DBD EVENT MAPPING, STRONG RELATION OF CLIMATE CONDITIONS AND POPULATION MOBILITY NUMBER WITH DBD INCIDENCE

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) is influenced by the environmental factors; climate and population mobility. The DHF incident mapping is conducted to know its distribution and the areas belong to high-risk of DHF. This study aims to know the DHF incident mapping, climate conditions, and population mobility at Putat Jaya in 2015-2017.This study is an observation analysis by using the ecology time series study. There were 110 samples population. This study used a correlation test to know the strength and weakness of climate variable, population mobility number towards the DHF incident. The data used a primary and secondary data. Most cases of DHF incident are found in community areas (RW) where the distance between citizen's house is narrow. The mapping showed the distribution pattern of DHF in each RW was grouping and spreading. Based on the correlation test, if the rainfall is higher, the DHF incident increases (r = 0,278). If the air temperature is higher, the DHF incident decreases (r = -0.480). If the humidity is higher, the DHF incident increases (r = 0.282). If the duration of solar radiation is higher, the DHF incident decreases (r = -0,150). If the population mobility rate is higher, the DHF incident increases (r = 0,413). There was an environmental factor that support the DHF incident at Putat Jaya. It causes a high-risk exposure to DHF, thus the case was grouping and spreading. In addition, it still need a cooperation between the Health Center and the society to control the DHF incident.

Keywords: Mobility Rate, Climate, Larva Density, Mapping

ABSTRAK

Penyakit Demam Berdarah Dengue (DBD) dipengarui oleh faktor lingkungan seperti iklim serta angka mobilitas penduduk. Pemetaan kasus DBD juga dilakukan untuk mengetahui persebaran dan mengetahui wilayah mana saja yang beresiko tinggi DBD. Penelitian ini bertujuan untuk melakukan pemetaan kejadian DBD, kuat hubungan kondisi iklim, dan mobilitas penduduk dengan kejadian DBD di wilayah Kelurahan Putat Jaya tahun 2015-2017. Penelitian ini merupakan penelitian observasional, menggunakan studi ecology time series dan menggunakan total populasi sebanyak 110 sampel. Penelitian ini menggunakan uji korelasi untuk melihat kuat atau lemahnya hubungan variabel iklim, angka mobilitas penduduk dengan kejadian DBD. Data yang diperlukan yaitu data primer dan data sekunder. Kasus DBD terbanyak ditemukan pada wilayah RW yang jarak antar rumah warganya sempit. Pemetaan menunjukkan pola sebaran kasus DBD di tiap RW adalah mengelompok dan menyebar. Kasus terbanyak ditemukan pada wilayah RW yang jarak antar rumah warganya sempit. Berdasarkan hasil uji korelasi, jika curah hujan tinggi maka kejadian DBD meningkat (r=0,278). Suhu udara tinggi maka kejadian DBD menurun (r=-0,480). Kelembapan tinggi maka kejadian DBD meningkat (r=0,282). Lama penyinaran matahari tinggi maka kejadian DBD menurun (r=-0,150). Angka mobilitas penduduk tinggi maka kejadian DBD meningkat (r=0,413). Faktor lingkungan yang mendukung kejadian DBD di wilayah Kelurahan Putat Jaya, menjadikan wilayah yang beresiko tinggi terhadap penyakit DBD dan membuat persebaran kasus terlihat mengelompok dan menyebar. Oleh karena itu diperlukan kerja sama antara pihak Puskesmas dan masyarakat untuk mengendalikan DBD.

***Kata kunci**: Angka Mobilitas Penduduk, Iklim, Pemetaan*

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INTRODUCTION

Currently cases of dengue fever are still a problem at the world level. Around 3.97 billion communities spread over 128 countries living in a world vulnerable to dengue viruses. Indonesia is very vulnerable to infectious diseases. Infectious diseases that are still a trend in Indonesia is dengue fever (DBD). The type of Aedes aegypti and Aedes albopictus mosquitoes are the vector causes of dengue fevercaused by bite and spread the virus from one person to another. Most of the Indonesian Aedes aegypti mosquitoes are most instrumental of Aedes albopictus. DBD disease is still a problem in Indonesia because the spread of the disease is very fast. At ≤ 80.4% of city in Indonesia becomes endemic to the region. The case of dengue fever in Indonesia emerged in more or less in the 18th century year 1968 and the first time in Indonesia appeared in the city of Surabaya, with a total of 58 inhabitants infected with the virus and who died counted as much as 24 inhabitants (Departemen Kesehatan, 2010).

The city of Surabaya is one of the major cities in East Java and is a city that first appeared DBD disease in Indonesia. Year 2014 DBD case in Surabaya reached the number of 816 inhabitants with CFR 2.08%. Year 2015 DBD case in Surabaya reached the number of 640 inhabitants with CFR 2.03%. Year 2016 DBD case in Surabaya reached the number of 938 inhabitants with CFR 0.75%. It appears that the number of CFR in the city of Surabaya from 2014 to 2016 approaching or even exceeding the target CFR set by the National is < 1% (Distric Health Office of Surabaya, 2016).

Environmental-based diseases are associated with sanitation. According to (Notoatmodjo, S, 2003) Environmental sanitation is the health status of an environment that covers the environmental conditions of housing, waste disposal, clean water supply and the existence of existing containers. Other factors that affect the incidence of DBD disease in Indonesia include the hospice factor, environmental factors, and immune response. The hospice factor is vulnerability and immune response. Environmental factors are geographical conditions (altitude from sea level, rainfall, humidity, season), demographic conditions (density, mobility, behavior, customs, habits, socio-economic population, mosquito type and density as vector of disease). The agent factor is the nature of dengue viruses that until now there are 4 types of viruses seroptipe dengue DEN 1, 2, 3.4 (Soegijanto, S, 2006). Incidence of disease can also be influenced by environmental factors, because environmental factors are a factor in holding an important role in the incidence of a disease. Environmental factors that can relate to the DBD event are climatic conditions (rainfall, temperature, humidity and prolonged sun illumination).

Climate change in Indonesia is uncertain, essentially climate change that brings changes to weather parameters. The weather parameters in question are humidity, rainfall, etc. (Kementerian Negera Lingkungan Hidup, 2007). Based on research conducted by (Pohan, Z., 2014) shows that there is a link between the climate including temperature, rainfall, prolonged illuminatin and humidity with the incidence of DBDThe climate that matches the environment of Aedes aegypti mosquitoes is associated with mosquito behaviour and also makes such vectors can breed well.

Population mobility is also instrumental in the transmission of DBD. People's mobility will facilitate transmission from one place to another. Research results from (Arsin AA & Wahududdin, 2004) in the city of Makassar, the mobility of residents plays a role in the dissemination of DBD. This is due to the relatively high population

mobility in Makassar city. The disease is usually spread from a central source of transmission, then follow the traffic (mobility) of the population. The higher the population mobility, the greater the likelihood of spreading DBD disease.

DBD event mapping in a region is necessary to be known whether the area is endemic, sporadic or free, so as to provide an overview and identification of areas of high risk of DBD. If a certain area has the most cases of DBD and always exists in every 3 year then the area is called endemic area. If viewed from 3 years the area is a DBD case but not consecutive the area is called sporadic. The area is said to be free if the region is viewed from 3 years there is no case. If it has been mapped and known to an area which is endemic, sporadic and free then the Puskesmas easily focuses the control efforts on the area.

METHODS

Research conducted is an observational study with the study of Ecology time series which involves environmental components that are in climatic conditions that are the risk factors of disease incidence within a certain period of time. The study described mapping, climatic conditions, and the population mobility of 2015-2017. The research also describes strong climate condition relations, population mobility in DBD events. DBD case mapping uses GPS Essential which is the application on mobile phones and using ArcGIS software so that the spread can be known and can be done mapping DBD cases in the village area Putat Jaya. The population of this study was all of the DBD sufferers in 2015-2017. Sampling is not carried out because research uses the total population. The case of the DBD in 2015 amounted to 42 cases and the year 2016 amounted to 40 cases, the year 2017 found 28 cases. The Total population in this study was 110. Distribution or spread of DBD events require the population address data recorded in the register of Putat Jaya Health Center with the address listed clearly. This research uses primary data and secondary data. Secondary Data is obtained from BMKG Perak (rainfall, temperature, humidity, and long sun illumination) in 2015-2017 for the Surabaya region. Secondary data is also obtained from Putat Jaya Puskesmas in the form of personal data sufferers. Secondary data also obtained from Kelurahan Putat Jaya is data on population mobility from 2015-2017 years. Primary data is the respondents ' self-data and the coordinates of the DBD house that are taken at one point to facilitate the time of making the map. This research has received information from the FKM Ethics Committee No: 106-KEPK.

RESULT

Table 1. Number of sufferers of DBD years 2015-2017

Month	Years					
	2015		2016		2017	
	Conditions					
	H	M	H	M	H	M
January	6	0	4	0	4	0
February	8	0	7	0	4	1
March	5	0	4	1	1	0
April	7	1	6	0	3	0
May	4	0	3	0	3	0
June	5	0	4	0	2	0
July	3	0	2	0	0	0
August	2	0	3	0	3	0
September	1	0	4	0	0	0
October	0	0	0	0	6	0
November	0	0	0	0	1	0
December	0	0	2	0	0	0
	41	1	39	1	27	1
Total	**42**		**40**		**28**	

Source: Secondary Data in Putat year 2015-2017

Based on the secondary data that obtained from the Puskesmas Putat Jaya in

2015-2017, it appears that many DBD events occurred at the beginning of the month and occurred up and down at the DBD incidence rate. The highest DBD case is in 2015 in February. The highest DBD case is in 2016 in February. The highest DBD case is in 2017 in October.

DBD Mapping

Pictures 1. DBD event mapping in village area Putat Jaya period year 2015-2017

Based on Figure 1, it is shown that DBD events in the area of Putat Jaya village have spread evenly, although there are some RW that has not found the case of DBD in a given year. DBD cases that are found in the case of DBD annually in the period 2015-2017 are RW 2, RW 3, RW 6, RW 7, RW 8, RW 9, RW 13, RW 15. Based on the point of the case in the image, the case of the most DBD in the year 2015 is in RW 2 and RW 4, each of which there are 7 cases, in the year 2016 that in RW 14 there are 6 cases, in the year 2017 that in RW 2 there are 7 cases. If viewed based on the overall period of 3 years that is year 2015-2017, RW the most cases DBD or endemic is RW 2, amounting to 16 cases in the region, hereinafter RW 3 and RW 8, each amounting to 10 cases of DBD in the region. The lowest DBD case in the period 2015-2017 was in RW 1 and RW 11, each of which amounted to 3 cases. Total DBD cases in the period 2015-2017 in Putat Jaya Village area as many as 110 cases.

Rainfall

Table 2. Annual rainfall in Putat Jaya region in 2015-2017

Month	Average (mm)		
	2015	**2016**	**2017**
January	436,6	284,1	366,3
February	293,5	409,3	248.5
March	243,8	163,1	244.0
April	133,0	129,6	102.1
May	109,7	358,8	157,9
June	0,7	126,8	91.5
July	0,0	90,1	22,4
August	0,0	38,2	0,0
September	0,0	102,0	11,3
October	0,0	161,5	26,6
November	130,2	117,9	326,6
December	184,8	358,8	291,1

Source: BMKG Perak Surabaya

Based on Table 2, the rainfall in the area of Putat Jaya region in 2015-2017, it is seen that rain is not always happening every month. Rainfall patterns tend to fluctuate in the event that the highest rainfall occurs at the beginning of the month, and there is a decline to the middle of the moon and increase back by the end of the month.

Year 2015, the highest rainfall occurs in February. Rain is not down in Putat Jaya Village area in July, August, September and October. In 2016, in the area of Putat Jaya Village every month there was rain, rainfall year 2016 in the area Putat Jaya Village is tetinggi in February. In 2017, the rain was not dropped in Putat Jaya village area in August and the highest rainfall in 2017 in Putat Jaya Village area is located in January. During the 2015-2017 period, the highest rainfall occurs in February 2015 to reach 436.6 MM.

Temperature

Table 3. The temperature in the Putat Jaya region in 2015-2017

Month	Average (°C)		
	2015	2016	2017
January	28,4	28,4	28,3
February	28,2	28,2	28,2
March	28,5	28,5	28,8
April	28,5	28,5	29,2
May	29,2	29,2	29,5
June	29,2	29,2	28,7
July	28,4	28,4	28,6
August	28,3	28,3	28,5
September	28,9	28,9	29,3
October	30,0	30,0	30,4
November	31,3	31,9	28,8
December	31,8	31,4	28,7

Source: BMKG Perak Surabaya

According to Table 3, the average monthly temperature variation tends to be the same during the year 2015-2017 and is seen to increase by the end of the year. The temperature in the village of Putat Jaya has a mean value or averages 29.2 º C. Temperature range in the area of Putat Jaya Village ranges from 28.2 º C-31.9 º C.

The temperature in the Putat Jaya region in 2015 tends to stabilize in the early years to mid-year, precisely in January to September, then the high return temperature at the end of the year is around October to the moon December. Temperature in the area of village Puskesmas Putat Jaya in 2016 tends to increase until the end of the year. Temperatures in the2017 Putat Jaya region tend to be stable or likely to climb down each month. The highest air temperature during the period of 2015-2017 in Putat Jaya region in November in 2016 for 31.9 º C.

Moisture

Table 4. Humidity in Putat Jaya region in 2015-2017

Month	Average (%)		
	2015	2016	2017
January	90	76	82
February	90	81	81
March	90	77	80
April	78	81	79
May	87	78	75
June	89	80	78
July	71	78	73
August	68	73	69
September	64	74	70
October	82	78	69
November	83	78	79
December	88	80	80

Source: BMKG Perak Surabaya

Based on Table 4, the humidity in Putat Jaya region is a range of numbers 64%-90%. The 2015-2017 year period of the highest humidity occurred in January-March at the beginning of the year 2015 with a humidity rate of 90%. The moisture pattern in Putat Jaya region during the period of 2015-2017 years subjected to fluctuating patterns or tends to have a downward rise. The lowest humidity in the Putat Jaya region in 2015-2017 period occurred in mid-2015 in September.

Year 2015 the highest humidity in the village area Putat Jaya is located in January-March and the lowest is in September. Year 2016 the highest humidity in the Putat Jaya region is occurred in February and April, the lowest is in August. 2017 the highest humidity is in February and the lowest is in August and October.

Sun Illumination Long

Table 5. Sun illumination in the area of Putat Jaya region in 2015-2017

Month	Average (%)		
	2015	2016	2017
January	62	63	53
February	77	55	53
March	68	69	65
April	63	60	68
May	62	76	79
June	91	69	70
July	91	77	84
August	92	72	91
September	99	79	91
October	97	61	87
November	92	55	47
December	61	36	56

Source: BMKG Perak Surabaya

According to Table 5, from 201 to2017 of the highest sun illumination was in September of 2015 by 99%. in 2016 that looked average was smaller than the previous year. The highest period of sun illumination in 2016 occurred in the same month as the previous year, in September of 79%. In 2017, it is seen that it tends to increase from January to September and decreases back in October to December. The highest sun illumination in 2017 occurred in September. The lowest solar illumination during the year 2015-2017 occurred in December 2016 by 36%. The pattern of the sun illumination is quite the same in each year. The length of the sun is quite high starting from the middle of the year from June to October. The longest occurrence of the sun in the period 2015-2017 occurred in September.

Population Mobility Number

Table 6. Population mobility figures in Putat Jaya region in 2015-2017

Month	Average (%)		
	2015	2016	2017
January	101,404	101,341	101,264
February	101,525	101,318	101,181
March	101,546	101,419	101,144
April	101,553	101,243	101,119
May	101,559	101,291	101,127
June	101,507	101,262	101,106
July	102,006	101,229	101,044
August	101,446	101,233	101,036
September	100,797	101,191	67,97
October	101,389	101,174	67,96
November	101,354	101,243	66,77
December	101,362	101,322	66,36

Source: Kelurahan Putat Jaya Surabaya

According to Table 6, the population mobility in the area of Putat Jaya region in period 2015-2017 seen that the highest mobility is in the early month of year 2015. The highest mobility peak in the village Putat Jaya is in May of 101.559. Population mobility figures in the area Putat Jaya region is in the 66,77-101,559 range.

The lowest population mobility in the period of 2015-2017 is at the end of year 2017, which is August to December. The lowest mobility rate in Putat Jaya region is at the end of the month precisely occured in December for 66.36.

Population mobility in the Putat Jaya region in the period 2015-2016 tends to stabilize in each month. There is a decrease in population mobility in Putat Jaya region at the end of the year that is precisely in September to December 2017.

DISCUSSION

DBD Event Mapping

Distribution or could be called DBD spread in Putat Jaya Village area in the period of 2015-2017 years almost always exist in each RW. The spread and mapping of DBD events can be described by using the distribution point to form a map that corresponds to the conditions in the field.

When viewed from the spread, the pattern tends to group and spread. This can be due to the flight distance of mosquitoes that cannot be fared away. Aedes aegypti mosquito flying distance ± 40-100 meters (Departemen Kesehatan RI, 2004), RW 2 is a RW with a DBD case found annually and RW 2 is also the case of the most DBD. When viewed from the neighborhood, the house is very close to the neighborhood or is in a narrow and small, even between houses there is no distance. In addition to RW 2, there are also RW 3 and RW 8 which annually find the DBD case. Not much different from RW 2, environmental conditions in RW 3 and RW 8 almost no distance between the house of its citizens. Crowded villages where the distance between the house is very narrow can be a region prone to the incidence of DBD. The closer the distance between houses, the easier mosquitoes spread from one house to the other because of the average mosquito flying distance of ± 40-100 meters (Ruliansyah, A., Yuliasih, Y., & Hasbullah, S., 2014) There are still many in one house there are more than 1 family, in this case mosquitoes easily transmit the virus dengue. According to the (Departemen Kesehatan RI, 2004) Female mosquitoes often bite more than one person. In different with RW 2.3 and 8, RW 1 is the most lowest RW hit by the DBD case in the period of 2015-2017. Since the layout of the House spacing in one RW is not too adjacent even the environment conditions are not narrow.

It is seen in Figure 1.1 that has been shown mapping of DBD events that exist in Putat Jaya Village area and can be seen any area which is high risk to DBD event. High-risk areas can be the thing to be considered by the related parties so as not to Mistarget and can immediately perform eradication so as to minimize the incidence of DBD in the future. Eradication effort or control program is a focus countermeasure (PF) that has been done in the village area Putat Jaya consists of PSN/Gebyar PSN DBD, Larvasidasi, fogging/fuming, and counseling. Focus mitigation Activities (PF) in the area of Putat Jaya Village has followed the guidelines of (Kementerian Kesehatan RI, 2011). Epidemiology investigation conducted first in the form of tracking in the house of sufferers and surrounding with a radius of 100 meters, and if the result is positive means if the results of the individual data search the suspect patients DBD is known that he is The actual dbd case and around his house (radius of 100 meters) was found a flick Aedes aegypti at least 1 home of 20 houses in check (5%), then the Sanitarian officers perform various PF activities such as 1) Larvasidasi conducted in the form of To the residents. 2) Counseling from the community in the form of talks to the citizens. 3) fogging is done only 1 time in one cycle, 4) the eradication of mosquito nests (PSN) DBD or periodic flick (PJB) conducted in Putat Jaya Village area to know the presence of a flick with the output of a free number of ticks (ABJ) and Reporting is done in every month, this activity is usually done at least 3 months.

Rainfall with Genesis DBD

Correlation test shows that the rainfall variables with the DBD event show a weak relationship strength (R = 0,278) and have a positive relationship direction which means increased rainfall will be followed by

increased DBD events. Generally, rainfall plays an important role in DBD events. (Departemen Kesehatan RI, 2004) also mentions that the incidence of disease transmitted by mosquitoes usually increases before the rainy season or after heavy rains. This theory corresponds to the pattern of rainfall in the area of Putat Jaya village. Peak rainfall is approximately one month before or after the peak of the highest DBD case in each year. The development needed from the egg to the adult mosquito is 7 to 14 days (Kementerian Kesehatan RI, 2013). Next condition mosquito becomes vector among others age of mosquitoes reach more than 10 days and the number must be a lot (Departemen Kesehatan RI, 2004), thus estimated after more than ± 1 month naturally without mosquito control intervention, estimated The number of mosquitoes will increase several times as much as the original and the time to facilitate mosquitoes for the time of transmission of dengue virus.

Temperature with Genesis DBD

The correlation test indicates that the temperature variable with the DBD event indicates the strength of the medium correlation (R =-0.480) and the direction of the correlation is negative so that the higher the temperature then the lower the incidence of DBD. Generally the higher the temperature then will increase the incidence of DBD. Temperature is an environmental parameter that is important in improving vector breeding, mosquito gonotropic cycles, bite levels, shortening the period of pathogen incubation and extending the lifespan of adult mosquitoes.

Temperature in the Putat Jaya region in the period 2015-2017 averages 28,2-28,5 °c with a temperature range ranging from 28,2-31,9 °c, should the temperature be quite optimal temperature for mosquito breeding. According to (Morin, C.W., Comrie, A.C., dan Ernst, K., 2013) The optimum temperature for mosquitoes is at a range of 25 ° C-27 ° C. (Morin, C.W., Comrie, A.C., dan Ernst, K., 2013) said that in addition to the range of 25 ° C-27 ° C, the temperature range of 20 °c-30 °c is ideal for mosquito survival at all stages of the cycle. Mosquito extrinsic incubation period is reduced from 9 days at 26 °c and 28 °c to 5 days at 30 °c. The female mosquito reproduction cycle process can also be influenced by ambient temperature ranging from the < 20 °c to the female mosquito fertilisation reduced. In addition, there is a mosquito bite activity will be reduced if it is at a temperature range of < 15 °c and > 36 °c.

This study shows negative patterns in temperature variables and DBD events. The occurrence of increased cases of DBD is not only influenced by climate factors, but can also be influenced by non-climate factors, where all of these factors are later interacted with each other and such factors become supporters of events Dbd. The non-climatic factors are like the geographic location density of the house, where the density of the house can also affect the density of mosquitoes and it also influences the flying power of mosquitoes. As already known that the flight distance of females ± 100 meters, if the house distance is less than 100 meters then mosquitoes will be easier to spread in the transmission of DBD disease, while the distance between houses in the village area Putat Jaya very short There is even no distance that means between one house and the other. It is evident that an increase in DBD cases is not only of climate-only factors, but it can be due to non-climate factors that could be between the two can collaborate.

Humidity with DBD events

The correlation test indicates that the humidity variable with the DBD event indicates the strength of the weak relationship (R = 0,282) and the direction of the positive

relationship so that increased moisture will be followed by increased DBD events. This research is in line with Hairani Research (2009). Humidity in the village area of Putat Jaya in 2015-2017 is in the range of 64%-90% with an average value of 75.6%. Humidity is not directly related to the DBD case, but moisture is associated with the age of mosquitoes. The mosquito vector is sensitive to moisture. The ability of the mosquito vector in the survival is lower if it is in dry condition (Gubler, G.J., Reiter, P., Ebi, K.L., Yap, W., Nasci, R., dan Patz, J.A., 2001).

Humidity also influences the existence of mosquitoes because it is associated with the mosquito respiratory system. The mosquito system uses trachea with holes in the body wall of the mosquito called Spiracle. Mosquito spiracle is in an open condition without any mechanism to set it so it is sensitive to moisture in the environment. If the humidity in the environment is low then the evaporation of water from the mosquito body will make mosquitoes lack body fluids (Dinata, A., dan Dhewantara, P.W., 2012). The humidity rate of 60% is the lowest limit to allow mosquito life. At a humidity of less than 60%, the age of mosquitoes will be shorter (Herawati, Y., dan Utomo, S.W., 2014). The potential humidity for vector breeding ranged from 81,5-89,5% to the embryosation and durability for mosquito embryos (Yudhastuti, R. dan Vidiyani, A, 2005). A high humidity range of 85% will extend the life of mosquitoes (Pohan, Z., 2014). The longevity of the mosquito will result in the frequency of bites also increased and later indirectly can add to the case of DBD.

Humidity in the village area of Putat Jaya with an average value of 75.6%. Research conducted by Mintarsih and Santoso about the influence of temperature and humidity to the age of female Aedes aegypti mosquitoes in Salatiga and Semarang in 1996 that show the results that on the average humidity of air 70,59-82,14% Recorded life span of mosquitoes both inside and outside the house is for 53 days or about 7-8 weeks. In the moisture range, the gonotrophic cycle of the female Aedes aegypti lasts for 3-4 days and as many as 95.23% of the female Aedes aegypti mosquitoes in the house have a gonotrophic cycle reaching between 4-9 times whereas for Aedes Aegypti females who are outside the house of about 86.64% have a gonotrophic cycle between 4-9 times.

Humidity rate in the region Putat Jaya with a value of 64%-90%. Humidity of less than 60% of the mosquito age will be short and the mosquito does not become vector because it is not enough time to move the virus from the stomach to the salivary glands. Humidity in the village area Putat Jaya more than 60% make mosquito life longer and potential for the breeding of Aedes aegypti mosquitoes. So it is true that the high incidence of DBD in the village area Putat Jaya proves that the moisture of the air is in accordance with the development of micro-causes microorganisms and with the humidity of dengue fever indicates improvement.

Population mobility numbers with DBD events

The correlation test between DBD events and population mobility numbers indicates the strength of the medium relationship (R = 0,413) and the direction of positive relationships which means increased DBD incidence followed by increased population mobility. It is seen that the mobility rate in Putat Jaya region is quite high. This research is in line with the research of (Azizah & Faizah., 2010). People who have visited endemic areas have a risk of 9.29 times greater than the DBD than those who do not do mobility to endemic areas. Based on the research of (Gama, Z.P., dan Nakagoshi, N., 2013) also stated that the

mobility of residents had relationships with DBD events.

Mobility is the process of transferring from an area to another area within a certain period of time and in accordance with the intention to settle or not in the destination area (Mantra, 2003). High mobility can negatively affect the dissemination or transmission of diseases including DBD from Sutu region to other regions due to population displacement. The movement of people is a more effective way of spreading dengue viruses compared to the displacement of the Aedes aegypti mosquitoes (WHO, 1999). DBD events occurring either in regions or regions endemic to sporadic or likely to occur are caused by high mobility to perform activities carried out every day such as going to school, market, and working. This research is done in the area of Putat Jaya region which are still many people who moved from between RT or even between cities and do not close the possibility of returning again to the previous territory. At a time off the field is known that many people whose homes still contract so within a certain period of time they are definitely moving to other contracts or even their home. Mobility is very instrumental in the incidence of DBD, both endemic and sporadic areas show that most cases are school-age children who do activities or make a transfer while going to school and turning back home Every day. This makes it easier for DBD to be transmitted.

CONCLUSION

Mapping that has been done is seen that the case of DBD in the Putat Jaya region period 2015-2017, RW the most cases DBD or the most endemic is RW 2. While RW is always encountered DBD cases annually are RW 2, RW 3, RW 6, RW 7, RW 8, RW 9, RW 13, RW 15.

The highest rainfall occurs in February 2015 reaches 436.6 mm. The highest rainfall patterns occur in the early months of January and continue to decline until August and again increase in September to the end of the year. The average temperature variation of each month tends to be the same during the 2015-2017 period. The average temperature value is 29.2 º C with a range of temperatures ranging from 28.2 º C-31.9 º C.

Humidity is at a range of 64%-90%. In the 2015-2017 year period the highest humidity occurred in January-March at the beginning of the year 2015 with a humidity rate of 90%. The length of the sun's illumination ranges from 36-99% with the longest illumination period in September 2015 by 99%.

Population mobility in the area Putat Jaya region in 2015-2017 look equal to the year, there is only a considerable decline at the end of the year 2017. The highest mobility summit was in May of 2015 for 101.559 and the lowest in December of 2017.

Based on the correlation test, rainfall has a weak relationship strength and a direction of positive relationship with the incidence of DBD (R = 0,278). The temperature with the incidence of DBD has the strength of medium relationship with the direction of the negative relationship (R =-0.480). Humidity has a weak relationship strength and the direction of positive relationships with the incidence of DBD (R = 0,282). The prolonged illumination of the sun with the incidence of DBD has the strength of medium relationship with the direction of the negative relationship (R =-0.150).

Based on the correlation test the number of population mobility has strong moderate relationship and direction of positive relationship with incidence of DBD (R = 0,413).

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