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Spatial Analysis of Dengue Hemorrhagic Fever in The Endemic Area of Magetan

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ABSTRACT

Dengue Hemorrhagic Fever was still a public health problem, the rapid distribution and the opportunity to cause death gives a frightening impression, therefore important to know the spread and characteristics its. Samples this study of all patients diagnosed with DHF was recorded in Candirejo Public Health Center from 2015-2017, that it is one of endemic areas in Magetan district, and analysis characteristic spatial. There were always cases of DHF in Baron villages, 3, 4 and 3 cases respectively with clustered locations, two years in a row always there, and most common case in January and February. The rainy season and temperature in this area support the proliferation of dengue vector breeding. Age of 56% patients is 6-17 years old, youngest age 0,5 and oldest 69 years old, and patients 59.65% is women, this indicates women are more at risk. Noted there was the number of platelet count recorded at below the normal level. Recommended surveillance, and community empowerment through clean and healthy behavior.

Keywords: Spatial analysis, DHF, Place, Time, Person

INTRODUCTION

Dengue Hemorrhagic Fever was still a public health problem and were often an Extraordinary Events because of its rapid distribution, the chance of causing death and giving a frightening impression. The cause of the Dengue virus were transmitted through the bite of *Aedes aegypti* and *Aedes albopictus* mosquitoes, living in a puddle of water around the house, has a habit of biting in the morning and afternoon, generally cases increase during the rainy season⁽¹⁾.

Dengue Hemorrhagic Fever cases were developing worldwide, more than 100 DHF endemic countries, especially in Africa, eastern Mediternia, America, Southeast Asia and the Western Pacific⁽¹⁾. In Japan in 2013 comes DHF cases after more than 70 years no cases. Indonesia in 2012 the number of cases increased reaching 90,245 cases, Case Fatality Rate (CFR) 0.9%; in 2013 the number increased to 112,511 cases and CFR 0.7%; mid-December 2014 the number of 71,668 cases and CFR 0.9%. Data on achievement of DHF Program Results of East Java Province 2014 shows the DHF mortality rate above the target, which were 1.16%, the situation were needed to increase early diagnosis and hospital case management as well as socialization of DHF disease. Areas with CFRs exceeding 1% reach 17 districts from the target of 5 districts, and the low number of free larvae shows that around the homes of the population there are still many transmitting vectors, so the transmission continues⁽²⁾.

In Magetan district the incidence of DHF continues to increase with 74 cases in 2012, 82 cases in 2013 and 76 cases in 2014, with an incident rate of 12.2 / 100,000 population. The area of Candirejo Public Health Center was one of DHF endemic areas in Magetan District, and Indonesia in 2014 CFR of DHF is 0.9%, so DHF gives the impression of a frightening disease to the community⁽³⁾.

METHODS

This descriptive research with cross sectional design takes the population of all the patients diagnosed with DHF recorded medical record at Candirejo Public Health Center from 2015-2017, using total sampling got a total sample 57 patients. The variables studied were place, time and person. Research instrument for data collection using medic record. Analysis of research data using descriptive statistics and spatial analysis using GIS.

RESULTS

Area of Candirejo public health center including high-density residential, surrounded by rice fields, across river, canal and ditch. The water-related facilities, including canals and ditches, and various types of residential area, as well as the interactions between them, were significant factors that elevated DHF risk⁽⁴⁾.

Distribution of DHF cases occurs in groups, indicating the pattern of transmission to the surrounding people occur and and high-density residential areas indicated the potential for high DF incidence e.g., clustered infections⁽⁴⁾ and it possible understanding of the isolation of patients was still lacking and unhealthy environment.

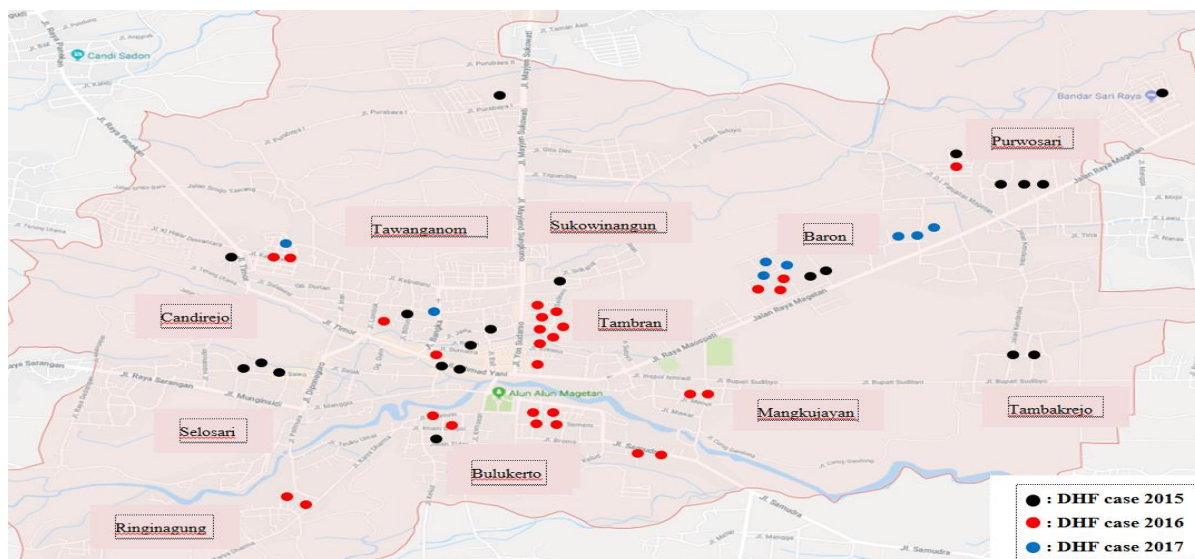


Figure 1. Distribution of DHF cases in Candirejo Public Health Center area

Table 1. Distribution of DHF case in Candirejo Public Health Center area 2015

Area	Frequency	Percentage
Purwosari	4	19.06
Sawo St.	3	14.30
Baron	2	9.52
Tambakrejo	2	9.52
A Yani St.	2	9.52
Selosari	1	4.76
Asabri Tawang Public Housing Complex	1	4.76
Public Housing Complex Baron	1	4.76
Mastrip St.	1	4.76
Bulukerto	1	4.76
Sukowinangun	1	4.76
Kepolorejo	1	4.76
Biliton St.	1	4.76
Total	21	100.00

Table 2. Distribution of DHF case in Candirejo Public Health Center area 2016

Area	Frequency	Percentage
Mangkujayan	2	7.15
Tawanganom	1	3.57
Muria St.	4	14.30
Baron	3	10.71
Baron Public Housing Complex	1	3.57
A Yani St.	1	3.57
Griya Asri Selosari Public Housing Complex	1	3.57
Samodra St.	2	7.14
Sukowinangun 2/1	5	17.86
Sukowinangun 5/1	2	7.14
Imam Bonjol St.	1	3.57
Kresno St.	1	3.57
Ringinagung	2	7.14
Sulawesi St.	1	3.57
Tamrin St.	1	3.57
Total	28	100.00

Table 3. Distribution of DHF case in Candirejo Public Health Center area 2017

Area	Frequency	Percentage
Citizens Association 2- Baron	3	37.50
Selosari Public Housing Complex	1	12.50
Bangka St. Kepolorejo	1	12.50
Sono Hamlet-Purwosari	3	37.50
Total	8	100.00

The DHF case was always present in the Baron village area during the period 2015-2017, 3, 4 and 3 cases / year, one of which occurred in the Baron Public Housing Complex. According to⁽⁵⁾, DHF often develops in densely populated urban areas. The presence of a water container around the house allegedly supports the breeding of Aedes mosquitoes.

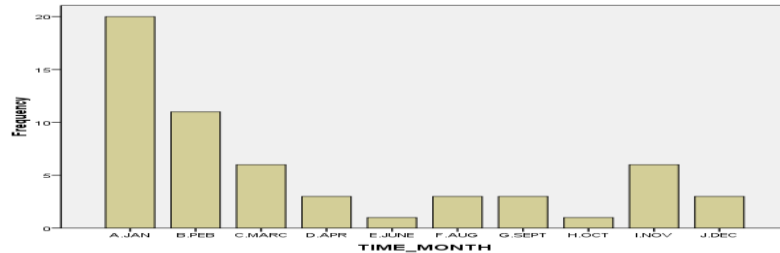


Figure 2. Distribution of time of DHF case in Candirejo Public Health Center area

The DHF cases during 2015-2017 were the most frequent in January totaling 20 (35.08%), and February 11 (19.29%), March and November 6 (10.52%), and April, August, September each 3 (5.26%) cases. Extraordinary DHF occurrences were frequent in January and February⁽⁶⁾.

Dengue Hemorrhagic Fever events were rainy season, peak in January and February. Water media supports mosquito breeding, Candirejo Public Health Center area temperature 24-31⁰C, ideal for Aedes mosquito breeding⁽⁷⁾. Temperature 26-29,5⁰C Aedes aegypti mosquito breeding potentially increased⁽⁸⁾.

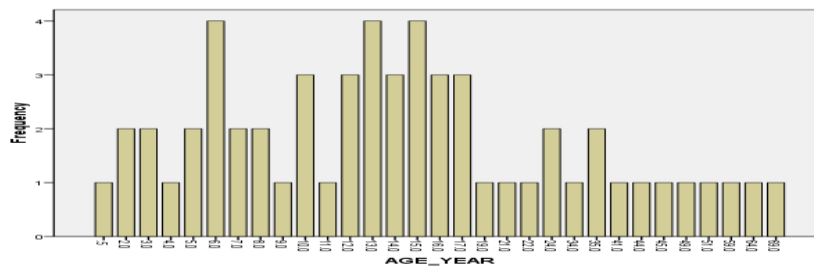


Figure 3. Distribution of age of DHF case in Candirejo Public Health Center area

Age of DHF patients most 6-17 years (56%), youngest 0.5 years old and oldest 69 years. There was a relationship of nutrition and age of DHF sufferers to the severity of the disease⁽⁹⁾. Ages 6-17 years including groups of children and adolescents were risky / vulnerable, if there were nutritional problems will give the condition of the disease. Recently DHF has attacked the elderly, the results of the study of the eldest patient's age of 69 years.

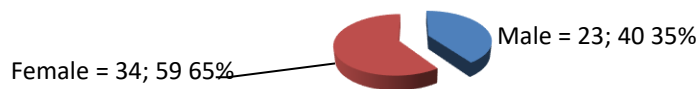


Figure 4. Distribution of sex of DHF patients in Candirejo Public Health Center area

In the 2015-2017 period is 57 patients total, contain 40.35% male and 59.65% female. The proportion of Dengue cases was higher in women than in males aged 20-29 years, both white and black. Dengue shock syndrome incidence was more common in girls than boys and death was higher among women. Dengue hemorrhagic affects more women, both in classic and severe forms, the hypothesis that women spend more time in residential homes as the preferred habitat of Aedes aegypti, resulting in more exposure to disease^{(10),(11)}.

The Hemoglobin (Hb) lowest patient was 9.8 g / dL, the highest was 19.1 g / dL. Hemoglobin mode patients at the level of 11.7 g / dL. Normal level Hb according to Ministry of Health (2011), Men: 13 - 18 g / dL and Women: 12 - 16 g / dL, children 11.5-16 g / dL. Obtained Hb 9.8 g / dL of a patient far below normal, may have occurred before the DHF case.

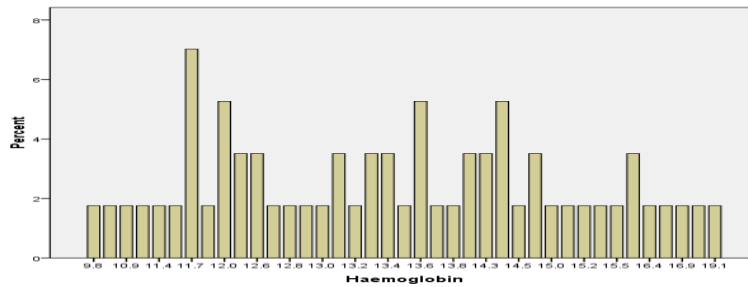


Figure 5. Distribution of haemoglobin of DHF patients in Candirejo Public Health Center area

There is an increasing pattern of Hb, 66% above 13 g / dL. Increase Hb because there was an increase in Hematocrit (Hct), dilution of concentrated blood will produce Hb levels higher. Although there was a tendency Hb increased in DHF patients but according to⁽¹²⁾, there was no correlation of Hb levels with the severity of DHF disease. According to⁽¹³⁾ there was a Hb relationship with clinical DHF patients.

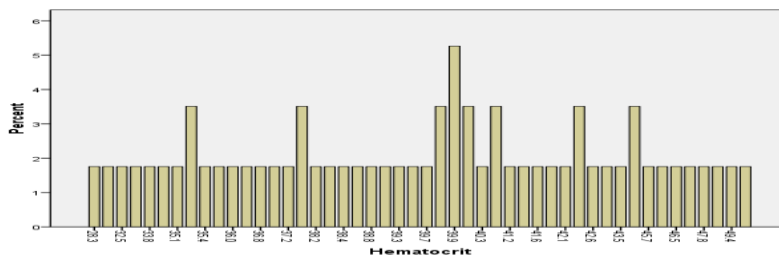


Figure 6. Distribution of hematocrit of DHF patients in Candirejo Public Health Center area

The lowest Hct patients was 28.3% and the highest was 50% and mode on the level 39.9%. The level of normal Hct according to Ministry of Health of the Republic of Indonesia (2011) was male: 40%-50% and female: 35%-45%, for children 33-38%. Hematocrit levels estimated because in the case of DHF there was leakage of plasma from the blood vessels, so blood concentrations will result in a higher Hct levels. But according to⁽¹²⁾, there was no correlation of Hct levels with severity of clinical disease of DHF.

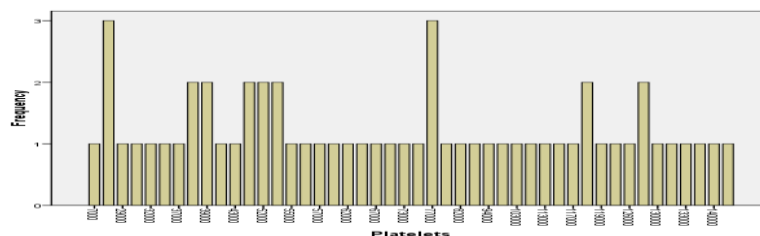


Figure 7. Distribution of Platelets of DHF patients in Candirejo Public Health Center area

The platelets of patients with DHF lowest $7 \times 10^3 / \text{mm}^3$, highest $141 \times 10^3 / \text{mm}^3$, platelet mode of patients $23 \times 10^3 / \text{mm}^3$ and $23 \times 10^3 / \text{mm}^3$ averages. Normal number of Hct according to Ministry of Health of the Republic of Indonesia (2011) was Male / Female Adult $170\text{-}380 \times 10^3 / \text{mm}^3$, children $250\text{-}450 \times 10^3 / \text{mm}^3$.

Patients with DHF have platelet levels tended to decline, recorded a medic record at the time of diagnosis of DHF highest only $141 \times 10^3 / \text{mm}^3$, this indicates platelet levels of both men and women are still below the normal number of adults $170\text{-}380 \times 10^3 / \text{mm}^3$ and children $250\text{-}450 \times 10^3 / \text{mm}^3$, (Ministry of Health of the Republic of Indonesia, 2011). The number of low platelet levels leads to hemorrhage. According to⁽¹²⁾, there was a correlation of platelet number with the severity of DHF disease, the lower the platelet count, the more severe the condition of the patient. According to Sicuro Correa et al., (2016), the most common signs and symptoms of DHF sufferers were gastrointestinal bleeding, abdominal pain and vomiting and blood vessel leakage marked by elevated Hct.

DISCUSSION

Area of Candirejo Public Health Center including high-density residential, surrounded by rice fields, across river, canal and ditch. The water-related facilities, including canals and ditches, and various types of residential area, as well as the interactions between them, were significant factors that elevated DHF risk⁽⁴⁾. Distribution of DHF cases occurs in groups, indicating the pattern of transmission to the surrounding people occur and high-

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Dengue hemorrhagic fever events were rainy season, peak in January and February. In Indonesia, the two main vectors *Aedes aegypti* and *Aedes albopictus* so the consequent transmission dynamics of the disease were strongly influenced by climate (14). Water media supports mosquito breeding, Candirejo Public Health Center area temperature 24-31°C, ideal for *Aedes* mosquito breeding⁽⁷⁾. Temperature 26-29,5°C *Aedes aegypti* mosquito breeding potentially increased⁽¹⁵⁾.

During 2015-2017 age of DHF sufferers most 6-17 years (56%), youngest 0.5 years old and oldest 69 years, but proportion of dengue cases was highest among women aged 20 to 29 years-old and increase in individuals less than 15 years-old, showing statistical significance⁽¹⁰⁾.

There was a relationship of nutrition and age of DHF sufferers to the severity of the disease⁽⁹⁾. Ages 6-17 years including groups of children and adolescents were vulnerable / vulnerable, if there were nutritional problems will give the condition of the disease. Recently DHF has attacked the elderly, the results of the study of the eldest patient's age of 69 years. According to⁽¹⁶⁾, patients were primarily under 15 years of age.

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CONCLUSION

The place where there are always DHF cases for 2015-2017 period is Baron village, which are 3, 4 and 3 cases respectively. For two consecutive years the case occurred in Baron housing complex. The most common case of DHF in January and February, the wet and temperate seasons support the breeding of *Aedes aegypti* mosquitoes. Age of patients with DHF most 6-17 years . Patients with DHF most female sex, showed more susceptible to suffering from DHF than men. There is a tendency to increase the value of Hb and Hct levels. The platelet platelet levels of DHF patients tended to decrease below normal.

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