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The Relationship of Host and Environmental Factors to Events Dengue Hemorrhagic Fever

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Abstract
Introduction: *DHF cases are still in the high category and the number of morbid cases and the distribution of exposed areas is increasingly widespread. Indonesia's Health Profile data shows that there are 143,184 cases of DHF in Indonesia throughout 2022. This number has jumped 94.8% compared to the previous year.* ***Objective:*** *The purpose of this study was to determine the relationship between host and environmental factors with the incidence of dengue hemorrhagic fever in the Working Area of the Pamenang Health Centre, Merangin Regency.* ***Methods:*** *This research is a quantitative research with a cross approach sectional* ***Results:*** *The results showed that there was no relationship between age (p-value=0.653 and PR=0.944), education (p-value =0.677 and PR=0.677), knowledge (p-value=0.661 and PR=0.661), economic status (p-value =0.686 and PR=0.874), occupancy density (p-value =0.782 and PR=0.828), and clean water facilities (p=0.269 and PR=0.663). Then, there is a relationship between nutritional status (p=0.029 and PR=1.217), DHF prevention measures (p-value =0.037 and PR=1.646), air humidity (p-value =0.046 and PR=1.714), waste storage facilities (p-value = 0.037 and PR = 1.432), wastewater disposal facilities (p-value = 0.015 and PR = 1.471), on the incidence of dengue hemorrhagic fever in the Work Area Pamenang Health Centre.* ***Conclusion:*** *It is concluded that there is no relationship between age, education, knowledge, economic status, occupancy density, and clean water facilities. There is a relationship between nutritional status, DHF prevention measures, air humidity, garbage collection facilities, waste water disposal facilities with the incidence of dengue hemorrhagic fever in the Work Area of the Pamenang Health Centre*
Keywords: DHF; Host; Environment; Public Health Centre; Merangin Regency;

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Introduction

Environment-based disease is a disease phenomenon that occurs in a community group, which is related, rooted, or has a close relationship with one or more environmental components in a space where the community lives or activities for a certain period of time. Public health experts generally agree that the environment is one of the determinants of public health (Jannah et al., 2021)

Dengue Hemorrhagic Fever (DHF) is an acute viral infectious disease caused by the dengue virus characterized by fever for 2-7 days accompanied by manifestations of bleeding, a decrease in platelets, the presence of hemoconcentration marked plasma leakage (increased hematocrit, ascites, pleural effusion, hypoalbuminemia). May be accompanied by atypical symptoms such as headache, muscle and bone pain, skin rash or back pain of the eyeball. Environmental aspects are very influential on the incidence of dengue fever because mosquitoes will usually reproduce by producing eggs in the rainy period.

Since 1976 the World Health Organization (WHO) introduced various new diseases categorized in environment-based diseases, and one of them is Dengue Hemorrhagic Fever (DHF) or more popular in Indonesia as Dengue Hemorrhagic Fever (DHF). The World Health Organization (WHO) said the distribution of the risk of dengue virus infection is spread in 129 countries, with 70% of the distribution in the Asian region. The number of WHO reported cases has increased more than 8-fold over the past two decades, from 505,430 cases in 2000, to more than 2.4 million cases in 2010, and 5.2 million cases in 2019 (Baitanu et al., 2022)

In Indonesia, dengue cases are still in the high category and the number of cases of illness and the spread of exposed areas is increasingly widespread. According to data sources obtained from the Department of Disease Control and Prevention of the Ministry of Health of the Republic of Indonesia, there were 138,127 cases and 919 deaths in 2019 (IR = 51.48 per 100,000 population and CFR = 0.61%) (Kurniawan et al., 2022). In 2020 there were 108,303 dengue cases with 747 deaths (lR= 40.0 per 100,000 population and CFR=0.7%). In 2021, there were 73,518 dengue cases, including 705 deaths (lR= 27.0 per 100,000 population and CFR=0.96%). Data from the Ministry of Health (Kemenkes) shows that there are 143,184 dengue cases in Indonesia throughout 2022. This number jumped 94.8% compared to the previous year which was 73,518 cases

Data obtained from the Jambi Provincial Health Office, dengue cases in Jambi Province in 2019 there was an increase in the number of cases from 2018, which was 2,229 cases. Furthermore, in 2020 there were 2,049 dengue cases. In 2021, there was a decrease of only 309 cases. Although there was a decrease in cases last year, efforts to prevent and control dengue disease must continue to be encouraged because this disease has the potential to become a case of outbreaks or extraordinary events. In 2022, dengue cases in Jambi province have increased to 1,381 cases, where the five areas with the highest cases are Jambi City with 298 cases, Batanghari with 198 cases, Tebo with 172

cases, Sarolangun with 160 cases and Merangin with 153 cases (Merangin Regency Health Office Profile Data Report in 2019)

According to the Merangin Regency Health Office profile data report, in 2019 there have been a total of 173 dengue fever cases (lR = 44.5 per 100,000 population) (Merangin Regency Health Office Profile Data Report 2020). In 2020 there were 114 dengue cases (lR = 32.2 per 100,000 population) (Merangin Regency Health Office Profile Data Report 2021). Furthermore, in 2021 there have been 82 dengue cases (lR = 23.4 per 100,000 population). It can be seen that the data shows a decrease in cases over the last three years, but when viewed from the dengue morbidity rate or Incidence Rate (IR) still has not reached the national achievement target. Based on the RPJMN (National Medium-Term Program Plan) for 2014-2019, there is a national target of achieving dengue lR of <20 per 100,000 population and a national CFR target of <1%. In 2022, there was an increase in cases in Merangin Regency from the previous year with 153 cases (Merangin Regency Health Office Profile Data Report 2021)

According to the profile data of the Merangin Regency Health Office, in 2021 there were 13 dengue cases at the Pakemenangan Health Center and in 2022 as of October there have been 15 dengue cases, of which there was 1 death.

Method

This research is a quantitative research with a cross sectional approach. Samples were taken by accidental sampling method, totaling 150 people. Data analysis was performed using univariate and bivariate analysis using the Fisher test. This research was conducted by Working Area of the Pakemenangan Health Centre, Merangin Regency

Result and Discussion

Result

Table 1

Frequency Distribution of Respondent Characteristics and Research Variables

Variable	Total	Percentage (%)
Age		
17-25 years	6	4,1
26-45 years	102	67,9
46-65 years old	42	28
Gender		
Man	45	30
Woman	105	70
Education		
No School	18	12
End of ES	17	11,3
End of JHS	21	14
Tamat SHS	68	45,4
Graduated from Academy	26	17,3
Work		
Farmer	30	20
Civil Servants	6	4
Private Employees	17	11,3
Entrepreneurial	17	11,3
Honor	6	4
Housewives	73	48,7
Student	1	0,7
Nutritional Status		
Normal	62	41,3
Tidak Normal	88	58,7
Knowledge		
Good	105	70
Less	45	30
DBD Preventive Actions		
Good	54	36
Less	96	64
Economic Status		
Good	85	56,7
Less	65	43,3
Air humidity		
Qualify	6	4
Not eligible	144	96
Occupancy Density		
Not Solid	144	96
Dense	6	4
Clean Water Facilities		
Good	104	69,3
Less	46	30,7
Garbage Collection Facilities		
Good	62	41,3
Less	88	58,7
Wastewater Disposal Facilities		
Good	52	34,7
Less	98	65,3

Based on the table above, it can be seen that the age characteristics of the most respondents are in the age range of 26-45 years as many as 102 people (67.9%), the age of 46-65 years as many as 42 people (28%) and the age characteristics of the least respondents are the range of 17-25 years as many as 6 people (4.1%). There are 105 more female respondents (70%) than male respondents (45 people (30%). The most educational characteristics of respondents were 68 people graduated from high school (45.4%), graduated from academy / PT as many as 26 people (17.3%), graduated from junior high school as many as 21 people (14%), did not go to school as many as 18 respondents (12%), and the least were respondents with an elementary school graduation level of 17 people (11.3%).

The characteristics of the most respondents were housewives as many as 73 people (48.7%), farmers as many as 30 people (20%), private employees and entrepreneurs each as many as 17 respondents (11.3%), civil servants and honoraries each amounting to 6 respondents (4%) and the least namely students with 1 person (0.7%). Based on the table above, it can be seen that out of 150 respondents, there were 88 people (58.7%) who were included in the category of abnormal nutritional status and 62 people (41.3%) were classified as normal nutritional status. Respondents' knowledge of the incidence of dengue disease is most in the good category, namely 105 people (70%) and those included in the knowledge are less than 45 people (30%). Community action regarding the prevention of dengue disease is most in the less category, which is 64% or as many as 96 people and those included in the category of good action by 36% or as many as 54 people.

The most dominant respondents' economic status is in the good category, which is 56.7% or as many as 85 people and vice versa, 43.3% or as many as 65 people are included in the theory of less economic status. The highest percentage of air humidity is those that do not meet the requirements, which is 96% or as many as 144 houses and those included in the houses that meet the air humidity requirements are 4% or as many as 6 houses. The percentage of respondents with a non-dense residential density is more dominant, namely as many as 144 respondents' houses or 96% and those whose occupancy density is not dense as many as 6 houses or 4%.

It can be seen that the highest frequency is respondents with good clean water facilities, which is 69.3% or as many as 104 respondents, and respondents with less clean water facilities by 30.7% or as many as 46 people. The highest respondents' waste disposal facilities were the less category, which was 88 respondents or 58.7% and those included in the category of good waste disposal facilities were 62 or 41.3%. Wastewater disposal facilities with the highest percentage are the less category with a frequency of 98 respondents or 65.3% and wastewater disposal facilities with a good category of 52 or 34.7%.

Bivariate Analysis

Table 2

The relationship between age and the incidence of DHF

Age	DHF Events				Total		PR(95%CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
17-41 Years	19	20	78	80	97	100	0,944(0,486-1,831)	0,653
42-65 Years	11	21	42	79	53	100		

It was found that respondents with the age category of 17-41 years who had suffered from dengue fever as many as 19 people (20%) and respondents with the age category of 17-41 years who had never suffered from dengue disease as many as 78 people (80%), while respondents with the age category of 42-65 years who had suffered from dengue fever as many as 11 people (21%) and respondents who had never suffered from dengue fever as many as 42 people (79%). From the results of the age variable bivariate test, a value of pvalue = 0.653 (>0.05) means that there is no relationship between age and the incidence of DHF in the Pakemenangan Health Center Work Area. In addition, a PR value = 0.944 (95% 0.486-1.831) was obtained. This shows that the age variable is a protective factor, meaning that age is not a risk factor for dengue events.

Table 3

The Relationship of Education with the Incidence of DHF

Education	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Tall	20	21	74	79	94	100	0,839(0,424-1,662)	0,677
Low	10	18	46	82	56	100		

Education variables found that respondents who had a high level of education and had suffered from dengue fever were 20 people (21%) and respondents who had higher education and never suffered from dengue fever were 74 people (79%), while those with low education and had suffered from dengue fever as many as 10 people (18%) and who had low education and never suffered from dengue fever as many as 46 people (82%). From the results of the bivariate test of educational variables, a value of p-value = 0.677 (>0.05) was obtained, meaning that there was no relationship between education and the incidence of DHF in the Pakemenangan Health Center Work Area. In addition, a PR value = 0.839 (95% 0.4241.662). This shows that the educational variable is a protective factor, meaning that age is not a risk factor for dengue events

Table 4

Relationship of nutritional status with the incidence of DHF

Nutritional Status	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Normal	11	18	51	82	62	100	1,217(0,624-2,373)	0,029
Tidak normal	19	22	69	78	88	100		

Respondents with normal nutritional status who had suffered from dengue fever as many as 11 people (18%) and respondents with normal nutritional status who had never suffered from dengue disease as many as 51 people (82%), while respondents with abnormal nutritional status who had suffered from dengue fever as many as 19 people (22%) and respondents who had never suffered from dengue fever as many as 69 people (78%). The results of bivariate tests that have been carried out on nutritional status variables show that a p-value of 0.029 (<0.05) is obtained, which means that there is a relationship between nutritional status and the incidence of DHF in the Pakemenangan Health Center Work Area. In addition, PR = 1.217 (95% CI 0.624-2.373) was obtained. This shows that people who have abnormal nutritional status are 1.2 times more at risk of dengue hemorrhagic fever compared to people who have normal nutritional status.

Table 5

The Relationship of Knowledge with DHF Work

Knowledge	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Good	20	19	85	81	105	100	1,857(0,437-1,682)	0,661
Less	10	22	35	79	45	100		

The knowledge variable found that respondents who were well knowledgeable and had suffered from dengue fever were as many as 20 people (19%) and respondents who were well knowledgeable and had never suffered from dengue fever were as many as 85 people (81%), while those who were less knowledgeable and had suffered from dengue fever as many as 10 people (22%) and those who were less knowledgeable and had never suffered from dengue fever as many as 35 people (78%). From the results of the bivariate test of knowledge variables, a value of p-value = 0.661 (>0.05) was obtained, meaning that there was no relationship between knowledge and the incidence of DHF in the Pakemenangan Health Center Work Area. In addition, PR value = 0.857 (95% 0.4371.682). This shows that the knowledge variable is a protective factor, meaning that age is not a risk factor for dengue events

Table 6

The Relationship of DHF Prevention Measures with DHF Work

Action	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Good	8	15	46	85	54	100	1,646(0,3093,951)	0,037
Less	22	23	74	73	96	100		

The variable of DHF prevention measures found that the percentage of respondents who had good actions who had suffered from DHF was 8 people (15%) and good actions who had never suffered from DHF was 46 people (85). Meanwhile, for respondents with less action who had suffered from dengue disease were 22 people (23%) and those whose actions were less and had never suffered from dengue disease were 74 people (73%). The

results of the bivariate analysis found that the p-value was 0.037 (<0.05), meaning that there was a relationship between respondents' actions and the incidence of DHF in the Pakemenangan Health Center Work Area. In addition, a PR value = 1.646 (95% CI 0.309-1.351) was obtained. This shows that people who have actions are approximately 1.6 times at risk of dengue hemorrhagic fever compared to people who have good actions.

Table 7
The Relationship of Economic Status with DHF Work

Economic Status	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Good	16	19	69	81	85	100	0,874(0,461-1,658)	0,686
Less	14	21	51	79	65	100		

The percentage of respondents who have good economic status who have suffered from DHF is 16 people (19%) and good economic status who have never suffered from DHF is 69 people (81%). Meanwhile, for respondents with less economic status who have suffered from dengue disease are 14 people (21%) and those with less economic status and have never suffered from dengue disease are 51 people (79%). The results of the bivariate analysis found that the p-value was 0.686 (>0.05), meaning that there was no relationship between the respondent's economic status and the incidence of dengue fever in the Pakemenangan Health Center Work Area. In addition, a PR value = 0.874 (95% CI 0.461-1.658) was obtained. This shows that the variable economic status is a protective factor, meaning that economic status is not a risk factor for dengue events.

Table 8
The Relationship of Air Humidity with DHF Work

Air humidity	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Qualify	2	33	4	67	6	100	1,714(0,521-5,576)	0,046
Not Eligible	28	19	116	81	144	100		

The percentage of respondents whose air humidity meets the requirements who have suffered from DHF is 2 people (33%) whose air humidity meets the requirements who have never suffered from DHF is 4 people (67%). Meanwhile, for respondents whose air humidity did not meet the requirements who had suffered from DHF disease was 28 people (19%) and whose air humidity did not meet the requirements and had never suffered from DHF disease was 116 people (81%). The results of the bivariate analysis found that the p-value was 0.046 (<0.05), meaning that there was a relationship between air humidity and the incidence of DHF in the Pakemenangan Health Center Work Area. In addition, a PR value = 1.714 (95% CI 0.521-5.576) was obtained. This shows that people who have unqualified air humidity are 1.7 times more at risk of dengue hemorrhagic fever compared to people who have qualified air humidity.

Table 9
The Relationship Between Residential Density and Dengue Work

Occupancy Density	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Not Solid	29	20	115	80	144	100	0,828(0,134-5,100)	0,782
Dense	1	17	5	83	6	100		

The percentage of respondents whose occupancy density is not dense who have suffered from dengue fever is 29 people (20%) whose occupancy data is not dense and has never suffered from dengue fever is 115 people (80%). Meanwhile, for respondents whose occupancy density is dense who have suffered from dengue disease is 1 person (17%) and whose occupancy density is dense and has never suffered from dengue disease is 5 people (83%). The results of the bivariate analysis found that the p-value was 0.782 (>0.05), meaning that there was no relationship between occupancy data and the incidence of dengue fever in the Pakemenangan Health Center Work Area.

Table 10
The Relationship of Clean Water Facilities with Dengue Works

Clean Water Facilities	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Good	18	17	86	83	104	100	0,663(0,349-1,262)	0,269
Less	12	26	34	74	46	100		

The percentage of respondents of clean water facilities in the good category who have suffered from DHF is 18 people (17%) whose clean water facilities are in the good category who have never suffered from DHF is 86 people (83%). Meanwhile, for respondents whose net means are in the less category who have suffered from dengue disease are 12 people (26%) and the category of cultivators and have never suffered from dengue disease is 34 people (74%). The results of the bivariate analysis found that the p-value was 0.269 (>0.05), meaning that there was no relationship between clean water facilities and dengue incidence in the Pakemenangan Health Center Work Area. In addition, a PR value = 0.663 (95% CI 0.349-1.262) was obtained. This shows that the variable clean water facility is a protective factor, meaning that clean water facilities are not a risk factor for dengue events.

Table 11
The Relationship of Garbage Storage Facilities with Dengue Works

Garbage Collection Facilities	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Good	7	11	55	89	62	100	1,432(0,198-1,799)	0,037
Less	23	26	65	74	88	100		

The percentage of respondents with waste disposal facilities in the good category who have suffered from DHF is 7 people (11%) whose waste disposal facilities are in the good category who have never suffered from DHF is 55 people (89%). Meanwhile, for respondents whose waste disposal facilities are in the less category who have suffered from dengue disease are 23 people (26%) and the category of cultivator and never suffer from dengue disease is 65 people (74%). The results of the bivariate analysis found that the p-value was 0.037 (<0.05), meaning that there was a relationship between waste disposal facilities and the incidence of dengue fever in the Pakemenangan Health Center Work Area. In addition, a PR value = 1.432 (95% 0.198-1.799). This shows that people who have poor waste disposal facilities will be 1.4 times more at risk of dengue hemorrhagic fever compared to people with good waste disposal facilities.

Table 12

The Relationship of Wastewater Disposal Facilities with Dengue Works

Wastewater Disposal Facilities	DHF Events				Total		PR(95% CI)	P-Value
	Ever		Never					
	n	%	n	%	n	%		
Good	6	12	46	88	52	100	1,471(0,206-4,079)	0,015
Less	24	25	74	75	98	100		

The percentage of respondents with wastewater disposal facilities in the good category who have suffered from DHF is 6 people (12%) whose wastewater disposal facilities are in the good category who have never suffered from DHF is 46 people (88%). Meanwhile, for respondents whose wastewater disposal facilities are in the less category who have suffered from dengue disease are 24 people (25%) and the category of cultivators and have never suffered from dengue disease is 74 people (75%). The results of the bivariate analysis found that the p-value was 0.015 (<0.05), meaning that there was a relationship between wastewater disposal facilities and the incidence of dengue fever in the Pakemenangan Health Center Work Area. In addition, a PR value = 1.471 (95% 0.206-4.079) was obtained. This shows that people who have poor wastewater disposal facilities will be 1.4 times more at risk of dengue hemorrhagic fever compared to people with good wastewater disposal facilities.

Discussion

1. Age Relationship with Dengue Incidence in Work Area of the Pakemenangan Health Centre

From the analysis of age variables, it was found that there was no relationship between age and the incidence of DHF in the Pakemenangan Health Center Work Area. Age is one aspect that influences people's insight. As you get older, the level of development will grow based on the knowledge gained and personal experience. Age also affects a person's life, because when they are old enough, the ability and maturity of those who think and receive information will increase. Similarly, the maturity of one's mind influences one's behavior better in one's environment.

This research is in line with research conducted by Baitanu et al. (2022) entitled the relationship between age, sex, mobility and knowledge with the incidence of DHF in Wulauan, Minahasa Regency which states that there is no relationship between age and the incidence of DHF with a p-value of 1,000 (Baitanu et al., 2022)

The age between 17-41 years which is classified as adolescence and early adulthood is included in the young age. This does make a person faster in absorbing information because he is more active in the use of information technology and social media where information about dengue prevention is found, but sometimes at that age it is still lacking in application, sensitivity or concern for the environment (Ramadani et al., 2023)

The majority of respondents with adult age are working respondents. A person with this age category usually has activities and activities that are more likely to vary and sometimes spend a lot of time outdoors in the afternoon. Going to school/work in the morning or playing in the home environment in the afternoon can also allow respondents to be bitten by Aedes aegypti mosquitoes. Therefore, the risk of dengue disease will be greater than respondents who have an old age category.

2. The Relationship of Education with the Incidence of DHF in the Work Area of the Pakemenangan Health Centre

The results of the research that have been conducted show that based on statistical tests, it is stated that there is no relationship between respondents' education and the incidence of dengue disease in the Pakemenangan Health Center Work Area.

This research is in line with research conducted by Ananda Putri Yandika (2022) entitled The relationship between the level of education and the level of public knowledge of the incidence of dengue fever about there is no significant relationship between the level of education and the incidence of DHF with a p-value obtained of 0.186 (Yandika, 2022)

The higher the respondent's education level, the higher the role in dengue prevention, the lower the respondent's education level, the lower the role (Liza et al., 2015). So it can be concluded that a higher level of education can further increase respondents' behavior in participating in preventing DHF. This is consistent with Grossman's theory that differences in education levels lead to differences in basic health knowledge. The higher the level of education, the easier they are to accept and develop knowledge and technology, which will increase productivity which will ultimately improve the health and well-being of the family

3. Relationship of Nutritional Status with Dengue Incidence in Work Area of the Pakemenangan Health Centre

The results of the research that have been conducted show that based on statistical tests, it is stated that there is a relationship between the nutritional status of respondents and the incidence of DHF in the Work Area of the Pakemenangan Health Centre

This study is in line with previous research, namely with the research of M. Tansil et al. (2021) which stated that there was a significant relationship between nutritional status and the incidence of dengue hemorrhagic fever in the working area of the Kayen Health Center, Pati Regency with a p-value of 0.009 ($p < 0.05$) (Tansil et al., 2021)

Basically, nutritional status is one of the important elements in shaping health status. Nutritional status is one of the factors that affect a person's immunity to immunity in fighting infection.

Nutritional status also describes the nutritional balance component of a person consisting of macronutrient and micronutrient components (Arwangga et al., 2016). This component also plays a role in the formation of the immune system. Macronutrients, one of which is protein, is absorbed by the body in the form of amino acids. Amino acids that play a role in the immune system are arginine. Arginine affects the function of T lymphocytes, stimulates T-cell ploriferation, strengthens macrophage function and forms nitride oxide which is cytotoxic to antigens.

Micronutrients such as zinc play an important role in the development of cellular immunity, especially T lymphocytes and maintain normal activity of macrophages and cells in the body. If this component is deficient, it will result in a decrease in the immune system and can affect the risk of dengue infection and the occurrence of disease (Husain, 2021)

The problem of abnormal nutritional status will be a risk factor for dengue fever, therefore intervention is necessary. Infectious diseases are often accompanied by weight loss, an increased risk of dehydration and fever. So it is necessary to provide adequate food and fluid intake to reduce the severity of infectious diseases. All diseases caused by viruses are generally only fought by the body's defenses. Then the body needs to strengthen its resistance by paying attention to food intake.

4. Knowledge Relationship with Dengue Incidence in Work Area of the Pakemenangan Health Centre

From the results of the analysis, it was found that the value of p-value = 0.661 (>0.05) means that there is no relationship between knowledge and the incidence of DHF in the Pakemenangan Health Center Work Area.

The results of this study are in line with research conducted by Heni Suryanti (2020) showing that the results of the analysis that have been carried out have obtained a value of P = 0.643. This means that there is no relationship between knowledge and the incidence of dengue hemorrhagic fever. This is because most respondents already have sufficient knowledge about the questions asked by researchers about DHF itself (Sunaryanti &; Iswahyuni, 2020)

In this study, results were obtained in accordance with the theory of Notoatmodjo (2014) in Damayanti (2022) which states that one of the factors that affect knowledge is education. Education affects the process of learning, the higher a person's education, the easier it is for a person to receive information and knowledge (Damayanti &; Sofyan,

2022). Based on the data obtained, the education level of the majority of respondents into the higher education level, namely if the last high school education and above as many as 94 respondents (63%) and respondents with low education levels as many as 56 people (37%).

In this study, researchers stated that respondents' knowledge was only limited to the stage of understanding (comprehension), namely respondents had understood and knew in general about the causes and symptoms of dengue fever. For this reason, the community must further increase knowledge about mosquito nest eradication and awareness in preventing dengue fever.

5. The Relationship of DHF Prevention Measures with DHF Incidence in the Work Area of the Pakemenangan Health Centre

The results of the analysis found that the p-value was 0.037 (<0.05), meaning that there was a relationship between the respondent's actions and the incidence of DHF in the Pakemenangan Health Center Work Area.

This research is in line with research conducted by Pangemanan (2019) in Watutumou Village I II and III of the Kolongan Health Center work area, with the results of the study there is a relationship between mosquito nest eradication actions and the incidence of dengue hemorrhagic fever as seen from the statistical results obtained, namely 0.048. This study suggests that one of the factors that influence the incidence of DHF is PSN, because PSN is a government program in the form of eradication activities for eggs, larvae, and pupae of aedes aegypti mosquitoes which is vector control as an effort to prevent dengue (Torondek et al., 2019)

Preventive measures against dengue disease depend on control of mosquito growth as vectors. One effective way to overcome dengue disease completely is to involve the community in eradicating the larvae / mosquitoes known as DHF PSN. Mosquito Nest Eradication Action (PSN) is a way of vector control as one of the efforts made to prevent the transmission of dengue disease.

Preventive measures against dengue disease that can be done by eradicating mosquito nests have an influence on the occurrence of DHF. Someone who has poor actions in preventing DHF can create a supportive environment for the development of mosquito larvae and facilitate contact with aedes mosquitoes so that they have a high risk of dengue infection.

6. Relationship of Economic Status with Dengue Incidence in Work Area of the Pakemenangan Health Centre

The results of the bivariate analysis found that the p-value was 0.686 (>0.05), meaning that there was no relationship between the respondent's economic status and the incidence of dengue fever in the Pakemenangan Health Center Work Area.

This research is in line with research conducted by Reichenbach et al. (2019) entitled The Relationship of Knowledge and Socioeconomic Status to Efforts to Prevent

Dengue Hemorrhagic Fever (Dbd) in Pajaresuk Village, Pringsewu District, Pringsewu Regency where a value of P = 0.408 was obtained, which means there is no relationship between economic status and dengue incidence (Muhammad, 2019)

Economic status factors, one of which is seen in terms of income, can affect a person's level of insight into health, the environment and housing. Economic status as part of the policy environment affects the health policy process and people's ability to access health facilities so that the flow of resources whose impact touches all levels of society. Economic and social conditions can cause a decrease in people's ability to pay for health services.

7. The Relationship of Air Humidity with Dengue Incidence in the Work Area of the Pakemenangan Health Centre

The results of the bivariate analysis found that the p-value was 0.046 (<0.05), meaning that there was a relationship between air humidity and the incidence of DHF in the Pakemenangan Health Center Work Area.

This research is in line with research conducted by Naumi Bone (2021) regarding the Incidence of Dengue Hemorrhagic Fever in Manado City in 2015-2020 where the p-value of this study was 0.000 and PR of 2,900. On average, someone with an unqualified home humidity state has 6 times greater than someone whose home humidity is qualified (Bone et al., 2021)

Air humidity can be influenced by several factors, such as temperature, air pressure, wind movement, vegetation, and altitude of the place. From the data obtained by researchers during the research process, it is known that Pakemenangan District is included in the category with areas with normal air temperatures, which are between 27 degrees Celsius to 33 degrees Celsius. This can certainly affect the air humidity to increase. The relationship between temperature and air humidity is inversely proportional. If an area has a high air temperature / hot then the air humidity will be low, while for air temperature it is said to be hot if the temperature reaches 35 to 40 degrees Celsius (Nyarmiati, 2017)

Air humidity can determine the survival of Aedes aegypti mosquitoes, meaning to determine the resistance of trachea which is a breathing apparatus for Aedes aegypti mosquitoes. The humidity rate in Indonesia can reach 85%. Indonesia is an archipelagic country whose ocean is wider than land, so the air contains more water. The average humidity for mosquito growth is about 65-90%. In this treatment, two categories are divided, namely the first is not qualified when the humidity is >60% and <40%, while for the second category or the qualified is when the humidity is 40-60%.

The need for high humidity influences mosquitoes to look for damp and wet places as a place to perch or rest. At a humidity of less than 60% the life of mosquitoes will become shorter so that the mosquito cannot become a vector because there is not enough time for the transfer of the virus from the stomach to its salivary glands.

8. The Relationship between Residential Density and Dengue Incidence in the Work Area of the Pakemenangan Health Centre

The results of the bivariate analysis found that the p-value was 0.782 (>0.05), meaning that there was no relationship between occupancy data and the incidence of DHF in the Pakemenangan Health Center Work Area.

This research is in line with research conducted by Ratri (2019) which states that there is no relationship between residential density and dengue incidence because a P value of 0.175 is obtained (Maharani et al., 2017)

Based on the results of research in the field, it was found that most respondents had a dwelling that was not dense. These results are obtained after knowing the area of the house and the number of occupants in the house. According to Law No. 1 of 2011 concerning Housing and Settlement Areas, it is explained that a dwelling is said to be dense if the occupancy density is <8m/person. Therefore, whether or not occupancy is dense is not a risk factor for DHF.

This is indeed because population density is not a causative factor for dengue fever, but can be a risk factor if together with other risk factors such as environmental sanitation, the presence of mosquito larvae, dengue prevention measures and others.

9. The Relationship of Clean Water Facilities with Dengue Incidence in the Work Area of the Pakemenangan Health Centre

The results of the bivariate analysis found that the pvalue value was 0.269 (>0.05), meaning that there was no relationship between clean water facilities and the incidence of dengue fever in the Pakemenangan Health Center Work Area.

This research is in line with research conducted by Made (2019) entitled The Relationship of Environmental Sanitation with the Presence of Mosquito Larvae to the Incidence of DHF in Kesiman Kertalangu Village, East Denpasar District, which states that there is no relationship between clean water facilities and dengue events with a P value obtained of 0.442 (Yati et al., 2020)

Environmental sanitation conditions that can be seen from good clean water facilities cause mosquito breeding sites to be not optimal. Dengue mosquitoes will develop well in places where there are many water reservoirs, especially those that are rarely cleaned or monitored. The sanitary condition of the home environment with good clean water facilities will minimize the chances of breeding mosquitoes that transmit dengue disease.

To prevent the occurrence of dengue hemorrhagic fever, intervention efforts must be made such as always routinely draining existing water reservoirs both inside the house and outside the house, so that it does not become a breeding nest for mosquitoes. In addition, avoid standing water on household objects that have the potential to become mosquito nests. In addition, in troughs or other water reservoirs must be equipped with lids so that mosquitoes cannot penetrate inside.

10. The Relationship of Waste Storage Facilities with Dengue Incidence in the Work Area of the Pakemenangan Health Centre

The results of the bivariate analysis found that the p-value was 0.037 (<0.05), meaning that there was a relationship between waste disposal facilities and the incidence of dengue fever in the Pakemenangan Health Center Work Area. In addition, a PR value = 1.432 (95% 0.198-1.799). This shows that people who have poor waste disposal facilities will be 1.4 times more at risk of dengue hemorrhagic fever compared to people with good waste disposal facilities.

This research is in line with research conducted by Akhmad Fauzan and Nuning Irnawulan (2020) which states that there is a relationship between sanitation facilities for waste disposal and the incidence of dengue fever in the Working Area of the Karang Mekar Health Center in Banjarmasin City in 2020 (Khairiyah, 2020)

Garbage disposal facilities play a role in dengue incidents where from the results of the study it was found that most respondents had waterproof waste disposal facilities at home but many were not covered. A total of 133 respondents (88.7%) already have a garbage shelter and the remaining 17 respondents (11.3%) do not have a garbage dump and usually the waste produced is only placed in the yard around the house just like that. The majority of respondents also answered that the waste disposal owned by no lid was 132 respondents (88%).

Therefore, the community must always maintain sanitation and environmental cleanliness, one of which is handling waste. To prevent the increase and reduce existing waste, the community should start implementing the 3R system in their daily lives, namely Reuse, Reduce and Recycle. Reuse means reusing garbage that can still be used for the same function or other functions. Reduce means reducing everything that results in waste. And Recycle means reprocessing (recycling) waste into useful new goods or products.

11. The Relationship between Wastewater Disposal Facilities and Dengue Incidence in the Work Area of the Pakemenangan Health Centre

The results of the bivariate analysis found that the p-value was 0.015 (<0.05), meaning that there was a relationship between wastewater disposal facilities and the incidence of dengue fever in the Pakemenangan Health Center Work Area.

This research is in line with the results of research conducted by Nyarmiati (2019) entitled Spatial Analysis of Environmental Risk Factors in the Incidence of Dengue Hemorrhagic Fever which shows a value of P = 0.000 which means there is a relationship between wastewater disposal facilities and dengue incidence (Nyarmiati, 2017)

Based on observations, larvae were found at the puddle point due to stagnant water that had settled. In addition, it is not uncommon to find garbage that is also in the ditch / sewer channel so that there is also a puddle of water in the garbage and can be a breeding place for Aedes mosquitoes. Wastewater disposal with open storage conditions allows such puddles for dengue vector breeding.

This is evidenced by research in Widyawati (2018), saying that if originally Aedes mosquitoes were known as mosquitoes that like to live in clean water, it turns out that the research conducted by IPB has shown changes. The results showed that Aedes sp mosquitoes can breed in dirty water, as long as the feces have settled. Similarly, the results of Jacob's research (2019), which states that Aedes aegypti is able to live in sewage water whose feces settle (clear water).

Conclusion

Based on this study, it can be concluded that there is no relationship between age, education, knowledge, economic status, occupancy density, and clean water facilities. There is a relationship between nutritional status, dengue prevention measures, air humidity, garbage collection facilities and wastewater disposal facilities with the incidence of dengue hemorrhagic fever in the Pakemenangan Health Center Work Area

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