Prediction Insecurity Outbreak Of DHF In Endemic Areas In Surabaya

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Abstract

Background : Dengue Hemorrhagic Fever (DHF) became known in Indonesia since 1968 in Surabaya and Jakarta. in 2015 a total of DHF patients in the city of Surabaya is 640 people with a total of 10 deceased people. Data obtained from East Java Health Office in 2015 showed the mortality rate from DHF patients has increased from 2014, that reaching 1.56 percent from the previous year which only reached 1.01 percent.

Methods : The purpose of this study was to map the distribution of dengue cases as predictions of insecurity outbreak of dengue in endemic areas of the city of Surabaya. This study is a descriptive observational based Geographic Information System, used quantitative methods that combine design time series with retrospective.

Result : The respondents were DHF patients amounted to 103 patients. Geo-location data obtained from the patient Surabaya City Health Department to map the distribution of the case. The results showed that dengue cases peaked on April. Manukan Kulon, Sememi, Kemayoran, Banyu Urip, Babat Jerawat, Moro Krembangan, Genteng and Sidotopo Wetan are areas of high risk in endemic areas in Surabaya. Manukan Kulon is an area with a high vulnerability due in June - December 2015 has the most number of cases. So that these villages needs to increase vigilance against outbreaks of dengue.

Conclusion : It can be concluded should be increased efforts to control dengue in Manukan Kulon village, especially on March to prevent the increase in the number of cases on April.

Keywords : *prediction insecurity, outbreaks, DHF*

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) became known in Indonesia since 1968 in Surabaya and Jakarta[5]. In 2015 a total of DHF patients in the city of Surabaya is 640 people with a total of 10 deceased soul[6]. The data obtained from East Java Health Office in 2015 showed the mortality rate of DHF patients has increased from 2014, that reaching 1.56% from the previous year which only reached 1.01% .

One of the ways that can be done in designing a dengue eradication program and better prevention is to perform spatial analysis using Geographic Information System (GIS). The ability of GIS to map the location of the patient based disease helpful in seeing the spread of the disease so as to identify areas of high risk[10]. Mapping serve as predictive tools insecurity endemic areas of dengue outbreak in Surabaya.

METHODS

This study is a descriptive observational based Geographic Information System, used quantitative methods that combine design time series with retrospective. Respondents were patients of dengue cases in June to December 2015 amounted to 103. Respondents were mapped based on the geographic location to illustrate the distribution of the case.

The research was conducted in the city of Surabaya with the collection of secondary data conducted in Surabaya City Health Office. Secondary data collected there are 2 kinds of data on the number of dengue cases in 2005 to 2015 were used as a prediction of the number of cases from 2016 to 2026 as well as geo-location data of dengue patients in June-December 2015 to map the distribution of the case.

The primary data which includes the coordinates of the geographical location of patients is done in a place to patient residence. The collection of primary data obtained from observations to shelter patients with DHF and location recording in the form of GPS coordinates using tools to obtain spatial data dengue. Collected data through the removal process, then processed and continued with data cleansing.

Transferring, is the process of moving data DHF patients waypoint from the GPS device to the computer via USB cable. Processing, a process waypoint data changes into spatial data based on the incidence of dengue cases of DHF patients into shape shapefile. Cleaning, a data cleansing or data checking to see the number of points the geographical location of DHF patients with DHF patients plotting observation table to avoid mistakes.

The data collected was analyzed by quantitative descriptive. Elementary analysis of disease is used to determine the spread of disease in the community revealed by plotting the incidence of the disease (in the place of residence of infected patients) were active with the corresponding geocoding or address[9]. Elementary analysis of disease is used to determine the incidence of dengue cases in the area of high vulnerability based point of incidence of dengue were portrayed on the map.

Historical data on the number of dengue cases across the city of Surabaya to the period 2005-2015 is used as a prediction of the number of cases 2016-2026 were analyzed using statistical analysis application arima models forecast. Forecasting the number of dengue cases can be identified through a plot of data which is then tabulated in tables and curves. This study has received approval from the ethics committee of the Faculty of Public Health Universittas Airlangga No: 378-KEPK.
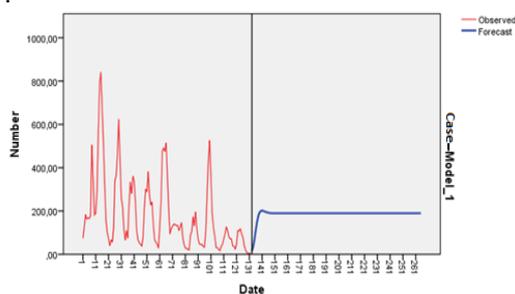
RESULT

Surabaya is the capital city of East Java Province. Surabaya City located at 07 21 South Latitudes and between 112 36 and 112 54 East Longitudes. North and East part are bounded by Madura Bay, South part is bounded by Sidoarjo Regency and West part is bounded by Gresik Regency. The area of Surabaya City is about 326,36 Km^2 and divided into 31 districts, 163 villages[2].

Data on the number of dengue cases in the city of Surabaya in 2005-2015 showed the highest case in the city of Surabaya on average occurred in April-May[4], can be seen in Figure 1, below :
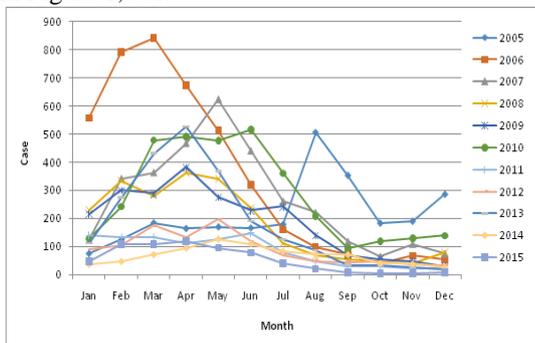

While the number of dengue cases in the city of Surabaya in 2005-2015 along with the predicted number of cases 2016-2026 were analyzed using statistical applications forecast analysis arima models, can be seen in Figure 2, below :

The prediction results show that on April 2016 there will be an increase in the number of cases. These results follow the pattern of the incidence of dengue cases last 3 years (2013-2015) whereas on September 2016 dengue cases peaked. In the following years the incidence of dengue cases visible pattern of constant, this is because the historical data used for predictive analysis using monthly data that are less appropriate to the characteristic of dengue disease with an incubation period $\pm$ 1 week[13].

The results are used to design prediction and prevention of dengue eradication program better. Spatial analysis using Geographic Information System (GIS) to map the location-based disease sufferers helpful in looking at the distribution
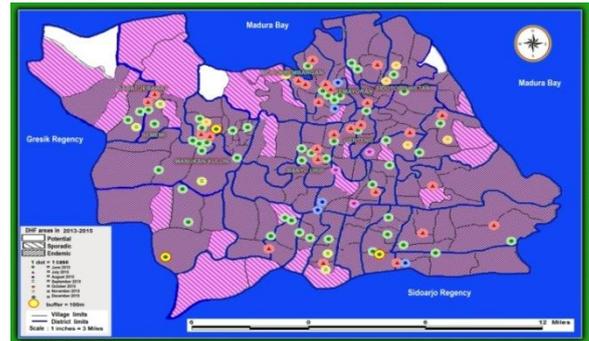
of dengue disease so as to identify areas of high risk[10]. Mapping serve as predictive tools insecurity outbreak of dengue in endemic areas in the city of Surabaya. Insecurity outbreak of dengue in endemic areas in Surabaya can be seen in figure 3, the following :

Figure 3 shows the Manukan Kulon, Sememi, Kemayoran, Banyu Urip, Babat Jerawat, Moro Krembangan, Genteng and Sidotopo Wetan are areas of high insecurity in endemic areas in the city of Surabaya. Prediction insecurity with spatial analysis in figure 3, mapping the distribution of location-based dengue cases of DHF in June-December 2015 amounted to 103 patients[13].

DISCUSSION

Prediction or forecasting is the study of historical data in order to find trends and patterns of systematic correlation[12]. By far the most widely used approach for numerical prediction (which was then called to the numerical prediction) is a regression, a statistical methodology that was developed by Sir Frances Galton, a mathematician. In fact, a lot of writing that uses the term "regression" and "numerical prediction" as a synonym[8].

The results show the prediction on April there will be an increase in the number of dengue cases. These results follow the pattern of the incidence of dengue cases last 3 years (2013-2015), which showed that dengue cases peaked on April. Prediction is used as a warning to raise early awareness in an effort to control dengue in endemic areas particularly prone to outbreaks of dengue.

Therefore approximately one month earlier, on March, efforts should be made to prevent the increase in the number of cases on April as well as cleaning and eradication of mosquito vectors from egg to adult stage especially in puddles, container and water bath.

The prediction results also showed that dengue cases peaked on September. Therefore, the importance of early awareness and prevention before the vector of dengue into adult mosquitoes. Drain, shut down and utilize thrift became one of the dengue control efforts need to be done at least once a month.

Perwitasari research results which states in January-March and October-December an increase of dengue cases in the city of Yogyakarta. Perwitasari (2015) conducted a study of climate conditions and patterns of incidence of dengue in the city of Yogyakarta in 2004-2011, whereas in this study observed climatic factors and the incidence of dengue cases in Surabaya 2005-2015. This shows the difference in the results of the study, expected due to the time different research and climate patterns that occurred in the city of Yogyakarta in contrast to Surabaya[11].

Spatial analysis showed the results of mapping the distribution of location-based DHF patiens in June-December 2015 amounted to 103 patients. Prediction vulnerability shows that areas with high vulnerability in endemic areas in the city of Surabaya included Manukan Kulon, Sememi, Kemayoran, Banyu Urip, Babat Jerawat, Moro Krembangan, Genteng dan Sidotopo Wetan.

Manukan Kulon is a village with a total area of DHF patients most reach 6.8 % or 7 patients of the total number of cases (103 cases) in all villages in the city of Surabaya in June-December 2015. This was possible because the village is Manukan Kulon area population density is highest among the working area of public health centers to another.

The results of this study had similar results with the results of research Andella (2012) which states Manukan Kulon village is one of the administrative areas of Manukan Kulon's public health centers that the incidence of dengue is highest among administrative regions Manukan Kulon's public health centers more. In the study Andella (2012) also stated that the village has Manukan Kulon free numbers larva of 87.6 % while the target of free larva rate in nationwide is 95%, which means Village of Manukan Kulon, District Tandes, Surabaya has not reached the target of national target larva[1].

Environmental health sciences is a multidisciplinary science that studies the dynamics of interactive relationship between a group of people or community with a variety of changes in the environmental components of human thought can cause health problems in the community and learn about efforts to prevent it[3].

DHF control management using knot theory approach refers to the source of the disease (first knot), disease transmission medium (second knot), behavioral exposure (third knot) and the incidence of disease (fourth knot).

The first knot management (control at the source of the illness) is searching DHF cases the source of the disease actively and epidemiological investigation by dengue surveillance officers. The second knot management (control on transmission media) on environmental management and vector control, both biologically, chemically at the larval stages into adulthood. The third knot management (control exposures / contacts in the community), namely the protection of individuals from the contact or mosquito bites transmitting DHF, as well as community participation in vector control as the bath tub drain, close the water container, utilizing thrift, and mosquito eradication to be an interpreter monitors larvae[7].

CONCLUSION
The conclusion of the study areas with high vulnerability is Manukan Kulon village. The results show the prediction on April there will be an increase in the number of dengue cases. So that needs to be increased efforts to control dengue in Manukan Kulon village, especially on March to prevent the increase in the number of cases on April.

DHF control management can be performed using knot theory approach. First, epidemiological investigation by a surveillance officer DHF. Once it can be done environmental management and vector control, both biologically, chemically at the larval stages into adulthood. In addition, it is important to conduct individual protection from mosquito bites transmitting contact, as well as community participation in vector control such as the tub drain water, close the water container, utilizing thrift, and mosquito eradication to be a larva monitoring.

Recommendations for the Surabaya city government is planning a program to eradicate and DHF prevention is better to suppress the incidence of DHF cases to consider and predict the seasons and the time of emergency outbreaks of dengue in the city of Surabaya. Improved management of DHF control can be done by using an integrated approach knot theory to be able to break the chain of transmission of DHF effectively and efficiently.

Next research, to obtain the predicted results and the pattern of incidence of dengue cases it is advisable to adjust the historical data the number of dengue cases with the characteristic of dengue disease (incubation period $\pm$ 1 week).

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