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Analysis of Risk Factor for incidence of Dengue Hemorrhagic Fever in Tana Toraja period 2012-2015

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Abstract- Dengue Hemorrhagic Fever (DHF) is a disease caused by the dengue virus. The virus is transmitted through the bite of the mosquito Aedes aegypti. Incidence of DHF is often associated with air temperature, humidity, rainfall, and the mobility of tourists. Tana Toraja is a plateau area and the tourism area. DHF is a new disease and have been found dead in Tana Toraja in the last three years. The purpose of this study to analyze the risk factors Of Dengue Hemorrhagic Fever (DHF) in Tana Toraja Period 2012-2015. Design used in this research is the ecology study time trend. This study was to determine the influence of air temperature, humidity, rainfall and mobility of the rating on the incidence of DHF each month in the period 2012-2015 in Tana Toraja. The unit of analysis of this research is the time. The results of this study air temperature (p= 0.027) and rainfall (p= 0.001) significant value <0.05 it means significant effect on the incidence of the DHF. This is because the vector mosquitoes carrying dengue virus can survive at low temperatures in Tana Toraja with an average of 22.8°C, while rainfall has a contribution in the habitat of the vector mosquitoes carrying dengue virus as a breeding place.

Keywords- DHF, Climate, Mobility

1. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a disease caused by the dengue virus. The virus is transmitted through the bite of Aedes aegypti which is the most effective vector transmitting the dengue virus. Dengue virus causes capillary blood vessel disorders in the blood coagulation system, causing bleeding. DHF is characterized by sudden onset of fever 2-7 days, accompanied by weak or lethargic, anxiety, heartburn, accompanied by signs of bleeding in the skin in the form of bleeding spots (petechiae), bruises (echymosis) or rash (purpura). Another sign is bleeding, dysentery, vomiting blood, decreased consciousness or shock (WHO, 2009).

Dengue hemorrhagic fever (DHF) was first discovered in the 1950s in the Philippines, clinical symptoms arise due to viral infection DEN-2 and DEN-4 were successfully electrically insulated in the Philippines in 1956. Two years later the four types of the virus was isolated in Thailand WHO, 2009). Since 1968 the World Health Organization (WHO) noted the state of Indonesia as the country with the highest dengue cases in Southeast Asia. DHF was first discovered in Surabaya in 1968 (Kemenkes,2010)

Climate change can affect the ecosystem habitats of animals transmitting the disease, even growth and development of colonies of germs naturally. Climate can affect the patterns of infectious diseases and viral vectors are sensitive to climate change. Thus, directly or indirectly may affect the incidence of a disease. Incidence of dengue fever is often associated with humidity and rainfall (Achmadi, 2008).

Tana Toraja is a plateau area with an altitude ranging between 700 m-1500 m above sea level and is the area of tourism. Based on secondary data District Health Office Tana Toraja, DHF have recently been found the last 5 years. DHF patients has been found dead in Tana Toraja, so we need to watch out for morbidity fluctuating every year.

2. RESEARCH METHODS

This research is a quantitative and an analytical study. Design used in this research is the Ecology study time trend with a natural approach that observes the trip and the natural progression of an event related to the environment. This study was to determine the influence of air temperature, humidity, rainfall and mobility of the rating on the incidence of DHF each month in the period 2012-2015 in Tana Toraja. This study uses a survey of secondary data. This study was conducted in Tana Toraja, South Sulawesi for six months starting in November 2105-May 2016. The subject of this research is the incidence of DHF data from the Health Department in Tana Toraja period 2012 - 2015, air temperature, humidity, and rainfall is from the Meteorology Climatology and Geophysics Council in Tana Toraja period 2012-2015, traveler mobility data from the Tourism Department. The unit of Analysis is time.

3. RESULTS AND DISCUSSION

The results of the data of climate trends in Tana Toraja, the air temperature in period 2012-2015. The average air temperature in Tana Toraja period 2012-2015 is 22.4°C with a maximum temperature is 25.5°C and the minumum air temperature is 21.1°C. The average relative humidity in Tana Toraja period 2012-2015 is 81.7 % with maximum humidity is 87.4% and minimum humidity is 66.7%. The average amount of rainfall in Tana Toraja period 2012-2015 is 236 mm with the maximum rainfall is 598.5 mm and the minimum rainfall is 8.8 mm. The Result analysis of mobility trend in Tana Toraja year period 2012-2015 showed that mobility was highest in the month of December 2015 is 23 245 people with a percentage (11.2%) and lowest mobility in May 2014 that 911 people with a percentage (0.44 %)

Table 1: Distribution of Climate and mobility Data in Tana Toraja period 2011-2015

Month	Air Temperature (°C)				Humidity (%)				Rainfall (mm)				Mobility			
	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014	2015
January	22.6	23.1	22.3	22.7	80	76.3	79.5	80.1	128.9	95.9	140.1	239.5	2126	1154	1524	2237
February	22.1	23.1	22.3	22	84.2	78.6	80.2	85.6	521	300.7	194	331	2130	1251	1062	3425
March	22.7	22.8	22.4	22.4	80.8	84	85.5	83.3	350.8	356.8	308.2	319.3	1015	1345	1942	1509
April	25.5	22.7	21.8	22.3	85.5	86.3	81.9	87.1	463.4	490.2	321.6	598.5	1063	1450	1412	1987
May	22.3	22.7	24.6	22.4	83.7	85.7	85.4	85.6	434.9	339.1	156.9	219.3	1229	1700	911	2986
June	21.7	22.5	22.5	22.1	85.8	83.7	87.4	86.6	246.7	364.1	315.2	148	1292	1980	1334	1697
July	21.1	21.5	21.8	21.6	84.8	86.9	85.4	79.2	110.9	323.7	152.5	22	1392	7650	9650	10893
August	21.3	21.5	21.3	21.5	83.4	80.2	82.1	77.3	134.6	139	99.9	20.6	1371	9066	12585	18893
September	21.8	21.8	21.5	21.9	79.9	80.5	76.5	69.7	194	109.3	53.4	0.8	1052	2087	4015	4642
Oktober	22.5	22.4	22.5	23	80.5	77.1	70.5	66.7	172.3	98.3	8.8	21	1677	1775	1985	1289
November	22.9	22.6	23.3	23.6	81.8	82.2	78	77.7	339.2	447.9	108.5	188.1	2434	1512	7998	9870
December	22.8	22.7	22.5	22.8	84.5	83.8	86.4	83.3	135.3	409.2	373.1	285.5	4055	11349	15651	23245

Source: Meteorology and Geophysics in Tana Toraja and health department in Tana Toraja

Table 2: Distribution of Number of Patients with DHF in Tana Toraja Period 2012-2015.

Bulan	Number of patient							
	2012		2013		2014		2015	
	Patient	Dead	Patient	Dead	Patient	Dead	Patient	Dead
January	0	0	20	0	9	0	6	0
February	0	0	26	0	13	0	7	0
March	1	0	58	0	12	0	7	0
April	2	0	26	0	8	0	13	1
May	0	0	7	0	20	0	8	0
June	1	0	1	0	13	0	7	0
July	3	0	9	0	13	1	9	0
August	1	0	2	0	8	0	8	0
September	2	0	5	1	5	0	8	0
Oktober	0	0	0	0	3	0	2	0
November	3	0	3	0	3	0	7	0
December	4	0	0	0	4	0	22	0

Source : Helath Department in Tana Toraja.

Before performing statistical tests using Poisson regression test in terms of test results show some poison distribution assumptions as multicolinierity test sample used for the data to be free of their multikolinieritas. VIF Value is less than 10 and Tolerance more than 0.1 then Ho is rejected means that the sample data free from their multikolinieritas. Assumptions dispersion test to

determine whether a response variable has an average value and variance are equal or not. Mean and Variance output results show the difference it is necessary to test Overdispersi / Underdispersi. Test Overdispersi / Underdispersi to see whether there overdispersi / underdispersi. The results show the value of output Deviance and Pearson Chi-Square divided df worth more than zero then the data experiences overdispersi. Furthermore it can be conducted to determine the model of Generelized Poisson Regression (GPR) with the following results:

Table 3 : Results Output Parameter Estimates Generalized Poisson Regression (GPR).

Parameters	B	Sig.
Air Temperature	-1.568	.027
Humidity	.143	.673
Rainfall	.267	.001
Mobility	1.283E-5	.201

Output Parameters Estimation of the above it can be concluded that variable temperature and rainfall affect terjadap incidence of dengue with significant values <0.05 it can be concluded Ho Denied means no influence Air Temperature and rainfall on the dengue hemorrhagic fever in Tana Toraja period 2012-2015 , Variable Humidity and Mobility have significant value > 0.05 then it can be deduced ho acceptable means no influence of humidity and mobility on the dengue hemorrhagic fever in Tana Toraja Period 2012-2015.

The average air temperature in Tana Toraja period 2012-2015 is 22.4°C with a maximum temperature of 25.5°C and the minimum air temperature is 21.1°C. Based on the analysis of the effect of air temperature on the incidence of dengue hemorrhagic hemorg in Tana Toraja year period 2012-2015 shows that temperatures significantly influence the incidence of dengue. The existence of significant influence is a sign that the vector mosquitoes can survive at low temperatures. Besides temperature also potentially in the spread of dengue virus in the body of the mosquito. However, the optimum temperature which favored mosquito vector for growth is 25°C-27°C. Incidences of DHF occurred in March 2013, with a temperature of 22.8 ° C. The temperature is not the optimum temperature for the breeding of mosquitoes but the vector mosquito to survive at low temperatures. The changes in temperature can cause changes in DHF transmission season..

The study is same with Purnomo (2010) research about the transmission dynamics of dengue hemorragic fever in Duren Sawit West Java stated that the temperature is one of the physical environmental factors DHF transmission. At temperatures below 33ºC are still many positive cases of DHF with case presentations 62.9%. Because at this temperature only takes 10 days to develop the mosquito Aedes aegypti. Because the mosquito Aedes aegypti can accelerate breeding.

The average relative humidity in Tana Toraja period 2012-2015 is 81.7 to the maximum humidity 87.4% and minumum humidity is 66.7%. Analysis of the effect of humidity to the incidence of DHF in Tana Toraja period 2012-2015 showed that the humidity does not have a significant effect to the incidence of DHF.

This is not same with the research Zubaidah (2012) research which shows that the influence of humidity to DHF. Humidity is found as the most critical factor in disease (WHO, 2003). As in other vector-based the incidence of DHF shows a pattern related to climate primarily because humidity affects the spread of mosquito vectors and the possibility of transmitting the virus from one human to another human. The mosquito vector is sensitive to moisture (Gubler, 2004)

The average amount of rainfall in Tana Toraja period 2012-2015 is 236 mm with the maximum rainfall of 598.5 mm and the minimum rainfall is 8.8 mm. Analysis of the influence of rainfall on the incidence of DHF in Tana Toraja period 2012-2015 showed that rainfall influenced the incidence DHF. There are significant influence is rainfall has a contribution in the habitat of the vector. Rainfall affecting an increasing breeding places. The incidence of diseases transmitted by mosquitoes typically rises some time before the heavy rains of the season or after a heavy rain that can leave puddles where mosquitoes like. Dengue mosquitoes are in the tropics and subtropics, which is dominated by high rainfall (Sukowati, 2004).

Conducted with the research by Sithorini (2007) which states that the existence of a significant relationship between the number of cases of DHF with rainfall. When the rainy season increases the availability of breeding places. mosquitoes like clean water to lay their eggs. A mosquito can lay 100-300 item, so that the mosquito population can increases quickly. To finalize the mosquito eggs will seek human blood so that the tendency to human bite.

Same with Zubaidah (2012) research, also shows that rainfall is the biggest factor affecting to the incidence of DHF. Rainfall has a significant effect to the incidence of DHF is an important concern in the eradication program, especially in anticipation of outbreaks during the rainy season.

Average mobility in Tana Toraja period 2012-2015 is 4289 people (2:08%) with the maximum number of visits in 2324 people (11.2%) in December 2015 and the minimum was 911 persons (0.44%) in May 2014. Analysis of the influence of mobility to the incidence of DHF, showed there was no significant effect of mobility to the incidence of DHF in Tana Toraja period 2012-2015. This is similar to Fathih et al (2005) research which shows that mobility does not play a part in incidence of DHF in the city of Mataram. Although not found the influence of mobility to the incidence of DHF is necessary because factors poorly controlled urbanization, and the rapid advancement of the transportation system so that the mobility of the population is very easy.

4. CONCLUSION

Based on the results and discussion of research on the analysis of risk factors for the incidence of DHF in Tana Toraja period 2012-2015 was concluded that the air temperature (p=0.27) and rainfall (p=0.001) significantly influence the incidence of DHF in Tana Toraja period 2012-2015 which means that the temperature and rainfall in Tana Toraja is that an optimal for vector breeding places of dengue mosquitoes.

Suggestions from this study are expected in the cooperation between the public and the government to increasing early warning in the prevention of DHF to reduce morbidity and breaking the chain of transmission of DHF.

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