0.022$  ( $p < 0.05$ ).

Based on table 2, population mobility did not have a significant relationship with the incidence of DHF in the Delta Pawan district, Ketapang regency (0.601,  $p > 0.05$ ).

This is in line with research conducted by (Putri 2018) which states that the population mobilization variable is not a risk factor for the incidence of dengue hemorrhagic fever in Lubang Basung with  $p$  value = 0.263 ( $p > 0.005$ ).

In contrast to research conducted by (Handoyo et.al., 2015) which states that there is a significant relationship between population mobility and the incidence of dengue fever in coastal communities in the buffer area of the Class II Port Health Office of Tarakan, the value of POR = 17.051 (95% CI = 3.318 -10.192).

Based on table 2, ventilation has a significant relationship to the incidence of DHF in the Delta Pawan district of Ketapang regency ( $p = 0.005$ . OR = 0.362). The Odds Ratio (OR) value of 0.362 means that respondents with ventilation without gauze are 0.362 times more likely to experience DHF compared to respondents whose ventilation has gauze.

This is in line with research conducted by (Wijirahayu & Sukesi, 2019) which states that there is a statistically significant relationship between gauze ventilation variables and the incidence of dengue fever in the working area of Kalasan Health Center, Sleman Regency. with  $p$  value 0.039 ( $p < 0.05$ ). This is also in line with research conducted by (Ayun & Pawenang,

2017) which states that the presence of gauze has a significant relationship to the incidence of DHF in the Sekaran Health Center Work Area, Gunungpati District, Semarang City ( $p = 0.024$ ,  $OR = 4.545$ ).

Another study that is in line with (Suryanto, 2018) which states that the use of gauze on ventilation has a relationship with the incidence of dengue fever shows that  $p = 0.035$  ( $p < 0.05$ ).  $H_0$  is rejected and  $H_a$  is accepted, meaning that the use of gauze on the vent has a relationship to the incidence of DHF in Dringu District, Probolinggo Regency. The bad effect of reduced ventilation related to the incidence of dengue fever is a decrease in  $CO_2$  gas levels, a stuffy smell, an increase in room air temperature and an increase in room humidity (Ayumi et.al., 2016).

A house with no gauze attached makes it easier for mosquitoes to bite and has a great chance of biting family members who are in the house, while a house with a vent with wire mesh can prevent mosquitoes from entering the house, thereby minimizing the possibility of mosquitoes biting family members inside the house. Inadequate use of gauze because the community considers it not very important and there is no trend of installing wire netting. In fact, according to the Ministry of Health itself, installing gauze wire is one of the efforts to prevent the transmission of DHF disease.

Based on table 2, house distance has no significant relationship with the incidence of DHF in the Delta Pawan district, Ketapang regency ( $0.577$ ,  $p > 0.05$ ).

This is in line with research conducted by (Apriliana et.al., 2017) in Gagakan, Sambong District, Blora Regency, which states that there is no significant relationship between the house distance variable and the incidence of DHF ( $p$  value =  $0.588 > \alpha = 0.05$ ).

The distance between houses can affect the spread of *Aedes aegypti* mosquitoes from one house to another. The closer the houses are, the easier it is for mosquitoes to spread to neighboring houses. The possibility of not finding a relationship between distance and the incidence of DHF in this study is due to the

similarity of house distance patterns in the case and control groups where the proportion of good and bad house distances between the two groups is not significantly different.

Based on table 2, water reservoir has a significant relationship with the incidence of DHF in the Delta Pawan district of Ketapang regency ( $p = 0.023$ ,  $OR = 0.448$ ). The Odds Ratio (OR) value of 0.448 means that respondents with open water reservoirs have a 0.448 times greater possibility of experiencing DHF compared to respondents whose water reservoirs are closed.

The importance of closing water reservoirs can reduce the number of mosquitoes that land on containers, where these containers become the breeding medium for *Aedes aegypti* mosquitoes. If all people have realized the importance of closing containers, it is hoped that the presence of mosquitoes can be eradicated, but this condition seems to have not been implemented optimally. There is a relationship between TPA and the incidence of dengue fever because some respondents have the habit of not closing water reservoirs on the grounds that closing the jars tightly will make it difficult or slow to collect water

Closing the water reservoir tightly will minimize the breeding of *Aedes aegypti*. Water reservoirs that are not tightly closed and rarely cleaned can function as breeding places for *Aedes aegypti* mosquitoes. As research conducted by Suyasa (2007) in (Song et. al., 2017) states that the eggs, larvae and pupa of *Aedes sp.* mosquitoes grow and develop in water. The puddle that is preferred as a place for mosquito breeding is a pool of water that is accommodated in a container which is commonly called a water reservoir.

This is in line with research conducted by (Soewarno, 2015) which states that there is a relationship between the availability of cover on containers and the incidence of dengue fever in Gajah Mungkur District ( $p = 0.001$  ( $p < 0.05$ )). Other supporting studies such as the one conducted by (Rahman, 2012) which states that there is a relationship between the practice of closing water reservoirs and the incident in the

DBH working area of the Blora Community Health Center, Blora Regency.

However, the results of this study contradict research conducted by (Winarsih, 2013) which states that there is no relationship between closing water reservoirs and the incidence of dengue hemorrhagic fever in Gajahmungkur Village, Semarang City.

Based on the results of observations made in this study, it was found that for the case group with closed landfills as many as 24 and for the other 42 had open landfills, while for the control group with closed landfills as many as 37 and for the other 29 had open landfills. The importance of closing water reservoirs can reduce the number of mosquitoes that land on containers, where these containers become the breeding medium for *Aedes aegypti* mosquitoes. If all the community has realized the importance of closing containers, it is hoped that the presence of mosquitoes can be eradicated, but this condition seems to have not been maximally implemented. There is a relationship between the water reservoir and the DHF incident because some respondents have the habit of not closing the water reservoir on the grounds that closing the jars tightly will make it difficult or slow to collect water.

## CONCLUSION

Based on the results of the research on the Relationship between Socio Demography and Physical Environment on the Incidence of Dengue Hemorrhagic Fever in Delta Pawan District, Ketapang Regency, it can be concluded that the variables related to the incidence of DHF are income, house ventilation and landfill ( $p < 0.05$ ), while the unrelated variables are variables. population mobility and house distance ( $p > 0.05$ ). Need to increase health promotion about the dangers of DHF and the importance of PSN (advocacy, atmosphere building, social support and household empowerment) and improve the performance of jumentik through continuous supervision and facilitation, it is necessary to increase awareness by always closing water reservoirs and using

gauze . Through these efforts, it is hoped that there will be an increase in ABJ and a decrease in the incidence of DHF.

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