

The Relationship of Knowledge Level, Home Environment and Prevention Behavior to Dengue Incidence

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Abstract

Dengue hemorrhagic fever is an infectious disease caused by dengue virus infection transmitted through the bite of *Aedes aegypti* and *Aedes albopictus* mosquitoes. According to health statistics and WHO data in Timor Leste reported dengue cases in 2020 from January to December 1,451 dengue cases were registered, of the total cases, 10 people died and most dengue cases came from Ermera sub-district, which was 318 cases. **Objective:** The purpose of this study is to determine the relationship between knowledge level, home environment and preventive behavior towards families whose members are infected with Dengue Hemorrhagic Fever in Ermera sub-district. **Method:** This study uses qualitative methods with the research design used is an analytical survey method with a case study approach, which describes the characteristics of the population or phenomenon being studied and is occurring, aiming to study the relationship between the independent variable and the dependent variable once and at the same time. **Result and Discussion:** The results showed that the level of knowledge was good (p-value 0.048) but there was a meaningful relationship between the home environment of DHF families (p-value 0.019) and the relationship of preventive behavior (p-value 0.000) to the incidence of DHF. **Conclusion:** From the results of the study above, it can be concluded that there is an influence of the family home environment and preventive behavior with the incidence of DHF

Keywords: Dengue; Knowledge; Environment; Behavior;

Introduction

Transmission of the dengue virus can only occur through the intermediary bite of the two mosquitoes that act as vectors. So that transmission cannot occur directly between humans without going through the medium of the Aedes mosquito bite. Aedes mosquitoes themselves will grow and multiply quickly in puddles of clean water, so the rainy season is generally the peak of the incidence of Dengue Hemorrhagic Fever (Santhi, Dewi, & Suyasa, 2019)

Dengue Cases in the World; according to CDC-US estimates 2020 there are 390 Billion Dengue cases per year, Some of the population 40% live in Dengue hazard environments including ASEAN members. An estimated 2.5 billion people in more than 100 countries are at risk and 50 million dengue infections occur annually in the world (WHO 2020) at (Antoro & Nova Nurwindasari, 2021).

Dengue cases in Southeast Asia and Asia Pacific; Infectious disease doctor in Singapore, Dr. Leaong Hoe Nam (Jun-2020), stated that the health care systems of countries in Southeast Asia are considered to be under pressure from an outbreak of another infectious disease, dengue hemorrhagic fever. Countries such as Singapore, Malaysia and Thailand are even grappling with dengue outbreaks. Singapore's national environment agency expects dengue cases to surpass the previous annual record of 22,170 cases in 2013. By recording dengue cases on Monday (6/7/2020), it has reached more than 15,500 dengue cases. The more cases, the more likely it is that an uninfected mosquito will bite an infected person, thus causing an increase in cases. Malaysia's director general of health announced a spike in dengue cases across the country last month in June-2020, while Indonesia's neighbouring health ministry reported 68,000 dengue cases nationwide by the end of June 2020.

WHO Dengue Situation Update Number 593 (April-2020), reported the dengue situation in Asia Pacific as many as 79,764 cases and 691 loss of life in April 2020, Dengue disease cases in Southeast Asia or South East Asia (SEA) 2015-2019 rose to 46% (from a total of 451,442 cases to 658,301) where the death rate is still high, from 1,584 to 1,555. (Dengue Statistics WHO-2020).

Dengue cases in East Timor and in the madia city of Ermera; According to health statistics and World Health Organization data in Timor Leste reported that dengue cases in 2020 from January to December registered 1,451 cases of Dengue Hemorrhagic Fever, and of the total dengue cases, 10 people died. And most dengue cases came from Kotamadia (*Município*) Ermera, which was 318 (0.8%) and Ermera sub-district registered 282 cases (*WHO 2020, EIS MdS/SSAM-E 2020*). And also in January-December 2021 the State of Timor Leste still registered 901 cases of Dengue and 11 people lost their lives due to the dengue disease, also the municipality (*Município Ermera*) still registered 42 cases of dengue (*Vijilância epi (8/2/22) no EIS MdS/SSAM-E 2021*). The characteristic symptom of Dengue Hemorrhagic Fever is a high fever that appears suddenly, accompanied by severe headaches and pain behind the eyeballs. Nausea, heartburn, to vomiting are other symptoms that are also often found in this disease.

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Because of the high fever, DHF patients will feel weak and painful throughout the body, pain in the bones, back to loss of appetite and severe causes shock and death. Dengue hemorrhagic fever (DHF) is also related to environmental health and cleanliness because mosquitoes carry or spread the disease, namely *Aedes aegypti* mosquitoes that breed around our environment. Poor residential environments become potential breeding grounds for *Aedes aegypti* mosquitoes.

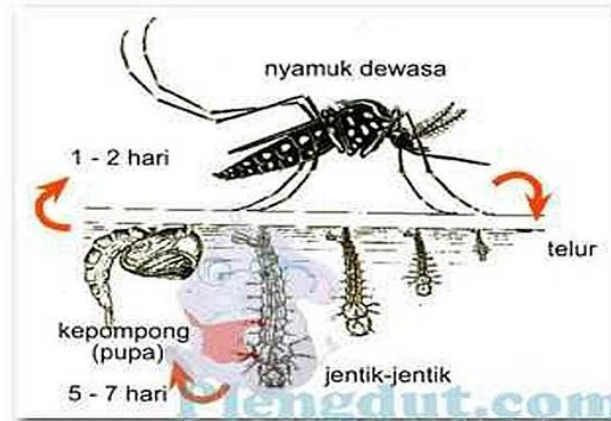


Figure 1 Mosquito breeding

The role of knowledge, behavior and home environment in the occurrence of DHF because the interaction between humans and the environment is not always beneficial, sometimes humans are even harmed such as contracting dengue fever. Environmental elements play an important role in determining the occurrence of the interaction process between humans and causative elements in the process of disease, poor environmental conditions provide advantages for disease viruses to multiply quickly (Fatmawati & Windarto, 2018)

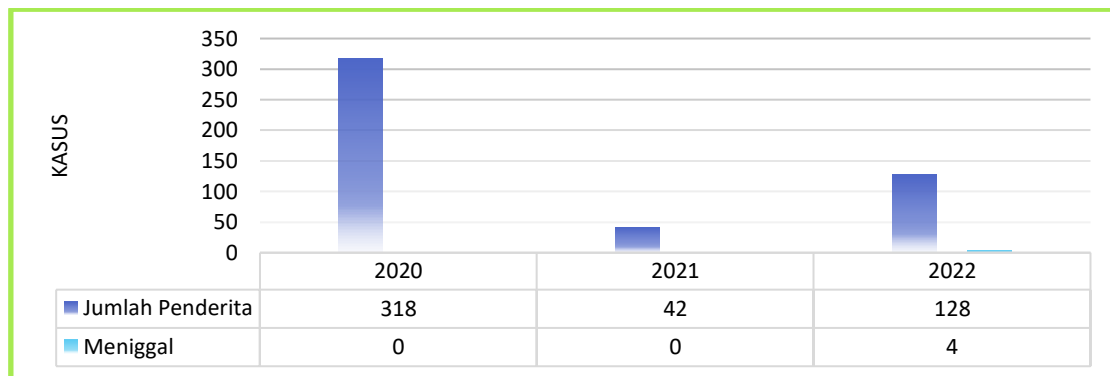
The carrier and spreader of dengue disease, *Aedes aegypti*, likes a poor quality environment, which is characterized by densely populated settlements with an environment that lacks sunlight, humid, dark, close to water with slow flow due to the presence of a lot of garbage, causing puddles as a breeding place for *Aedes aegypti* mosquitoes (mosquito ecosystem/habitat) (Theresia, Lestari, and Hutagaol, 2023). The transmission of dengue disease is influenced by the interaction of three factors, namely host factors (humans), causative factors (*Aedes aegypti*), and environmental factors that facilitate contact with dengue disease transmission (MEIZHEDIRA, 2021). In Timor-Leste the effect of seasons on dengue fever is not very clear, but in general it can be stated that the number of cases increases between January and February which reaches its peak in March. In densely populated areas of the city, the peak of sufferers is February or March, which coincides with the beginning of the rainy season. The ecology and climate of Timor-Leste State provide ideal conditions for mosquito nests.

This condition makes mosquitoes that cause Dengue Fever (DHF) multiply and freely transmit the virus to humans now and also in the future. Varied climatic conditions also provide opportunities for the development of dengue disease.

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Other factors of visits in people activities (*movimento*), immigration/transmigration, population growth, lack of economy, lack of health education, lack of control systems in the community greatly contribute to the occurrence rate of dengue disease, if there is no good disease eradication strategy, then dengue fever is still a problem for public health in economic development in Timor-Leste.

The incidence of dengue hemorrhagic fever in the sub-district (*Posto Administrativo*) Ermera continues to increase from 2020-2022 and the Gleno Health Center (*C entro Saúde*) is the *puskesmas* with a high number of Dengue Hemorrhagic Fever events throughout the municipality (*Município*) of Ermera, namely in 2020 282 cases were registered, in 2021 there were 42 cases and in January-February 2022 there were 128 cases of dengue registered (Dinas Health of the city of madia Ermera (*SSAM-Ermera*)).



Graph 1 Dengue case statistics for 2020 – 2022

Based on previous observations, it is known that no research has ever been conducted on the causes or factors associated with the incidence of dengue disease. Therefore, researchers want to examine what causes dengue fever in the area, because until now dengue cases in the region are still registered.

The incidence of DHF is influenced by many factors including, knowledge, home environment, preventive behavior and also factors such as virus-carrying agents, vulnerable hosts, and environments that support the development of mosquito populations. One that can affect the increase in morbidity and death rates due to this disease is the behavior of the community in implementing and maintaining environmental cleanliness. This happens because of the lack of public knowledge about dengue fever and the lack of practices or community participation in maintaining the cleanliness of the surrounding environment

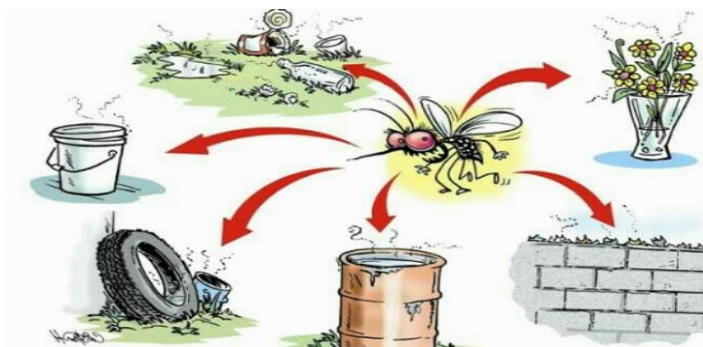


Figure 2 Environment that supports dengue mosquito breeding

Community knowledge and actions to control the density of *Aedes aegypti* mosquito larvae have a relationship with the presence of *Aedes aegypti* mosquito larvae. Knowledge, behavior and community home environment about DHF are important to improve because the better public knowledge about DHF can enable the emergence of behavior and community home environment regarding prevention that can reduce cases and mortality due to DHF (Prameswarie, Ramayanti, & Zalmih, 2022)

Method

This study uses qualitative methods with the research design used is an analytical survey method with a *case* study approach, which describes the characteristics of the population or phenomenon being studied and is occurring, aims to study the relationship between the independent variable and the dependent variable once and at the same time, through approaches, in-depth interviews, observational and data collection (Notoatmodjo, S, 2005).

This research is included in explanatory research research, which analyzes the relationship of research variables by testing the hypotheses formulated and studying the relationship between knowledge factors, home environment and prevention behavior with the incidence of DHF in families infected with DHF. This study was conducted in Ermera District, Madia Ermera City, Timor-Leste, in 2020, the ampel in this study is a part of the population that has certain characteristics that match the researchers' criteria, namely family members infected with dengue hemorrhagic fever (DHF) through a doctor's diagnosis or laboratory examination.

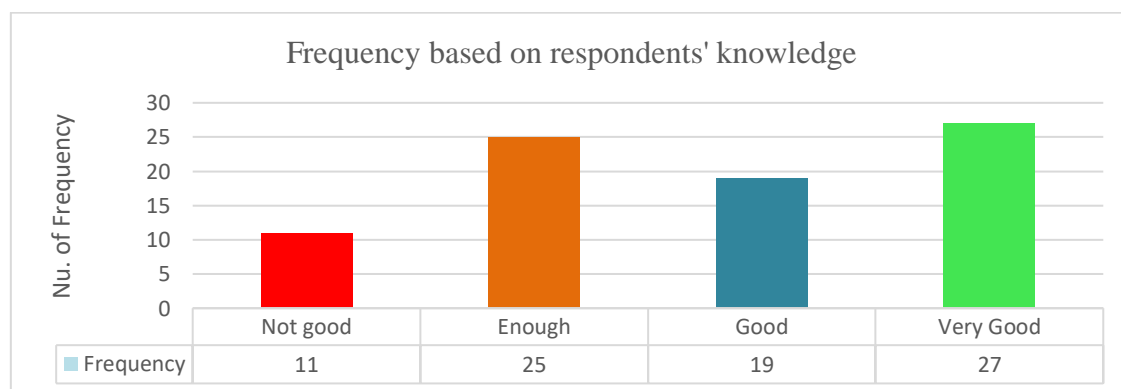
Result and Discussion

Result

Table 1
Respondent Overview

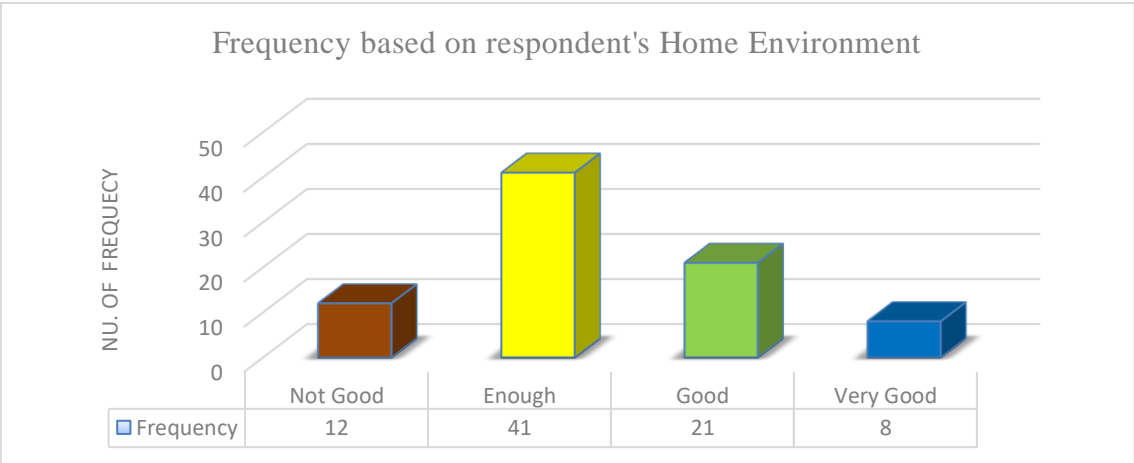
Characteristic	Category	Total	Persent (%)
Age	18-24 years	14	17%
	25-45 years	51	62%
	45-60 years	16	20%
	>60 years	1	1%
Education	ES-JHS	18	22%
	SHS	35	43%
	DI-DIII	9	11%
	S1-S3	20	24%
Work	Civil Servant	34	42%
	Businessman	6	7%
	Farmer	32	39%
	Student	10	12%
History of DHF or Family of DHF Patients	The	82	100%
	No	0	0%
Family Knowledge Level about DHF	Not good	36	44%
	Good	46	56%
Home Environment of DHF Family	Not good	53	65%
	Good	29	35%
Level of Family Prevention Behavior of DHF	Not good	48	59%
	Good	34	41%

The table above shows that the majority of respondents aged 25-45 years are 62%. The majority have a high school education with a percentage of 43%. All respondents were families of Dengue Hemorrhagic Fever 82% and DHF patients by 12%. The majority of respondents from family knowledge who were one member infected with DHF were not good by 48% and good by 39%. While the home environment towards DHF and preventive behavior is less good 84% and good by 16%, as well as preventive behavior from families who are infected with DHF which is less good 59% and good 41%.



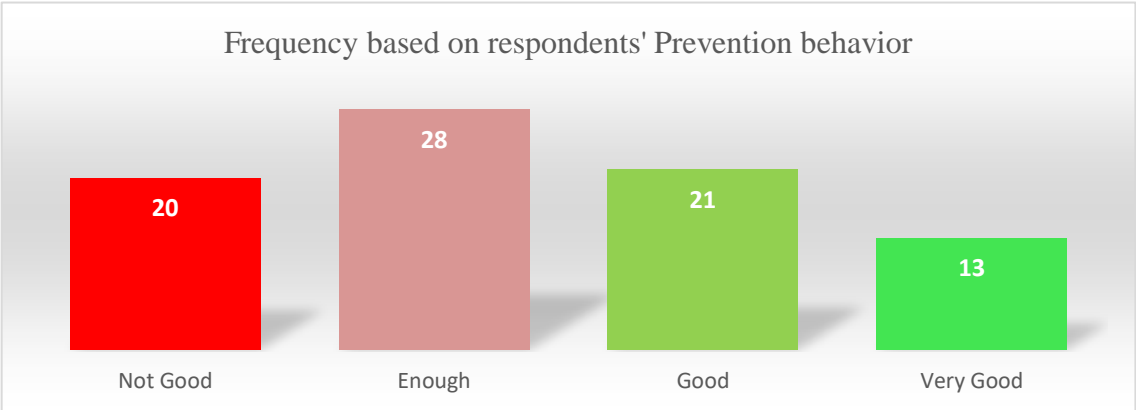
Graph 2 Frequency of respondents' knowledge

Based on the frequency beam work above, it shows that from 82 respondents. Respondents who gave responses with very good categories 27 with a percentage of 32.9%, respondents who gave responses with a fairly good category 25 people with a percentage of 30.5%. While in the good category there were 19 people with a percentage of 23.2% and respondents who responded with the poor category as many as 11 people with a percentage of 13.4%.



Graph 3 Frequency of respondents' home environment

Based on the beam graph above shows that from 82 respondents. Respondents who responded with a fairly good category were 41 people with a percentage of 50.0%, respondents who gave a response with a good category of 21 people with a percentage of 25.6%. While the very good category there were 8 people with a percentage of 9.8% and respondents with the poor category as many as 12 people with a percentage of 14.6%



Graph 4 Frequency of respondents' preventive behavior

Based on the beam chart above shows that out of 82 respondents. Respondents who responded with a very good category were 13 people with a percentage of 15.8%, respondents who gave a response with a fairly good category were 28 people with a

percentage of 34.1%. While in the good category there were 21 people with a percentage of 25.6% and respondents who responded with the poor category as many as 20 people

Bivariate Data Analysis

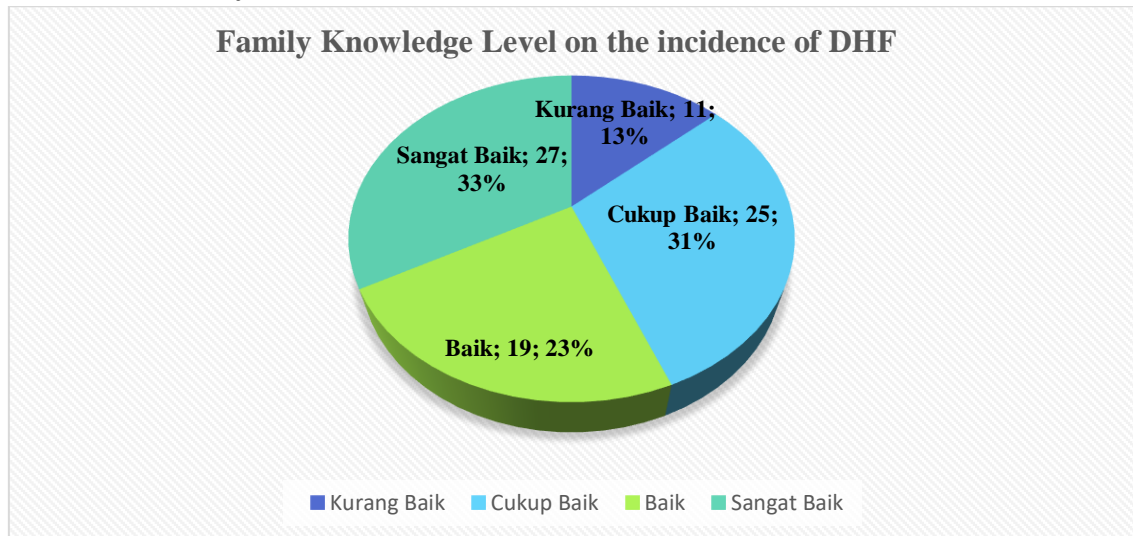


Diagram 1 The level of family knowledge of the incidence of DHF

Based on the diagram above shows that from 82 respondents. Respondents who responded with a very good category were 27 people, which means that the relationship between the level of knowledge about dengue events is very good, respondents with a fairly good category as many as 25 people, respondents with a good category as many as 19 people, while respondents who responded with poor knowledge as many as 11 people.

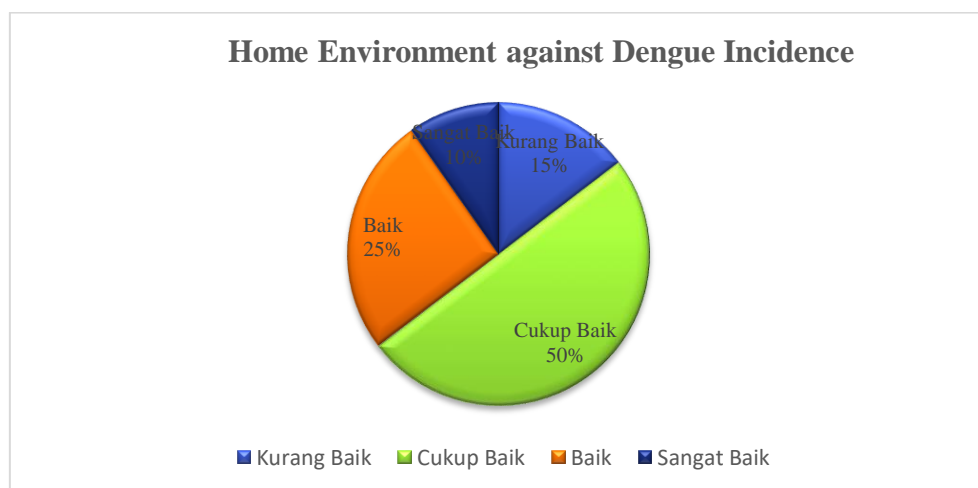


Diagram 2 Home environment against dengue incidence

Based on the diagram above shows that from 82 respondents. Respondents who responded with a fairly good category were 41 people, which means that the relationship between the home environment to the incidence of DHF is quite good, respondents with

a good category as many as 21 people, respondents with a bad category as many as 12 people, while respondents who responded with a very good home relationship as many as 8 people.

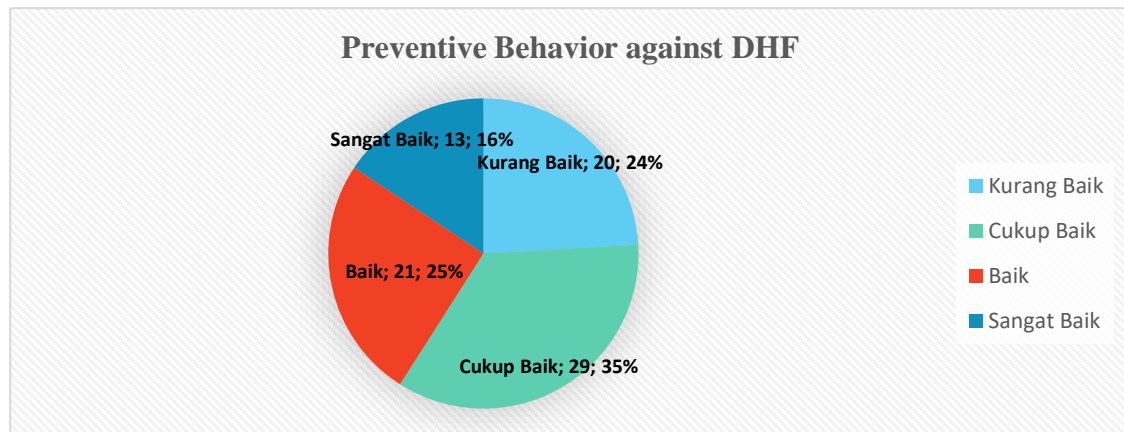


Diagram 3 Preventive behavior against DHF

Based on the diagram above shows that from 82 respondents. Respondents who responded with a very good category were 13 people, which means that the relationship between preventive behavior to dengue events is very good, respondents with a fairly good category as many as 28 people, respondents with a good category as many as 21 people, while respondents who responded with poor preventive behavior as many as 20 people.

Discussion

Good health can reduce poverty through improving one's capacity and knowledge. And in a healthy human spirit can improve the level of knowledge and income. The ecological condition of Timor Leste is ideal for the life of *Aedes Aegypti* mosquito vectors seen from irregular climatic conditions, an environment that has not been well organized, namely irrigation systems, insufficient clean water distribution, house conditions and good enough garbage arrangement can cause many suggestions of *Aedes Aegypti* mosquitoes to contribute to the incidence of Dengue Hemorrhagic Fever (DHF) (Ministerio da Saude TL, PENSS, 2011-2030).

This study used a sample of 82 respondents in 10 villages of Ermera District, Kotamadia Ermera, all respondents with an average of 18 years and over. The results showed that the level of knowledge was good (P value 0.048) *but there was a meaningful relationship between the home environment* of DHF families (P value 0.019) and the relationship of preventive behavior (P value 0.000) to the incidence of DHF. The conclusion of this study is the influence of the DHF family home environment and preventive behavior with the incidence of DHF.

The relationship between the level of knowledge to the incidence of DHF



Figure 3 Knowledge Level

The results of this study found that the majority of respondents with the last education was high school as many as 35 respondents (43%), respondents' education will affect the good and bad level of knowledge. From the study, it can be known that as many as 46 respondents have a good level of knowledge (56%) about Dengue Hemorrhagic Fever (DHF), symptoms, main causes and activities that can prevent DHF. While as many as 36 respondents have a fairly good level of knowledge (44%) about DHF treatment, symptoms, the main causes of the disease and activities that can avoid the disease. Thus, it can be interpreted that the level of family knowledge of DHF patients mostly still has a good level of knowledge and a small part has sufficient knowledge.

Knowledge can affect the degree of one's health, one form of health object can be described by knowledge gained from one's own experience (Notoatmodjo, 2012). A poor level of knowledge is at risk of dengue disease compared to those who have a good level of knowledge (Suhardiono, 2005). According to research (Ayudhay, 2014), cited by (Jastika, 2018), that a person's level of knowledge of dengue prevention behavior, one of which can be seen from the respondent's last education.

The level of education is one of the factors determining the level of knowledge a person has, this is supported in the theory that high semaking education is also the level of concern for health (Jastika, 2018). From the test results *Chi-Square* This study showed that there was no significant relationship between the level of family knowledge and the incidence of DHF (*p value 0.048*).

The relationship between the home environment and the incidence of DHF



Figure 4 Home Environment

Home environment, the occurrence of dengue disease cannot be separated from the interaction between dengue vectors containing dengue virus and humans through the role of the home environment as a medium of interaction. Some factors of the home environment that are considered to contribute to the occurrence of dengue disease include the density of the house, the presence of mosquito breeding sites, mosquito resting places, mosquito density, larvae free numbers, and others. Therefore, if the home environment is good, it greatly reduces the existence of vectors that cause DHF (Marwanty and Raw, 2019)

According to research (Deni Abdul Rahman, 2012), the existence of *Breeding place* is a place where mosquitoes can breed which is usually a place that can hold water (aquariums, drums, used cans, old tires, bamboo pieces, unused flower vases, used jars and others that can hold water) (Rahman, 2012)

The existence of breeding places around the home environment will affect the presence of mosquitoes themselves, the results showed a relationship between the existence of resting places (p value = 0.31, OR = 3.333), the practice of closing water reservoirs (p value = 0.342, OR = 1.840) with the incidence of DHF. From the results of the Chi-Square test in this study showed that there was a significant relationship between the patient's family home environment and the incidence of DHF (p value 0.019).

The relationship between preventive behavior towards dengue incidence



Figure 5 Preventive Behavior

Behavior is influenced by several factors (in Donsu, 2017), namely genetic factors which include the type of RAS, gender, physical traits, personality traits, innate talent, and intelligence. While external factors include environment, education, religion, socio-economy, and culture. **Preventive behavior**, Healthy living can be explained as a person's response to stimuli or objects related to illness and disease, health care systems, food, and beverages that can maintain and promote health (INTEN RATNA SARI, 2018). The better a person's behavior, the better his health.

According to research (Faradistiani R. J, 2018), that the existence of a positive attitude with support from someone will bring up positive behavior to do something in accordance with the object of their nature, and vice versa. In this case, if someone has a good attitude towards DHF prevention, then in that person will intend to carry out behaviors that can prevent DHF, supported by environmental factors, namely time, clean water and have knowledge about DHF prevention behavior.

Eradication of mosquito advice or breeding place can be done with 3M activities, namely draining or tying the bathtub once every week, closing water reservoirs, burying or disposing of used items and also other physical prevention activities, namely changing water in flower pots every week, floating every day in the home environment, with this activity it is hoped that mosquito larvae will not have the opportunity to breed and live sustainably. This is in line with behavior that refers to the prevention of DHF. From the results of the *Chi-Square test* in this study showed that there was a significant relationship between the preventive behavior of the patient's family with the incidence of DHF (*p value 0.000*).

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Conclusion

Based on the results of the research and discussion described above, the following conclusions are drawn; Respondents' knowledge of DHF is good, namely 56% of 82 respondents. The home environment of DHF families is not good with 65% of 82 respondents. The level of prevention behavior of DHF families is not good at 59% of 82 respondents. There is a significant relationship between the dengue home environment and the incidence of dengue fever in the sub-district (*Posto Administrativo*) Ermera, the occurrence of dengue disease cannot be separated from the interaction between dengue disease transmission vectors containing dengue virus and humans through the role of the home environment as a medium of interaction.

Some factors of the home environment that are considered to contribute to the occurrence of dengue disease include the density of the house, the presence of mosquito breeding sites, mosquito resting places, mosquito density, larvae free numbers, and others. Therefore, if the home environment is good, it greatly reduces the existence of vectors that cause DHF and if families who have a poor home environment will occur DHF. There is a significant relationship between the level of prevention behavior of dengue families and the incidence of dengue fever in the sub-district (*Posto Administrativo*) Ermera, the level of prevention of dengue families is not good at the occurrence of dengue disease.

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