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ISPHE

PROCEEDINGS

FIRST INTERNATIONAL SEMINAR ON PUBLIC HEALTH AND EDUCATION

GRAND CANDI HOTEL, SEMARANG CITY, SEPT 2ND 2014

BOOK 2

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FACULTY OF SPORTS SCIENCE
SEMARANG STATE UNIVERSITY

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FIRST INTERNATIONAL SEMINAR ON PUBLIC HEALTH AND EDUCATION (ISPHE) PROCEEDINGS

Public Health Department, Semarang State University

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PREFACE

Assalamu'alaikum warrahmatullahi wabarakatuh

Firstly, may we made our highest praise and thank to Allah The Almighty, for His bless so that we are able to conduct such an precious moment; First International Seminar on Public Health and Education 2014 in Semarang Indonesia, to share our knowledge and ideas with so much warm and friendship from worldwide public health and education community.

International Seminar on Public Health and Education 2014 is aimed to gather all of experts, researchers, academicians and practitioners in health education field in general as well as national and international level in one prestigious academic forum which to discuss all health-education-related issues, ranging from human resources, curriculum, institutionalization etc. The seminar also proposed to contribute to the focus of health development direction; by considering also situation and the status of local health condition from each region, both national and regional levels as well as its relation to global health trends

I would like to deliver our highest respect and appreciation to our honorable speakers, Prof. Dr. Ir. H. Musliar Kasim, M.S (Indonesia vice Minister of Education and Culture for Education Affairs) and to the Rector of Semarang State University for their support and appreciation on this seminar; and my deep gratitude to our honorable guests: Prof. Doune Macdonald (Queensland University Australia), Maria Consorcia LIM Quizon, MD (South Asia Field Epidemiology and Technology Network, Inc , Philippine), Dr. Khancit Limpakarnjanarat (WHO Indonesia Representative), and also Assist. Prof. Dr. Songpol Tornee (Srinakharinwirot University, Thailand). I really expect that this seminar will be beneficial for all of us and to the development of the Public Health and Education field.

Allow me to express my gratitude to the participants and audiences from Indonesia and other foreign countries who are enthusiastic in attending this seminar. I do hope that all audiences will gain important values and collaborate it into our own fields and make significant changes in the future. Besides that, I also convey my appreciation to all of organizing committee who has given their outstanding commitment for presenting this occasion.

Wassalamu'alaikum warrahmatullahi wabarakatuh

Sincerely yours

Rudatin Windraswara

Content

ORAL PRESENTATIONS

ORAL PRESENTATIONS

STUDY OF ENVIRONMENTAL FACTORS ON DENGUE HAEMORRHAGIC FEVER (DHF) CASES

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Abstract

Introduction: The research is conducted in Gorontalo city. The objectives of the research are to study about; correlation between physical environmental factors and DHF cases in Gorontalo city; correlation between Larvae Free Index and DHF cases; correlation between the spread of DHF cases and distance index and DHF infection; correlation between environmental sanitation factors with DHF cases; correlation between risk factors of DHF incidence with PSP in Gorontalo city.
Methods: This research is a survey using spatial and ecological approach, and quantitative descriptive methods. Data analyzing use statistical analysis such as frequency distribution, linear regression, multiple regression and Chi-Quadrate.
Results: The results research are; In DHF cases, there are a negative correlation to temperature factor as much as 61%, and a positive correlation to humadity factorequal to 60,3% with significant in the real level of 0,05%. While the rainfall factor has no significant correlation to DHF cases, and free larva numbers in Gorontalo city is still under the national standard of 95%; There is a correlation between environmental sanitation factors and DHF cases; The knowledge, behavior and participation factors in DHF control also has significant correlation to DHF cases, and the significant value is showed by $p<0.05$.

Key Words: Physical environment,social-culture, Dengue Hemorrhagic Fever

Introduction

Dengue Haemorrhagic Fever (DHF) is a disease caused by the dengue virus that attacks the main part of the transport system in the human body, namely blood. As a result of virus attack, the number of platelets in the blood will decrease, if the attack rate is high and it is handled slowly, it may result in fatal consequence, death. DHF is caused by the bite of mosquitos named *Aedes aegypti* and or *Aedes albopictus*. The bites of the two mosquito types cause a virus that enters the human body. This is what causes human suffering from DHF. The symptoms experienced by patients who suffer from DHF include headaches, high body temperature and high fever. In addition, dengue is categorized as a disease that potentially can be an outbreak. Dengue hemorrhagic fever of which has not been found the cure is highly related to environmental sanitation. Moreover, such condition happens because the vectors of this disease are *Aedes aegypti* and *Aedes albopictus* which live and breed around the settlements. (Hamzah, 2004)

DHF is still one of the diseases that should receive major attention both from government and the society. In 2009, the provinces with the mortality rate (MR) from the highest to the lowest are Bangka Belitung (4.58%), Bengkulu (3.08%) and Gorontalo (2.2%) while the provinces with the lowest mortality rate are West Sulawesi (0 %), Jakarta (0.11%), and Bali (0.15%). Mortality Rate has managed to achieve the national target that is below 1%, but most of the provinces (61.3%) have high MR which is still above 1% (Ministry of Health, 2009). It should be the concern to

Gorontalo province who has not reached the target in order to increase the efforts that can decrease the MR. The efforts that can be done are such as conducting training on the case management for the officer, providing facilities and infrastructure for early detection, and proper and quick handling for the DHF case.

Gorontalo city as the administrative center of the Gorontalo province has the development of various aspects such as in economic, social, cultural, agricultural, and industrial, as well as the high mobility of the population. These conditions certainly have an impact on the environment and the public health, such as changes in residential environment that supports the development of disease vectors as well as the decrease in population health status.

The development of *Aedes albopictus* and *Aedes aegypti* as the vector of DHF is closely related to environmental factors. It includes altitude, rainfall, air temperature, air humidity, density of settlements and population density.

Although various endeavors have been made to control the vectors of DHF disease, but The DHF cases is getting even higher from year to year. According to Boewono DT., et. al. (2012), "Some problems in the prevention efforts may be because of a possibility of DHF cases without symptoms (asymptomatic), the trans-ovarian transmission (virus passed on to the offspring through the ovum), the occurrence of the *Ae.* Aegypti resistance vector to insecticides, and the people's unhealthy behavior that supports the existence of mosquitoe habitats ".

Methods

Research procedures

Research procedure consists of preparation of thematic maps used in the study, and the classification and the criteria determination of environmental and social factors.

Preparation of thematic maps used in the study

Preparing thematic maps used in the study includes: Isohiet maps, temperature maps, humidity maps, altitude maps, population density maps, and residential density map.

Classification and criteria of environmental and social factors

From both the measurement of the field data and the results of the interpolation of the maps used as research parameters, it is carried out the classification and criteria determination. Classification method used in the study is by determining the class interval as proposed by Bintarto (1989). The formula is as follows.

$$\text{Class Interval} = \frac{\sum \text{highest score} - \sum \text{lowest score}}{\sum \text{class}}$$

Analysis of the relation between physical environmental factors and DHF cases.

The relation between climatic factors, which consists of precipitation, air temperature, and humidity, and DHF cases in the Gorontalo city is analyzed by simple and multiple regression analysis. In which the climatic factor is the independent variables (X) and the DHF case is the dependent variable (Y).

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Analysis and relation between environmental sanitation factors and DHF cases

The relation between environmental sanitation (clean water, sanitation, environmental hygiene, and drainage) and DHF cases in the Gorontalo city is analyzed in the form of cross-tabulation with Chi-squares with a significant probability of 0.05.

Analysis of the relation between factors KAP (Knowledge, Attitude / behavior, and Participation) and DHF Case

The relation between the respondents' knowledge, the respondent's behavior, and community participation in DHF control and DHF cases in Gorontalo city is analyzed in the form of cross-tabulations with Chi-squares with a significant probability of 0.05, it can be concluded that there is a relation.

Results and Discussion

Geographic location, border, and area of the study

Gorontalo city is one of the six regions located in Gorontalo province, which borders Gorontalo and Bone Bolango regency. Geographically, it has 64.79 km^2 in width or 0.58 percent of the Gorontalo province. Astronomically, Gorontalo city is located between 00° 28 '17' - 00° 35 '56' of North Latitude and between 122°59 '44' '- 123° 05' 59 'of east longitude. Based on its geographical position, Gorontalo City has boundaries which are in the Northern part is Tapa district in Bone Bolango district. The southern part is bordered by Tomini Bay. Western part is bordered by Telaga and Batudaa district of Gorontalo regency. The eastern part is bordered by Kabi;a district, Bone Bolango regency. The distance between the capital city of Gorontalo to the districts and all-regions, namely: (1) To the Districts: Gorontalo-Kota Barat (4,00 km), Gorontalo-Kota Selatan (0,40 km), Gorontalo-Kota Utara (4,00 km), Gorontalo-Kota Timur (3,00 km), dan Gorontalo-Dungingi (5,00 km); (2) To-Regions: Gorontalo-Limboto (16.00 km), Gorontalo-Kotamobagu (251.09 km), Manado-Gorontalo (442.81 km), Gorontalo-Tondano via Tomohon (474.07 km), Gorontalo-Tahuna (992.81 km), and Gorontalo-Bitung (484.20 km).

Gorontalo city is divided into six (6) districts and it consists of 49 villages. These districts include Kota Barat District, Dungingi, Kota Selatan district, Kota Timur district, Kota Utara district, and Kota Tengah district. The largest district is Kota Bara with area of 15.16 ha or 23.40 percent. The width of the smallest district, the Dungingi District, covers 4.10 ha or 6.33 percent.

Number and population density

The number of population in 2010 decreased by 1734 people. The decrease in population occurred in four districts namely Kota Barat, Kota Selatan, Kota Timur and Dungingi. Kota Selatan District is the district where the decrease of the population is the highest, 2289 people. On the other hand, the district which has the least decrease of population is Dungingi district which is 384 people.

Population density describes the ratio of the number of population per unit area of the region presented by measuring number of people/km2. Based on the results of data analysis of

population density and associated with the number of people suffer from DHF in 2010, it is concluded that there is no relationship between the population density with the number of DHF sufferers. Districts based on the population density from the highest one to the lowest are Kota Tengah District, Dungingi District, Kota Timur district, Kota Selatan district, Kota Utara district, and Kota Barat district with the number of cases of each are 35, 60, 26, 45, 20, and 19 people.

Types of population's profession

Types of work done by Gorontalo citizens include Civil Service, Army, Police, Teacher, Lecturer, Doctor, Midwife/Nurse, Legislative Members, Students and Student Colleges, private Employees, Entrepreneurs, Farmers, Fishermen, breeders, labors, servants, and not yet working or jobless.

The relationship between employment with DHF is more about over the activities of a person / worker outside the house. It means there is an opportunity to be exposed to the bite of the *Aedes aegypti* both inside and outside the house. The relationship between people's activity, in which the higher the activity, the more fatigue the condition of the body. Thus, the condition where the body is unhealthy (fatigue), it is easy for the virus to transmit through the bite of *Aedes aegypti* mosquito. And it can cause people sick.

Health facilities

The number of health facilities in 2010 such as public hospitals, health centers, sub health, yandu Post, and others, has not changed much. In 2010, there were only 1 public hospital, 3 private hospitals, 2 maternity hospitals, and 7 health centers, 33 auxiliary health centers and 132 health posts. The number of health facilities is very important in helpin the treatment of DHF disease. Based on the data of Gorontalo City Health Department, almost every district in Gorontalo has a health center. In Kota Baru, there are two of it. In Gorontalo city, there is also an auxiliary health center located in each village. In addition, the highest number of auxiliary health centers is located in Kota Selatan. On the other hand, in Kota Tengah and Dungingi districts, there are only four auxiliary health centers. Referring to the availability of health centers in every district, it is easy for the immediate treatment of DHF disease.

The spreading of DHF cases in year 2003-2010

DHF disease is a disease caused by factors such as people's behavior and the environment where people live. The secondary data obtained showed that the number DHF sufferers in Gorontalo City increased from year to year. This is even found in each district. At the district level, DHF surveillance generated data in the form of number of DHF sufferers which fluctuated from year to year. In 2003, there were 20 DHF sufferers in Kota Tengah, Kota Selatan and Kota Timur districts with two of them were passed away. In 2004, there were two cases without death toll in Kota Selatan and Kota Timur districts. In 2005, the number of the sufferers has increased drastically. There are 184 cases with the death toll 5 occurred in five districts. In the 2006 to 2010 DHF cases have been found in all the districts in Gorontalo city. In 2006, the number of the sufferers is 170 with 2 death cases. In 2007, there were 124 cases of DHF with 3 death cases. In

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2008, there were 99 cases. In 2009, there were 86 cases and in 2010, there was an increase of DHF cases that is by 205 patients. From the data between 2003-2010, since it was found the DHF cases, there is an increase of the DHF cases from three to five years.

DHF vector conditions

Larva Free Numeric Data (LFND) which is obtained from the health centers in six District in Gorontalo City showed that *Aedes aegypti* population is quite high in each district.

The value of LFND in Dungingi 61%, Kota Tengah 78%, Kota Utara 79%, Kota Selatan 74% and Kota Barat (Buladu 82% and Pilolodaa 95%) (see Table 4.9). Based on the data above, the value is still far below the national standard which is 95%. Low LFND illustrates the lack of community participation in eradicating mosquitoes. Thus, it triggers the increase of the population of *Aedes aegypti* mosquitoes and this is what causes DHF transmitted.

The increasing population of Aedes aegypti is caused by the lack of public participation in doing the mosquito larvae eradication (MLE), as well as the use of insecticide which less effective. The fact that there are insecticides used in Gorontalo city since the finding of DHF, from 2003 until now it uses the insecticide called *Malation*. This causes *Aedes aegypti* become resistant. "The use of insecticides in the control of *Aedes aegypti* mosquitoes needs to be replaced with the alternative insecticide." (Boewono, DT, et.al, 2012).

Physical environmental conditions

The discussion of the physical environmental conditions in the study includes climate factor namely rainfall, air temperature, air humidity, altitude, and environmental sanitation.

Climate

Climatic factors affect the growth of *Aedes aegypti* mosquito larvae that causes dengue transmission. There are three namely dengue virus, the presence of the vector (as an intermediary) and the third is human factor. Dengue virus transmits to the human body through the bite of its mosquito vector that is *Aedes aegypti*. Climatic factors, especially in the rainy season and the availability of container that can hold rainwater, it means that there are potential places for reproduction (habitat) of the *Aedes aegypti*.

Temperature

Temperature is a measure of the relative thermal conditions possessed by an object. Air temperature or temperature data are generally hard to obtain because not all the rainfall stations have the data of temperature. The temperature data is obtained from secondary data by means of interpolation of five temperature recording stations located around the Gorontalo city, which includes Tapa, Kabila Suwawa, Taludaa and BGM Jalaludin stations.

The rainy and the dry seasons have an influence on the level of temperature on the environment. This influence tends to be local to a particular time period only. This is due to the more complex temperature and humidity levels and also influenced by global phenomenon, regional and topography as well as the vegetation. When it is season changes from rainy season to dry season,

air temperature ranges between 23°C-31°C, it means this is the optimum temperature range for breeding mosquitoes (24 ° C -28 ° C).

Air humidity

Air humidity tells the number of air humidity of water vapor in the air. The water vapor in the air is a small part of the whole atmosphere and air components which are are very important in terms of weather and climate. Water vapor is not constant, varying from 0% to 5%. The greater the amount of water vapors in the air, the greater the amount of latent potential energy available in the atmosphere. This is the source/origin of storm. The minimum average range of air humidity is 72.05%-74.34 and the air temperature 27,38^{0}C-27,56^{0}C on September it was found 2 cases of DHF.

Altitude

Altitude is one of the environmental factors that influence the growth of the Aedes aegypti as the DHF vector. The process of making a height map as the base map is from a contour map of Gorontalo city with the scale 1: 50,000. The height map can be used to determine the spreading of altitude according to the administration area. Therefore, village or district as a potential habitat for the mosquito Aedes aegypti can be recognized through the DHF sufferers.

Residential Density Conditions

Density settlements, settlement increase, the management of the urban environment that is not optimal and not supported by the climatic conditions, will accelerate the spread of DHF. This raises the major issues that must be solved. The unavailability of the determination on the appropriate level of vulnerability of the region to the breeding of *Aedes aegypti* and *Aedes albopictus* mosquitoes makes the efforts to eradicate those DHF vectors harder. It also costs more and will take a long time to make it.

The residential density is the distance of home buildings that indicates the condition of the air circulation and comfort to reside. High density settlements show the limited distance between the buildings, so that the air circulation cannot be going well. The bad air circulation will make the settlements dump, and it becomes a good medium for the proliferation of disease-carrying viruses and bacteria.

Sanitation conditions

The condition of environmental sanitation from the result of field observations include population density, waste management, water canal conditions, water containers, environment hygiene, land use, density of settlement, and settlement patterns in each district is as follows (the results of the field survey is presented in appendix on survey data field). The basic sanitation efforts include the provision of clean water, latrines (human waste disposal), waste management and drainage (canal) of liquid waste disposal.

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Water Supply

Based on the Regulation of the Minister of Health, 416/Min. of Health/Per/IX/1990, clean water "is water that is used for everyday purposes that qualifies the quality of health and it is drinkable when it is already boiled. Air is one of the human needs to meet the standards of a healthy human life ".

Water sanitation is the infrastructure along with its tools and equipment that produce, supply and distribute clean water to the community. Types of clean water in Gorontalo city include dug wells, hand pump shallow wells, rain water reservoirs, springs storage, and piping. Water circulation, water utilization, and the nature of water allow the water effect on health. "In particular, the influence of water on health can be direct or indirect" (Soemirat, 2002).

Latrine

Latrine is a facility to dispose of human waste. Human waste is all objects or substances which are not used anymore by the body and must be removed. Substances that are removed from the body are feces, urine and CO2 as a result of breathing process. "Disposal of human waste in the environmental health sciences are aimed for feces and urine, but generally called latrines, privy or toilets" (Notoatmodjo, 2003).

Waste management

In general, the waste management Gorontalo city is actually good enough. It is proved by the city of Gorontalo as the five year Adipura achiever. Waste management facilities Gorontalo city are namely the availability of permanent waste disposal sites while temporary waste disposal site is place in a public place such as school, market, bus stations, harbor, on the side of the road and the residential units, especially in the housing complex. Household level waste management is still limited to the collection and subsequently burned or transported to the permanent waste disposal site by a janitor.

Environmental hygiene which is fairly considered by the resident of household waste from each house was collected to the temporary waste disposal sites either supplied by each household or those provided by the Cleanliness city agency from the department of environment. Thus, it is then transported by car as a routine janitor to permanent waste disposal sites.

Knowledge, attitude / behavior and participation (KAP)

Age

Nadesul, (2007) suggests that "DHF is actually a disease that attacks children only. However, in the last few years this disease also affects adults". The range age suffering from DHF survey and the field data in Gorontalo city ranged from age 0 year to > 60 years. The youngest age range of the respondents who suffer from is 10, while the oldest is 64 years old.

Results of interviews shows that 58.05% (15-59 years) of DHF patients were in the productive age, the second highest was 41.46% which is in the range between 0-14 years old and the least is the only one person whose age is 60 years old.

The characteristics of respondents (age) is the highest is from the productive age (119 people). This result is different from the situation nationally, that based on the report of the extraordinary occurrence in sub directorate of the Ministry of Health (2009), "there was a shift in DHF cases by age group in period 1993 to 2009."

Sex

DHF is a disease that continues throughout the year in Indonesia, hence such disease is called as an endemic. "This shows that this disease can attack both men and women alike with no exception" (Misnadiarly, 2009). The characteristics of the respondents viewed from results obtained 104 (50.73%) of the respondents were male and 101 were female respondents (49 274%). Based on Table 4.13 and Figure 4.12 in Gorontalo city there is no difference between the number of cases of men and women. This is differed from Soemirat (2005) who says that "there is a difference of various diseases attacking between men and women, as well as the risk will be higher tc women compared with men ".

Education

Education increases the knowledge and understanding of health. It increases the awareness of the concept of healthy and sick. Thus, it affects the point of view of one's way of life and efforts to improve health status. The eradication of *Aedes aegypti* should be an immediate need and the result of it should be preserved so that the attempt to nourish themselves and their surroundings will be carried out spontaneously. This eventually will become a habit, attitude and behavior of a person to live a healthy life.

Characteristics of respondents by educational level show that there is no the never finish primary school or never school people, 102 (49.8%) high school graduate respondents, 25 (12,2,8%) primary school respondents, 26 (12.7) junior high school graduate respondents, and 39 (19.0%) college graduate respondents.

Job

The characteristics of respondents by occupation in Gorontalo city show that most of Gorontalo citizens did not work which were counted to be 75 (36.59%) of them. Those who are working in the service sector 7 (3.41%), merchant with 12 (5.85%) people self-employed with 19 (9.27%) people, private employees with 19 (9.27%) people, civil servants with 25 (7.32%) people and in other fields are 52 (25.37%) people. Based on the data analysis of the type of work of the Gorontalo citizens, it is obtained that the highest number of the not working are children. It shows the everyone with every type of job is vulnerable to DHF disease.

Behavior Society

Human behavior is essentially a human activity done on their own. Behavior is a reflection of a variety of psychiatric symptoms, such as knowledge, desire, will, interest, motivation, perception, attitude, and so on. Meanwhile, psychiatric symptoms are also influenced by the experience, confidence, facilities and socio-cultural factors that exist in the environment (Notoatmodjo, 1993). "Behavior is the result of all kinds of human experiences and interaction with the environment

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which is manifested in the form of knowledge, attitudes and actions" (Sarwono, 1993: 1). According to Notoatmodjo (1993), "health behavior is basically a response to stimuli associated with illness and disease, health care systems, food and environment". In addition, health behavior according to Becker (in Notoatmodjo, 1997: 124) is "activities done relating to one's actions in maintaining and improving health ".

Society's knowledge

The assessment of knowledge about DHF was measured by 14 questions covering knowledge about DHF, DHF source of information, DHF symptoms, DHF transmission, DHF that can be contagious, kinds of insect causes DHF, the breeding places of DHF-causing mosquitoes, DHF vectors' activity, the risk to be infected by DHF, and DHF can be prevented.

Notoatmodjo (2003) states, "Knowledge is the result of knowing. It is created after sensing a certain object by the human senses". The knowledge of the respondents regarding the DHF and its vectors as well as the factors that influence the presence of Aedes aegypti is needed to prevent and suppress the growth and the transmission of DHF and its vectors.

Knowledge about DHF

From the result of collecting 205 respondents' knowledge, it is obtained the frequency analysis results shows that the respondents who have ever heard about DHF are 79 (38.5%) of the respondents, and those who had never heard of DHF are 126 (61.5%) of the respondents. This can be one of the further efforts to improve education and dissemination of information to the public about dengue.

Source of Information about Dengue Hemorrhagic Fever (DHF)

The sources of information about dengue can be obtained from the cadres and health workers as well as electronic media (TV / Radio) and newspapers. Health cadres are those who were recruited by the Department of Heaith who then trained to become facilitators for health workers as well as assigned to include in helping the public health centers. Cadres of health are those from housewives who joined the Family Welfare Movement (FWM) group who had been trained by health workers to deal with the symptoms, prevent DHF. On the other hand, health workers are civil servants. The sources of information about DHF include cadres of health, health workers, electronic media (TV / Radio), and newspapers.

DHF Symptoms

Symptoms of DHF illness is not typical and specific in nature. It means that the "signs and symptoms can vary for each patient based on the degree they experienced" (Hamzah, 2004). The knowledge of the respondents about the signs or symptoms of people suffering from DHF, from the questions asked that the signs and symptoms of people affected by DHF are headache, bone pain, fever, and those are all true. Based on Table 4:19, 79 people or 38.5% of respondents knew about the signs or symptoms when someone is suffering from DHF, such as high fever, headache, bone pain and fever. However, 99 people (48.3%) of respondents knew that the symptoms are only the

high temperature. Those who knew fever are 22 people (10.7%), and headache and bone pain are 5 (2.4%) people.

Ways of DHF to transmit

Society plays an important role in the efforts to eradicate DHF. For example, the role of the community in surveillance of DHF, where people can recognize the early signs of DHF that may attack one of the family members or their neighbors, so they can be hospitalized immediately in the nearest health care facility. "Surveillance activity is a series of activities that are regularly and continuously, actively or passively observing, collecting, analyzing, and interpreting a phenomenon on human health / particular community and the result is used to take action against these health occurrences" (Directorate of Health and Nutrition society, 2006).

Knowledge about dengue

Misnadiarly, (2009) mengemuakan that "Dengue hemorrhagic fever is an infectious disease caused by the dengue virus and transmitted by the bite of Aedes aegypti" .Pengetahuan about whether dengue is contagious or not, of the 205 respondents that as many as 50 people or 24.4% figure that dengue is an infectious disease, dengue is not transmitted 118 people (57.6%), a highly contagious 1 person (0.5%) and did not know 36 people (17.6%).

Type of Insects

People's knowledge about the insect causing DHF which is mosquito Aedes aegypti is still low. There are 131 (63.9%) of the respondents who do not know the Aedes aegypti mosquito causing DHF. This indicates that most respondents do not know the Aedes aegypti mosquito is the cause of DHF.

Breeding place for Aedes aegypti

Breeding places for mosquitoes are the stagnant water and water reservoirs. 35 (17.1%) of the respondents said that they know the breeding places for mosquitoes which is the stagnant water and 154 (75.1%) of the respondents said it is in the water reservoirs, while the remaining 16 people knowing where the breeding place for Aedes aegypti is in the bathroom tub and landfills. This is in accordance with the opinion of Sigit and Hadi (2006), that: "The breeding places for Aedes Aegepti mosquitoes are in shelters that are not paved soil such as the tub, jars, drums, flower vases, and used items that can collect rain water".

Time biting mosquito *Aedes aegypti*

Aedes aegypti, the mosquito's biting activity is during the day, morning and in the afternoon (Sigit and Hadi, 2006). Knowledge of respondents regarding when a mosquito bites an analysis of the results obtained indicated that the results of 46 people have said that it is the morning and evening, or it is the 22.4 percent of the respondents. A total of 5 people declare mosquito bites occur at night or 2.4 percent, while those who state the whole day are just 142 people, or 69.3 percent.

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DHF can be prevented

Respondents' knowledge about the symptoms, signs and causes of DHF is fairly good. They also has well know about the breeding places for mosquitoes as well as anyone who commonly can be infected and DHF actually can be prevented respondent. The level of knowledge of the population is strongly influenced by the information obtained either directly or from the results of learning. If the information is not delivered right on target, it is due to the delivery of information or transfer information from health workers to the health cadres at the lower levels. Besides, it is also influenced by the "media to deliver information through counseling, electronic media, practice, leaflets and banners" (Notoatmodjo, 2003).

Community action

Components society actions captured by the questions about dengue symptoms of dengue fever include how to handle DHF symptoms, efforts to avoid the bites, usig the temefos, cleaning up efforts with voluntary work, counseling and organizing outreach activities about DHF. Notoatmodjo (2003) suggested that "action is the manifestation of attitudes into real action".

The provision of information is critical for handling DHF case and it is where one can directly receive information from health professionals about the mosquito causing DHF. Rogers in Notoatmodjo (2003) states that before adopting new behavior, there happens the following process inside one's self: (1) Awarenes in which one recognizes in term of knowing about the stimuli or object.; (2) Interest for the stimuli or the object. In this case, subject's attitude starts to appear. ; (3) Evaluation on either it is good or not about the stimuli for him. This means that the respondents' attitude is getting better; (4) Trial, where the subject starts to try to do something according to what is desired by the stimulus and; (5) Adaption, where the subject has recently behaved in accordance with the knowledge, awareness, and attitude toward the stimulus.

The Relationship of Physical Environmental Factors on Dengue Cases

DHF is a vector-based disease that becomes a major cause of death in many tropical countries. The increase of DHF cases is influenced by several factors. One of which is the lack of attention on the climatic factors. The least attention on climatic factors in DHF prevention program resulted in the prevention and control of DHF less than the maximum. If what becomes the concern is only the DHF sufferers, outbreak of concern are patients, however, the efforts to anticipate the causing will be still lacking.

Relationship between Rainfall on DHF cases in Gorontalo city

DHF cases always occur in every rainy season (before, in the middle, and after the season). Rainy season becomes the factor causing DHF due environmental factors that support the growt of larvae of *Aedes aegypti*. This is according to McMichael (2006) in one epidemiological bulletin (2010) states that "climate change causes changes in rainfall, temperature, humidity, air direction so that it also affects the terrestrial and marine ecosystems as well as affecting health, especially the proliferation of disease vectors such as mosquitoes *Aedes*, malaria and such before and after the monsoon season ".

The analysis of the relationships between rainfalls with dengue cases uses statistical analysis with SPSS 16.0. Based on the results of the correlation coefficient in attachment 9, it can be known that the relationship between rainfall and dengue cases showed no association with (R = 0.47). The coefficient of determination (R2) is 0.223, meaning that the regression line equation can explain that variation which is 22.3% of dengue cases based rainfall factors as the determinant of dengue cases in Gorontalo city in 2010. In addition, 77.7% of dengue cases variation is explained by other factors. Next, from the analysis of variance (F test), the value of F (count) is 2.874 with a probability of 0.121, which is much larger than 0.05. It can be said that the relationship was not significant / non-significant with a constant value (a value) is -12.996 and the value of b = 0.222 so the regression equation: Y = a + bx, so the DHF cases = -12 996 + 0.222 (Rainfall).

Temperature relationship with DHF cases in the city of Gorontalo

The rainy and dry seasons have an influence on the level of temperature of the environment. The effect of temperatures tends to be local to a particular time period, this is due to the more complex temperature and humidity levels and also influenced by global phenomenon, regional and topography and vegetation. The changes of season from rainy season to dry season make the conditions of temperature ranging between 23°C-31°C. *Aedes aegypti* mosquito usually lives at low temperature with decreased metabolism, and even stops when the temperature drops to below the critical temperature. Meanwhile, temperatures which is higher than 35 ° C can affect physiologic process, the optimum temperature for mosquito growth is 25 ° C -30 ° C (WHO, 2003).

The Relationship between Air Humidity with DHF case in Gorontalo city

Air humidity becomes one of the environmental factors that determine the development of *Aedes aegypti* mosquito larvae. Air humidity monthly average ranged between 72%-83.5%. Lowest humidity occurs in September (72.05%) and the highest is in January (83.49%). The ideal humidity for the growth or breeding of the Aedes aegypti mosquito is 60-80%. Humidity affects the Aedes aegypti mosquito breeding cycle. If it is less of dumpness, the eggs can hatch in a long time, and it can reach three months. If it is more than three months, the eggs will decrease its fecundity (no longer able to hatch). Although, it is only a week, if the humidity is quite high (> 70%) embryos can still grow in its eggshell.

The relationship between Altitude with dengue cases in the city of Gorontalo

DHF is a health problem in the tropical region. This is an endemic disease. This disease spreads over most parts of Indonesia, and repeatedly raises Extraordinary Events (KLB) which followed by the death of many of its sufferers . The disease is transmitted by the mosquito *Aedes aegypti* and i is influenced by various factors, including the altitude factor.

The relationship Index of Larva Free with DHF cases in the city of Gorontalo

DHF is a public health problem. An area is said to be free is when the index of larva free is ≥ 95%, and no free larvae <95%. By analysis of variance, the value of F (count) of 29 166 with a probability of 0.003, which is much smaller than 0.05, the linear regression model Y = 161.98 - 1.68X can be used to predict the DHF patients, or in other words, it has nothing to do with the

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increase in the index of larva free decline in the growth of DHF mosquito larvae resulting in a decrease in the number of DHF. The regression of the larva free index coefficient of 1.68 explains that each decrease of 1% larva free index can contribute to the decline in mosquito larvae which causes a decrease in DHF cases around 1.68 people (rounded 2).

The Index of Distance and spreading of DHF Cases

Gorontalo city is a city that is DHF endemic, because of DHF cases increased year by year. In 2010, the number of DHF cases are 205, after conducting the distance index, indicating that the distance between the case for all districts in the city of Gorontalo is located between 0-50 meters.

The buffer zone showed that the location of the house between dengue cases in the city of Gorontalo is relatively adjacent which are 50 meters. This could potentially be a source of transmission of DHF. The transmission of DHF in Gorontalo city is largely determined by the behavior of the mosquito vector *Aedes aegypti* (<100 m). The results of this study support the claim of Boewono DT, et. al. 2012 that states that: "The transmission distance of DHF is 100 meters in accordance with the flying range (flight range) of the mosquitoes *Aedes aegypti*".

The Relationship between Environmental Sanitation with DHF Cases in Gorontalo city.

Environmental sanitation is a factor to determine whether or not the condition of a good environmental sanitation. The components include settlements, provision of clean water, latrines, sanitation, and waste disposal management. In general, the condition of the environment in Gorontalo city is good enough, it is supported by the availability of water and clean water supply systems, waste management and waste management facilities in the city of Gorontalo as well as the residential density.

The Relationship between KAP (Knowledge, Attitude / behavior and participation) with DHF cases in Gorontalo City

Socio-cultural factors were analyzed further is the level of knowledge, the behavior of the respondent, and the respondent's participation in the control of DHF and DHF cases occurs in the city of Gorontalo is described below.

The relationship between Knowledge with DHF Case

"Knowledge is the cognitive process of a person or individuals to give meaning to the environment, so that each individual will give their own meaning to stimuli even if the stimuli received is the same", (Winardi, 1992). "Knowledge is the result of the sensing of an object. Sensing is largely derived from the vision and hearing ", (Notoatmodjo, 1993).

The relationship between Respondent's Behavior with DHF Cases

Human behavior is essentially an activity done by himself. "Behavior is a reflection of a variety of psychiatric symptoms, such as knowledge, desire, will, interest, motivation, perception, attitude, and so on. Meanwhile, that psychiatric symptoms are also influenced by the experience, confidence, facilities and socio-cultural factors that exist in their environment "(Notoatmodjo, 1993)." Behavior is the result of all kinds of human experiences and interaction with the

environment that is manifested in the form of knowledge, attitudes and actions ". (Sarwono, 1993:1).

Relations Community Participation in Dengue Control

Participation is an effort for someone to be involved in the control of DHF in Gorontalo city. Participation is a process where all relevant parties (stakeholders) are actively involved in the activities, starting from planning to implementation. "Involvement of all groups does not necessarily mean physically involved, but the important thing is to ensure the involvement of all stakeholders procedure can represent all interests" (Sambroek and Eger , 1996). Furthermore, Bryant (1983) in Slamet (1993), argued that: "In a community, participation activities are influenced by the benefits received, costs spent, and the risk that must be faced in the implementation of activities".

Closing

Based on the analysis and discussion described in Chapter IV, it can be concluded that the DHF cases in the city of Gorontalo related to some physical environmental factors, environmental sanitation and the KAP factor (knowledge, attitudes / behaviors, participation). In general, there obtained some conclusions as follows: (1) The physical environmental factors in Gorontalo city including rainfall, air temperature, air humidity, and altitude have a relationship with DHF cases. In conditions of high rainfall (158.63), the number of cases is 96. When temperature > 27^{0}C, the number of cases is 197. With the humidity <80, the number of cases is 134, and with altitude <50 m above sea level, it occured 115 cases, with the height of above sea level 50 -> 100 m, the number of cases is 90 case; (2) Free Larva Index has a relationship with DHF cases. The average of Free Larva Index in 2010 in the city of Gorontalo is still below the national standard (95%), the public participation needs to be improved; (3) The spreading of DHF cases in Gorontalo city is clustered, with an index of 50 meters and transmission caused by the Aedes aegypti mosquito behavior; (4) Environmental sanitation factors have a relationship with DHF cases. Poor sanitation conditions are reflected with larva free index <95% and the number cases occurred in 2010 was 205 cases; (5) KAP community factors including the level of knowledge, behavior and participation in DHF control has a relationship with DHF cases in each region of districts in the city of Gorontalo. The higher the knowledge, the lower the respondents' possibility of DHF transmission. The better the behavior, then the smaller the number of DHF patients. The higher the participation, the lower the DHF cases in the city of Gorontalo.

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