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Analysis of the Distribution of DHF Using Information System Studies Geographical District Karanganyar

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Abstract — Dengue Hemorrhagic Fever is still a major public health problem in Indonesia. DHF is closely related to geographical/spatial aspects because one of the sources of disease occurrence cannot be separated from environmental factors so that these environmental factors can be mapped using GIS tools. GIS is a spatial description of the spread of DHF on the earth's surface that can be displayed in digital graphic form and can be visualized in map form. This study uses a descriptive analytic survey search method with a spatial approach to analyze the pattern of distribution of cases, which is then buffered to see the direction of mosquito travel, and displays an overlay map. Results The distribution of dengue fever cases in Karangayar sub-district, namely Gedong sub-district had 6 cases, Bejen sub-district 35 cases, Delingan sub-district 17 cases, Gayamdompo sub-district 4 cases, Popongan sub-district 34 cases, Tegalgede sub-district 26 cases, Jantiharjo sub-district 27 cases, Bolong sub-district 9 cases, Karanganyar sub-district 13 cases, Cangakan sub-district 34 cases, Jungke sub-district 7 cases, Lalung sub-district 34 cases.

Keywords – *Dengue* Hemorrhagic Fever, Geographic Information System

Abstrak — Demam Berdarah Dengue masih menjadi masalah kesehatan masyarakat yang utama di Indonesia. DBD sangat erat kaitannya dengan aspek geografis/spasial karena salah satu sumber terjadinya penyakit tidak lepas dari faktor lingkungan sehingga faktor lingkungan tersebut dapat dipetakan dengan menggunakan alat GIS. GIS merupakan gambaran spasial penyebaran DBD di permukaan bumi yang dapat ditampilkan dalam bentuk grafik digital dan dapat divisualisasikan dalam bentuk peta. Penelitian ini menggunakan metode penelusuran survei deskriptif analitik dengan pendekatan spasial untuk menganalisis pola sebaran kasus, yang kemudian dibuffer untuk melihat arah perjalanan nyamuk, dan menampilkan peta overlay. Hasil Sebaran kasus DBD di Kecamatan Karangayar yaitu Kelurahan Gedong 6 kasus, Kelurahan Bejen 35 kasus, Kelurahan Delingan 17 kasus, Kelurahan Gayamdompo 4 kasus, Kelurahan Popongan 34 kasus, Kelurahan Tegalgede 26 kasus, Kelurahan Jantiharjo 27 kasus, Kelurahan Bolong 9 kasus, Kelurahan Karanganyar 13 kasus, Kelurahan Cangakan 34 kasus, Kelurahan Jungke 7 kasus, Kelurahan Lalung 34 kasus.

Kata kunci – Demam Berdarah Dengue, Sistem Informasi Geografis

1. INTRODUCTION

Dengue Hemorrhagic Fever is still a major public health problem in Indonesia. Dengue fever in Indonesia was first detected in 1968 in the city of Surabaya, where 58 people were infected and 24 of them died, and since then this disease has spread throughout Indonesia [1] .

Infectious diseases, especially DHF, are closely related to geographic/spatial aspects because one source of disease cannot be separated from environmental factors so that these environmental factors can be mapped.

GIS is a spatial technology that is very useful in the field of processing and planning for the eradication of infectious diseases at this time, including the analysis of epidemic diseases such as DHF. With GIS, a spatial description of the spread of DHF on the earth's surface can be displayed in digital graphic form and can be visualized in the form of a map.

Based on sholihah research, the mapping of the spread of DHF in Kupang City was carried out using the ArcGIS application with the results obtained, namely DHF cases in coastal areas were higher than hilly areas. Based on Syauqiannur's research, the

results showed that the distribution of Dengue Hemorrhagic Fever cases in the Sungai Durian Public Health Center, Sungai Raya District, tended to increase from 2016 to July 2018, namely 13 cases, 35 cases and 37 cases. Based on Samal's research, the results obtained were that the condition of the wastewater disposal system and the presence of stagnant water were risk factors for the incidence of DHF in Tamamaung Village, Makassar City in 2021 [2] .

From the data obtained during the preliminary study from the Karanganyar Health Center, in 2017 there were 43 cases of DHF, in 2018 it decreased, namely there were 32 cases, then in 2019 it increased and was the highest increase in cases with 101 cases, in 2020 it decreased again so that there are 40 cases and in 2021 DHF cases will increase again, there will be 72 cases.

This is the basis for researchers to analyze the distribution of dengue fever in Karanganyar District in 2022. The purpose of this study was to determine the distribution of dengue cases in Karanganyar District.

2. RESEARCH METHODS

a. Types of research

This study used a descriptive analytic survey search method with a spatio-temporal approach to analyze the distribution patterns of cases, which were then buffered to see the direction of mosquito travel, and displayed an overlay map. data collection using the observation method in cases of dengue fever.

b. Research instrument

The research instrument used in this study was GPS Essentials as a tool to determine the coordinates of infected patients, ArcGIS as an application for mapping.

c. Methods of data collection

The data collection technique used for this research is to use the observation method. Using secondary data, namely DHF cases in Karanganyar District in 2022 from the Karanganyar Health Center. This observation technique was carried out by researchers directly to find out cases of dengue fever.

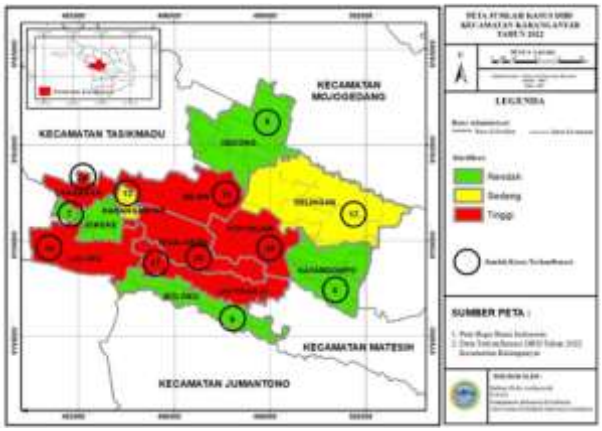
3. RESULTS

a. Location Overview

The area of Karanganyar Regency is 76,778.64 km², while the population is 938,808 people, so the population density is 1,223 people/km² while Karanganyar sub-district has a population density of 2,007.30 people/km². It can be seen that the population density of Karanganyar sub-district is relatively high [3] .

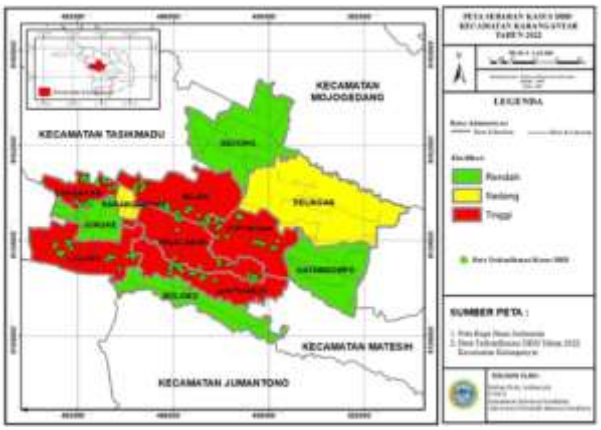
b. Analysis of the Distribution of Dengue Hemorrhagic Fever Cases

cases of Dengue Fever in Karanganyar District, namely 240 cases. Gedong sub-district has 6 cases, Bejen sub-district has 35 cases, Delingan sub-district has 17 cases, Gayamdompo sub-district has 4 cases, Popongan sub-district has 34 cases, Tegalgede sub-district has 26 cases, Jantiharjo sub-district has 27 cases, Bolong sub-district has 9 cases, Karanganyar sub-district has 13 cases, Cangakan sub-district has 34 cases , Jungke sub-district 7 cases, Lalung sub-district 34 cases. The highest case was in the Bejen sub-district with 35 cases while the lowest case was in the Gayamdompo sub-district with 4 cases. The following is a map of the number of dengue cases in Karanganyar sub-district



Picture 1. Map of the number of dengue cases in Karanganyar sub-district

From the number of DHF cases, it is known that the areas affected by the highest DHF cases are Bejen, Popongan, Cangakan, Tegalgede, Jantiharjo, Lalung. After knowing the number of cases then doing the coordinates for the distribution of cases can be seen from the map below.



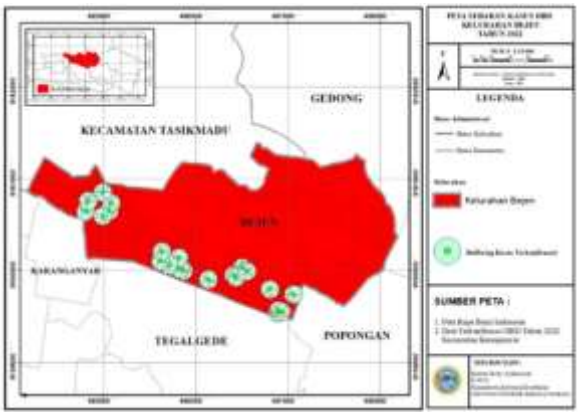
Picture 2. Sub-districts with high case classification

Based on the pictures, sampling was carried out in sub-districts with high case classification, such as Bejen

sub-district with 23 sample cases, Cangakan sub-district with 24 case samples, Lalung sub-district with 21 case samples, Popongan sub-district with 23 case samples, Tegalgede sub-district with 15 case samples and Jantiharjo sub-district with 20 case samples.

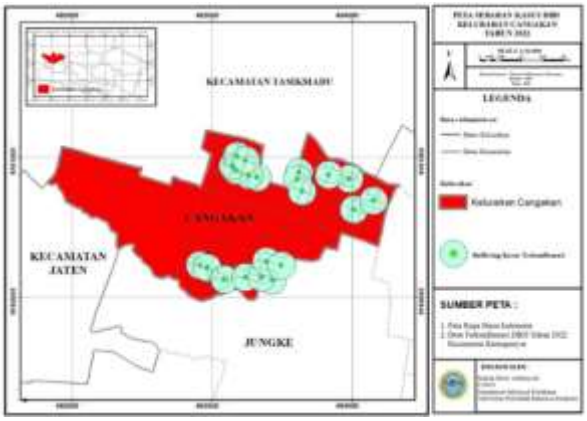
c. Buffering Cases of Dengue Hemorrhagic Fever

From the results of the distribution map, the incidence of DHF can be described by means of distribution points based on geographic locations in the field and the distance between disease cases close to each other means that the factor of DHF incidence is increasing. There are 20 cases in the 100m buffer zone in the Jantiharjo sub-district, which indicates that the location of the sufferer is within the flight range of the Aedes Aegypti mosquito.



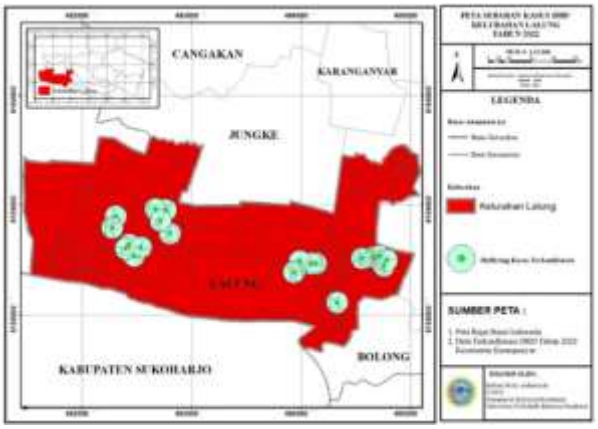
Picture 3. Location of the sufferer is within the flight range of the Aedes Aegypti mosquito

The DHF endemic area in the Bejen sub-district is ranked first with the highest DHF cases, namely 35 cases. The villages that enter the endemic area in the Bejen sub-district are Ringinasri village, Bejen village, Jengglong village, Dukuhan village and Tegalasri village.



Picture 4. Bejen sub-district are Ringinasri village, Bejen village, Jengglong village, Dukuhan village and Tegalasri village.

The DHF endemic area in the Bejen sub-district is in second place with the highest DHF cases, namely 34 cases. The villages that enter the endemic area in the Cangakan sub-district are Manggung village, Daleman village, Badranasri village, East Cagakan and West Cangakan.

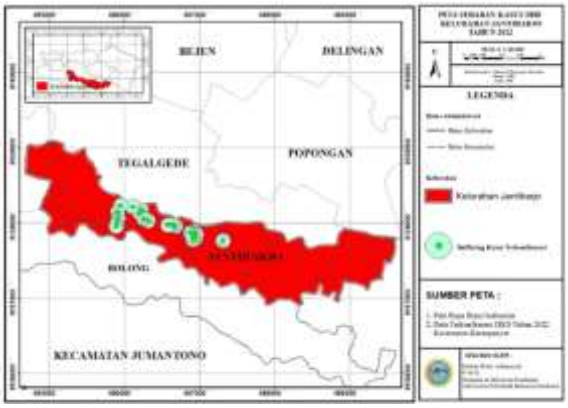


Picture 5. Map Cangakan sub-district are Manggung village, Daleman village, Badranasri village, East Cagakan and West Cangakan.

The DHF endemic area in Lalung sub-district is ranked third with the highest DHF cases, namely 34 cases. The villages that enter endemic areas in Lalung sub-district are Perum Lalung village, Ngaliyan village, Tegalan village, Kepuh village, Karang village and Jagan village.

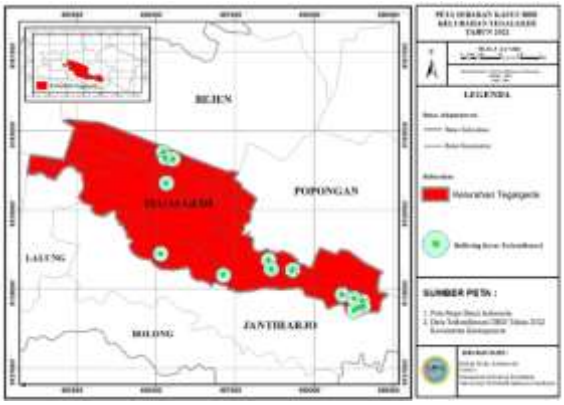
Picture 6. The villages that enter endemic areas in Lalung sub-district are Perum Lalung village, Ngaliyan village, Tegalan village, Kepuh village, Karang village and Jagan village.

The DHF endemic area in Popongan village is ranked fourth with the highest DHF cases, namely 28 cases. The villages that enter the endemic area in the Popongan sub-district are Perum Pelita village, Ngarjosari village, Perum Korpri village, Mekar Asri village, Popongan village, Serut village, and Jl. East law



Picture 7. The villages that enter the endemic area in the Popongan sub-district are Perum Pelita village, Ngarjosari village, Perum Korpri village, Mekar Asri village, Popongan village, Serut village, and Jl. East law

The DHF endemic area in the Jantiharjo sub-district is ranked fifth with the highest DHF cases, namely 28 cases. The villages that enter the endemic area in the Jantiharjo sub-district are Janti village, Kerten village and Mojo village.



Picture 8. The villages that enter the endemic area in the Jantiharjo sub-district are Janti village, Kerten village and Mojo village

The DHF endemic area in the Tegalgede sub-district is ranked sixth with the highest DHF cases, namely 26 cases. The villages that enter the endemic area in the Tegalgede sub-district are Demangan village, Donomulyo village, Supan village, Titang village, Tolok village, and Tegal Winangun village.

4. DISCUSSION

Based on the theory put forward by Lestari in the journal (Komaling et al., 2020) says that high population density and close proximity of houses can make the spread of DHF more intensive in urban areas than rural areas because close proximity of houses makes it easier for mosquitoes to spread the dengue virus from one person to another around him because the mosquito's flight distance is estimated to be around 50-100 meters.

The spread of DHF cases is also influenced by the altitude of an area as stated by (Siswanto & Usnawati, 2019) which said the Dengue virus can be spread by the Aedes Aegypti mosquito below an altitude of 1000 meters above sea level, and Karanganyar sub-district is at an altitude of 320 meters above sea level which means that Karanganyar sub-district is a plain. low. Apart from being influenced by the height of an area where dengue cases are spread, it is also influenced by population density and Karanganyar sub-district is classified as a high population density which has the effect of the emergence of urban slum areas with uninhabitable houses and a decrease in environmental quality.

5. CLOSING

Conclusion

The distribution of DHF cases in Karanganyar sub-district has a clustered pattern, namely there are 126 points of cases entering the 100-meter buffer zone, which indicates that the location of the sufferer is within the mosquito's flight range. The following villages are prone to the spread of DHF, namely Bejen village, Kadipiro village, Tegalasri village, and Jengglong village which are in the Bejen sub-district. Manggung village, Daleman village, and Badranasri village which are in the Cangakan sub-district. Perum Lalung village, Tegalan village, Kepuh village, and Karang village which are in Lalung sub-district. Mekar Asri village, Perum Korpri village, Popongan village, and Serut village which are in the Popongan sub-district. Kerten village and Mojo village which are in the Jantiharjo sub-district. Supan village and Tegal Winangun village are in the Tegalgede sub-district.

Suggestion

Further research can be developed by increasing the area of the research area and adding variables such as environmental factors and economic factors. It can be used as an intervention material for Puskesmas to suppress the spread of dengue fever.

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