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DETERMINANTS OF THE INCIDENCES OF DENGUE HEMORRHAGIC FEVER IN 2019 – 2021

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ABSTRACT
Dengue Hemorrhagic Fever (DHF) is an endemic disease transmitted by mosquitoes which has spread rapidly throughout the world, especially in Indonesia. Whereas in the working area of the Gunungpati Primary Health Care Centre the number of DHF cases increased by 128.57% in 2021.Objective: The objective of the study was to determine association related of the incidence of DHF in the working area of the Gunungpati Primary Health Care Centre in 2019-2021. Method: The research design used in this study was a correlational quantitative study. The sampling method using purposive sampling. Data collection in this study used secondary data sourced from the DHF Information System (Tunggal Dara) Semarang City Health Office for 2019-2021 was 30 people. Data were analyzed using the pearson correlation test. Results: The findings of this study were an overview of the incidences of DHF in the working area of the Gunungpati Primary Health Care Centre was 30, with the highest IR at the Jatirejo Village, 232.02 by 100,000 population. Based on the results of the bivariate analysis, it was found that only the variables sex (0.001) and ABJ (0.001) obtained P-value <0.05.Conclusions: The determinants associated with DHF cases in the working area of the Gunungpati Primary Health Care Centre were sex and ABJ with a correlation value of 1.000 and -1.000.

Keywords: determinants; dhf; epidemiology

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INTRODUCTION

Dengue Hemorrhagic Fever is an endemic disease transmitted by mosquitoes which has spread rapidly throughout the world, especially in Indonesia. Dengue fever is widespread throughout the tropics, with local variations in risk influenced by climatic parameters as well as social and environmental factors (WHO, 2022). Dengue hemorrhagic fever is a seasonal disease that often appears in several tropical and subtropical regions of the world (Trang et al., 2016). Dengue Hemorrhagic Fever (DHF) is an acute viral infectious disease caused by the dengue virus characterized by fever 2-7 days accompanied by bleeding manifestations, decreased platelets (thrombocytopenia), presence of hemoconcentration marked by plasma leakage (increased hematocrit, ascites, pleural effusion, hypoalbuminemia) (Kemenkes RI., 2017). The natural host of dengue fever is humans, the agent is the dengue virus which belongs to the Flaviridae family and the Flavivirus genus, consisting of 4 serotypes, namely DEN-1, DEN-2, DEN-3 and DEN-4 (Candra, 2010). Aedes aegypti and Aedes albopictus are the two most important vectors of DHF infection, which transmits the virus to humans through bites (Fadilla et al., 2020).

Globally the number of dengue cases reported to WHO has increased more than 8-fold over the last two decades, from 505,430 cases in 2000, to more than 2.4 million in 2010, and 5.2

million in 2019 (WHO, 2022). Nationally, Case Fatality Rate (CFR) of DHF in 2021 reached 0.96%, was increase from 0.69% in 2020 (Kemenkes RI., 2021). The Case Fatality Rate (CFR) of DHF in Central Java in 2021 was 2.7%, was increase compared to in 2020 was 1.9% (Dinkes Prov Jateng, 2021). Deaths from DHF in Semarang City have increased by 9 deaths (CFR 2.7%) in 2021 (Edy Rijanto dkk, 2022). IR DHF in the working area of the Gunungpati Primary Health Care Centre in 2021 was 27.68 per 100,000 population, was increase compared to 2019-2020 (Gunungpati, 2021).

Etiological factors associated with DHF are host factors (age, sex, mobility), environmental factors (house density, presence of mosquito breeding sites, mosquito resting places, mosquito density, free larvae, rainfall), and behavioral factors (patterns of sleep and mosquito nest eradication activities) (Delian, Yafi; Darmawan, Armaidi; Suzan, 2022). The number of cases and deaths due to DHF nationally in 2021 has decreased compared to 2020. However, this condition was different from the City of Semarang in 2021 where there will be was increase in cases and deaths due to DHF from the previous year. Whereas in the working area of the Gunungpati Primary Health Care Centre the number of DHF cases increased by 128.57% in 2021. There are still several other supporting factors that have not been studied by previous researchers such as work history, use of trousers, and history of staying/traveling for the last three weeks. Based on the description above, the causes of DHF are influenced by host factors, environmental factors, and behavioral factors. Therefore, the objective of the study was to determine association related of the incidence of DHF in the working area of the Gunungpati Primary Health Care Centre in 2019-2021.

METHOD

The research design used in this study was a quantitative correlation analysis (Correlational Quantitative Study). The Time of this research during 2019-2021 and place of the research in the working area of the Gunungpati Primary Health Care Centre Semarang City. The population in this study were all DHF cases in the working area of the Gunungpati Primary Health Care Centre recorded in the Semarang City Health Office. The research sample was 30 people with minimum estimated sample size was 30. The sampling method using purposive sampling. Inclusion and exclusion criteria in this study, inclusion were all DHF cases in the working area of the Gunungpati Primary Health Care Centre recorded in the Semarang City Health Office report for 2019-2021 and exclusion all DHF cases were not reside in the working area of the Gunungpati Primary Health Care Centre. The variables studied were the incidence of DHF in the working area of the Gunungpati Primary Health Care Centre, age, sex, work history, use of trousers, history of stay/travel for the last three weeks, ABJ, and number of medical history. Data collection in this study used secondary data sourced from the DHF Information System (Tunggal Dara) Semarang City Health Office. Data analysis in this study was bivariate analysis with correlation analysis using the pearson correlation test. The ethical clearance conducted with Semarang City Health Office number B/15449/070/VI/2023 and The UNDIP Postgraduate School Epidemiology Masters Study Program permission number 080/UN7.M1.1/AK/VI/2023.

RESULTS

This study was conducted to examine the determinants that were significantly related to the incidence of DHF. Respondents Overview of DHF Cases in 2019-2021 based on Characteristics

Table 1.
The distribution of dengue hemorrhagic fever (DHF) based on village in 2019-2021 (n= 30)

Village	Cases			Total
	2019	2020	2021	
Plalangan	0	0	0	0
Gunungpati	0	0	0	0
Nongkosawit	1	1	0	2
Mangunsari	1	1	1	3
Pakintelan	1	1	1	3
Sumurrejo	0	1	3	4
Pongangan	1	0	1	2
Cepoko	0	0	1	1
Kandri	1	0	2	3
Jatirejo	0	0	5	5
Sadeng	2	3	2	7
Total	7	7	16	30

Based on table 1, the number of DHF cases at the Gunungpati Primary Health Care Centre in 2019-2021 was 30 cases. The highest number of DHF cases was in Sadeng Village with 7 cases.

Table 2.
The respondents characteristics of DHF cases in 2019-2021

Variables	Cases			%	Total
	2019	2020	2021		
Age					
<5	0	1	4	16.67	5
5-12	4	3	6	43.33	13
13-25	2	3	4	30	9
26-45	0	0	1	3.33	1
46-59	1	0	1	6.67	2
>60	0	0	0	0	0
Sex					
Male	4	5	8	56.67	17
Female	3	2	8	43.33	13
Work History					
Student	6	3	8	56.67	17
Housewife	1	0	0	3.33	1
No Work	0	2	3	16.67	5
Others	0	2	5	23.33	7
Use of Trousers					
Yes	6	3	8	56.67	17
No	1	4	8	43.33	13
History of Stay					
Yes	2	1	1	13.33	4
No	5	6	15	86.67	26
ABJ					
>95%	4	3	2	30	9
<95%	3	4	14	70	21
Number of Medical History					
>1	6	6	11	76.67	23
≤1	1	1	5	23.33	7

Tabel 2, of all DHF cases (30), 43.33% were aged 5-12 year, 56.67% were male sex, 56.67% were have a work history as student, 56.67% were using of trousers, 86.67% were have no history of stay, 70% were have ABJ <95%, and 76.67% were have number of medical history >1.

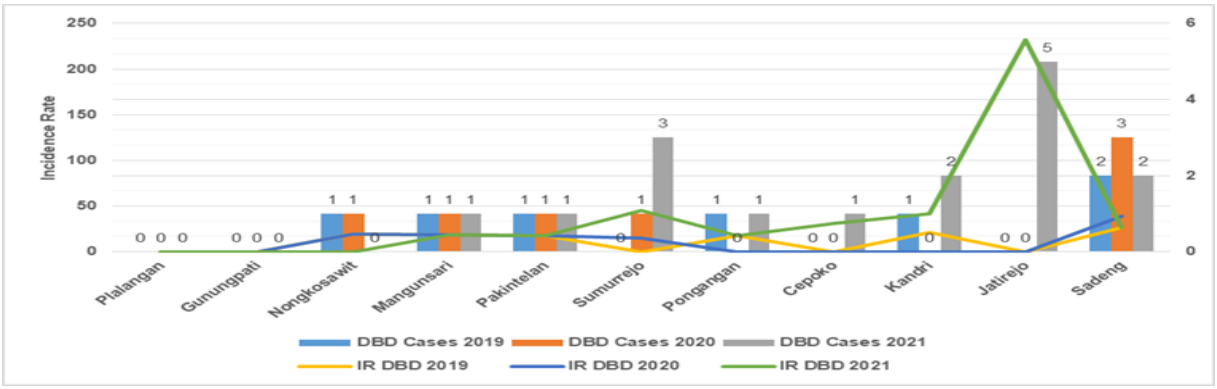

Figure 1.
Graph of Incidence Rate (IR) of DHF based on village in 2019-2021

Based on figure 1, it can be seen that the village with the highest incidence rate (IR) of DHF was in Jatirejo Village was 232.02 by 100,000 population. The number of DHF cases in the Jatirejo Village was 5 cases and it was the highest compared to other village.

Bivariate Analysis of DHF Cases in 2019-2021

Based on the results of the analysis, it was found that only the variables sex (0.001) and ABJ (0.001) obtained P-value were <0.05. So it can be concluded that sex and ABJ have were significant associations with the incidences of DHF in the working area of the Gunungpati Primary Health Care Centre in 2019-2021. While the variables of age, work history, use of trousers, history of stay, number of medical history were not proven to have associations with the incidences of DHF in the working area of the Gunungpati Primary Health Care Centre in 2019-2-21 because they obtained P-value were >0.05.

Table 3.
The bivariate analysis of DHF cases in 2019-2021

Variable		Value	
Dependent	*Independent*	R	*P-value*
Incidence of DHF (Y)	Age (X1)	-0,500	0,667
	Sex (X2)	1,000	0,001
	Work History (X3)	0,500	0,667
	Use of Trousers (X4)	0,500	0,667
	History of Stay (X5)	0,500	0,667
	ABJ (X6)	-1,000	0,001
	Number of Medical History (X7)	-1,000	0,667

Based on table 3, it can be concluded that the proposed hypothesis was proven true. This was evidenced by obtaining sex variable correlation value of 1,000. This means that the sex variable related the incidences of DHF cases in the working area of the Gunungpati Primary Health Care Centre by 100%. ABJ variable correlation value -1.000. This means that the ABJ variable related the incidence of DHF cases in the working area of the Gunungpati Primary Health Care Centre by -100%. The negative correlation value indicates the associations between the decrease in the larvae-free rate (ABJ) was directly proportional to the increase in DHF cases. Other variables that were not related can be influenced by other determinants that were not included in the analysis of this study. The cause of DHF was driven by other factors such as community behavior towards eradicating mosquito nests, as well as the environment that affects vector survival (Delian, Yafi; Darmawan, Armaidi; Suzan, 2022).

DISCUSSION

In line with the results of previous studies proved that the presence of mosquito larvae was the main factor causing DHF (Maros & Juniar, 2020). Based on the results of other studies, it was concluded that the presence of larvae in containers ($p<0.001$) was related to the incidence of DHF in the working area of the Kedungmundu Health Center, Semarang City (Nasifah & Sukendra, 2021). The significant association between breeding places and dengue incidence indicates the importance of eradicating mosquito larvae in the surrounding environment because the presence of mosquito larvae increases the risk of transmission (Anggraini et al., 2013). Previous research was expected to provide information to the public that to be vigilant when rainfall was high so that measures to eradicate mosquito nests must be taken by mobilizing the community through 1 family 1 larva monitor to control the incidence of DHF (Komaling et al., 2020). Mosquito Nest Eradication (PSN) Behavior will be able to improve health status (Muda, Alivia Sasa; Nasirul Haqi, 2019). Based on the results of previous research, it showed that there was a significant association between 3M Plus and the incidence of dengue hemorrhagic fever (DHF) in the Payung Sekaki Health Center Work Area in 2019-2020 and respondents who did not do 3M Plus had a 5.7 times risk of DHF incidence (Putri et al., 2021).

The reason for the high number of the incidence of DHF in the working area of the Gunungpati Community Health Center was the lack of optimal eradication of mosquito vectors and the lack of clean and healthy living behavior in the community, such as: knowledge about risky behavior, attitudes about dengue prevention, routine mosquito nest eradication (PSN) activities, lack of knowledge regarding fogging, abatement and implementation of 3M Plus (draining, covering and recycling with measures plus preventing mosquito bites) (Wijayanti & Lestariningsih, 2014). Cleanliness and health need to be paid attention to by the community because cleanliness is a condition for achieving health (Yana et al., 2019). Health will also be realized if people practice cleanliness both inside the house and in the environment around the house (Nurhayati & Wahyuni, 2022). If the householder rarely cleans the house and finds used items around the house, there is also the potential for mosquito larvae to be found (Sutriyawan et al., 2020). Aedes mosquitoes breed in water reservoirs such as bathroom tubs, drums, dispensers, bird drinkers, jars and used items such as bottles, glasses, plastic waste, etc. that can collect rainwater both at home and outside the home (Umaya et al., 2013). Keeping fish that prey on larvae such as betta fish and tilapia is also useful for preying on mosquito larvae (Putri et al., 2021). The 3M mosquito nest eradication (PSN) method is highly recommended to be carried out once a week and carried out throughout the year, especially when the rainy season arrives (Podung et al., 2021).

Larvae eradication needs to be done regularly by drying, cleaning and brushing the water container at least once a week without throwing away the clean water (Wanti et al., 2019). Sex was risk factor of the incidence of DHF in the working area of the Gunungpati Community Health Center, also because sociodemographics cannot be separated from the characteristics of each individual or group (Ismah et al., 2021). One of the differences between men and women is the mobility factor. Men basically spend more time outside the home, in contrast to women who tend to stay indoors so the risk of being bitten by mosquitoes is also greater (Tomia et al., 2020). Another study states that during infancy and childhood, there is an increase in the susceptibility and severity of dengue fever infection, which is found to be more common in males, because it is often associated with a decrease in the humoral and cellular immune response to dengue fever infection (Kharisma et al., 2021).

Several previous studies have also provided results that were not in line with this study. Age was the most dominant variable related to the incidence of DHF in the Metro City area in 2013, with a p value of 0.011 and the largest OR of 14.7 which means that respondents aged 15 years or less have a 14.7 times greater chance to experience DHF compared to those aged more than 15 years (Wijayanti & Lestariningsih, 2014). The age group of 5-14 years is the most vulnerable age group to suffer from DHF because that age is school age so they have a high level of exposure to mosquito bites (Tomia et al., 2020). This study was not in line with previous research found was no difference between sex with the death of dengue hemorrhagic fever sufferers but the death was found more in female than male (Tomia et al., 2020). The strength of this study, there were variables that have not been studied before that have potential to be a determinants of the incidence DHF cases such as use of trousers, history of stay/travel for the last three weeks, and number of medical history. The limitation of this study, researchers have a limited number of samples and other variables outside those studied which may have a significant associations. It was necessary to evaluate the DHF control program that has been running so far in order to prevent an increase in DHF cases in the following years (Maros & Juniar, 2020). It was hoped that health workers will convey about the breeding places of dengue fever mosquitoes, how to deal with them and the impact that will occur if this was not allowed to go unchecked (Rikasari et al., 2022).

CONCLUSION

The determinants of the incidences of dengue hemorrhagic fever (DHF) in the working area of the Gunungpati Primary Health Care Centre in 2019 – 2021 were sex and the larvae-free rate (ABJ). Our research results suggest that the public should carry out PSN 3M Plus activities in an appropriate, sustainable and quality way to increase the larvae-free rate (ABJ> 95%). For further research, we can further examine deeply the associations of climate factors on the incidence of dengue hemorrhagic fever (DHF) cases.

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