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Research Article

Epidemiology of Dengue in Jetis Public Health Centre, Yogyakarta 2013-2016

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ABSTRACT

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Background: Dengue disease is found in tropical and sub-tropical climates worldwide, especially in urban and semi-urban areas. Of 70% of actual cases exist in Asia. The incidence of DHF in Indonesia during 2018 amounted to 24.73 per 100,000 inhabitants. Yogyakarta City is one of the dengue susceptible areas that receive serious attention from the health authorities. Jetis Public Health Centres is one of the PHC in Yogyakarta with high dengue incidence with one mortality. The purpose of this study was to describe the epidemiology of dengue cases based on time, place, people, observe dengue trend, and assess the larva free rate target's achievement.

Methods: This research was descriptive quantitative using secondary data obtained from Jetis Primary Health Centre's health information system, Yogyakarta. Dengue data year 2013-2016 was analysed using descriptive epidemiology (time, place, and people) to show the dengue trend. Last, the larva free rate was compared between targets and achievements.

Results: In 2016, the dengue case increased from 81 to 104 in 2014 with one mortality. Out of 104 cases, 37 cases occurred in the Bumijo village, 33 cases in Cokrodiningratan village, 34 cases in Gowongan village. 85.58% of DHF cases occur at age \geq five years, and 57.69% happen in women. The achievement of larvae free rate was 67.73% and had not reached the determined target. There was a tendency for an increase in dengue cases from May to June during the observed year.

Conclusions: 2016 was the peak of dengue cases during 2013-2016. Women and people aged more-equal to five years were the most infected group. Most of the cases were found in Bumijo village. Larva's free rate in Jetis was not achieving the target. June was the peak of the case in 2016.

Keywords: Dengue Fever, Dengue Haemorrhagic Fever, Epidemiology, Yogyakarta

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INTRODUCTION

Dengue fever is a viral infection transmitted by *Aedes aegypti* mosquitoes. The latest WHO estimates 390 million dengue infections per year, 96 million with severe disease levels. Globally, the WHO estimated the prevalence of Dengue fever 3.2 billion people spread over 129 countries, 70% of the burden was in Asia (1). The disease is found in tropical and sub-tropical climates worldwide, especially in urban and semi-urban areas (2).

The climate change phenomenon that changes weather patterns is believed to contribute to the death, injury of some infectious diseases (3). Globally, the dengue incident has risen 30 times over the last 50 years, and the climate is a driving force on the distribution and incidence of dengue fever (4). Some literature review discusses the inconsistent relationship between climate variability and the transmission of dengue fever and needs advanced research about that (5).

Aedes Aegypti mosquitoes are susceptible to environmental conditions, especially temperature, rainfall, and humidity (6)-(7). Previous research indicates there was no correlation between precipitation and humidity with dengue fever [6]. Another study has shown that dengue fever cases were correlated with rainfall but not the case for temperature (8). Research in Indonesia shows that higher temperatures have led to shorter incubation periods and virus replication (7).

These factors affect the pattern of dengue cases, the time of the incident, the number of people involved, and the case's location or area. Meteorological and Climatology Agency (BMKG) estimates that Indonesia is experiencing an increased rainfall in early February and faces a long rainy period in February-March. This situation leads to flooding in some areas, including in Yogyakarta (9). Program to preventing outbreaks has been developed through the decree of the Indonesia Minister of Health. Its main activity is mosquito nests eradication as part of early awareness in society (10). Dengue prevention and control success depends on effective vector control measures and sustainable community involvement (11). Besides, it is essential to detect the dengue diseases associated with severe dengue fever and access to appropriate health care to reduce the mortality rate from severe dengue to below 1% (11)

Dengue incidence in Indonesia reached 24.73 per 100,000 population in 2018 (12). In 2016, 90.08% of Indonesia's regions were infected with dengue fever. This number increased to 84.44% in 2017, and a continuous increase in 2018 with 85.60% with a mortality rate due to dengue was 0,70% (12). Five Yogyakarta provinces suffer from dengue every year; one of them was Yogyakarta City (12). One of the PHC in Yogyakarta City categorized as high dengue incidence in 2016 was Jetis PHC - with 104 dengue cases and one mortality. The following year – 2017 and 2018, there were 32 and 5 cases, respectively (13). The purpose of this study was to describe the epidemiological of dengue cases based on the time, place people, observe the dengue trend and assess the achievement of larva free rate in Jetis PHC of Yogyakarta.

METHODS

Quantitative descriptive was applied in this research. We used tables and graphs to present our analysis. Secondary data set (2013-2016) from SIMPUS (information system management system) in the health centre, manual report and case registry were obtained from the Jetis Primary Health Centre, Yogyakarta City. The data was collected from residence who diagnosed with dengue positive in Jetis health center during that periods. Data was analyzed using descriptive epidemiology (time, place, and people), trend, and comparative analysis.

RESULTS

Epidemiology descriptive

1) Case distribution by time

Based on the case report, Dengue disease in the work area of Jetis PHC occurs every year. In 2013 dengue case in this area was 56, and in 2014 was 19 cases. However, in 2015 there was an increase in the case of more than twice higher compare with last year (81 cases). 2016 was the year with the highest cases compared to the previous 2 years (Figure. 1 and 2).

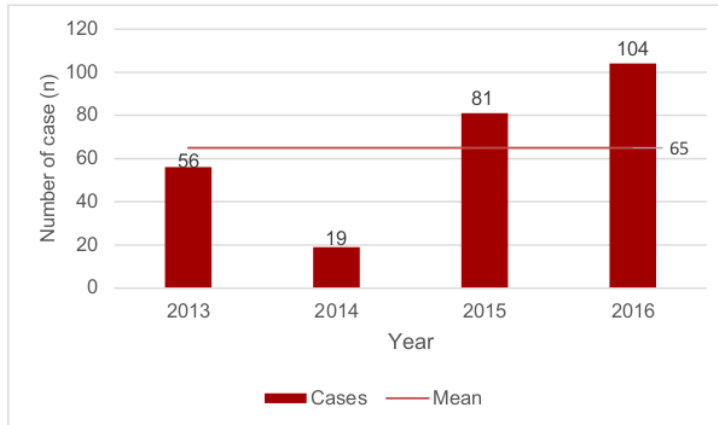


Figure 1. Number of dengue case in Jetis PHC, 2013 - 2016

During 3 years of observations, most dengue cases occurred in 2016, with 1 case of death in January. The dengue case peak occurred in June that increased significantly from 2 cases in June to 21 in June. (Figure. 2).

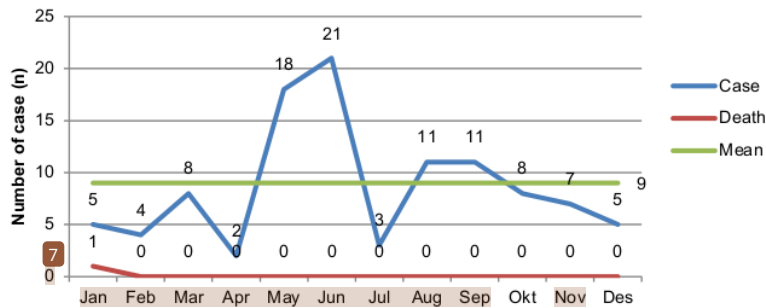


Figure 2. Number of the monthly case and mortality Jetis PHC year 2016

Time-based analysis can be seen from trends using maximum and minimum patterns during the 3-years of data set. The year 2013 - 2015, the increase of dengue cases occurred in April, and the peak was in June. Then it decreased and fluctuated in the following month. The same happened in 2016, where there was an increase in the case after April to June (Figure 3).

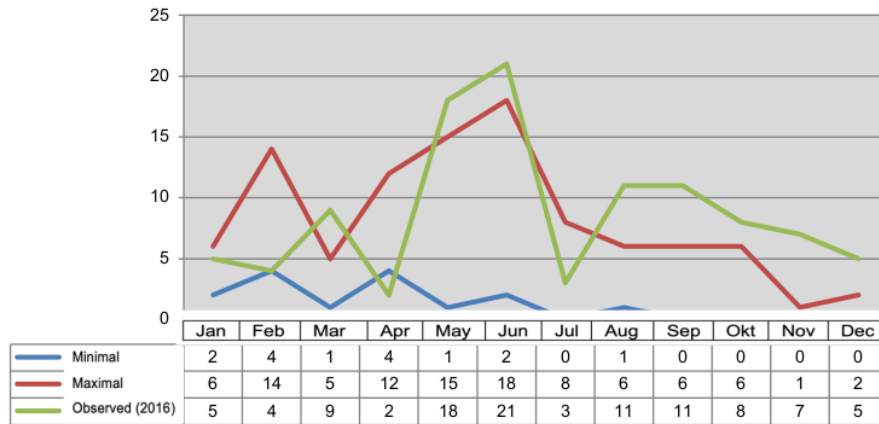


Figure 3. Dengue case trend in Jetis PHC, during 2013-2016

2) Case distribution by place

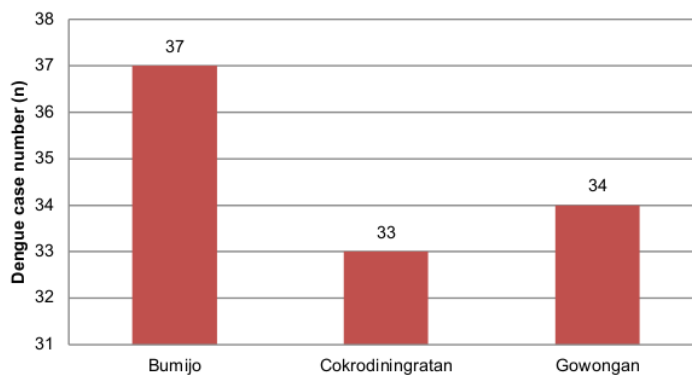


Figure 4. Dengue case per village in Jetis PHC year 2016

Jetis District is part of the City of Yogyakarta, located near the Code River. The Jetis Community Health Center's work area consists of three villages: Bumijo, Cokrodiningratan, and Gowongan. Of the 104 DHF cases in 2016, the highest case occurred in Bumijo Village (Figure 4).

3) Case distribution by people

Most of the dengue cases in the research area occurred in people aged \geq five years (85.58%). More than half of the dengue cases were infecting women (57.69%) (Table 1).

Table 1. Dengue case distribution by sex in Jetis, 2016

Age	Sex		N (%)
	Male	Female	
< 5 years	7	8	15 (16,42)
≥ 5 years	37	52	89 (85,58)
N (%)	44 (42,31)	60 (57,69)	104 (100)

Comparative analysis

One indispensable indicator in dengue prevention is larva-free rate (ABJ). Jetis PHC targeted the ABJ coverage of ≥ 95%. However, the implementation merely reached up 67.73% or still under the target (Figure 5).

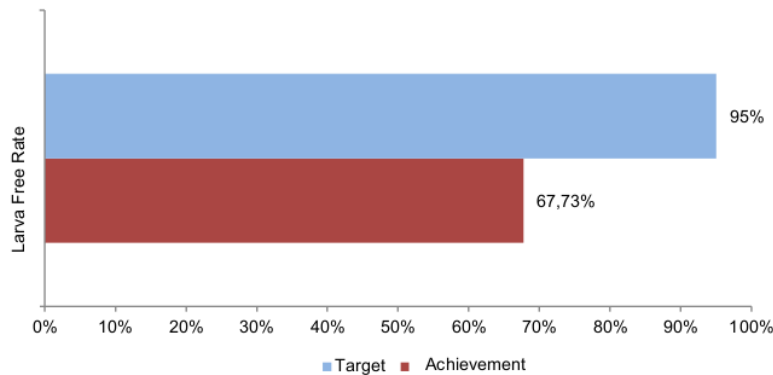


Figure 5. Comparison between target and achievement of larva free rate

DISCUSSIONS

This research discusses the epidemiology of dengue cases in Jetis PHC, Yogyakarta City by time, place, and people during 2013-2016, followed by trend and comparative analysis for larva free rate for 2016.

Case distribution by time

Dengue cases were increasing during the three years of observation in the research area (2013-2016). Most cases occurred in 2016 (104 cases), most of which occurred in June. Several previous types of researchers observed the relationship between the dengue increases and the rain intensity that potentially raises *Aedes' aegypti* breeding habitat, such as puddles (14)-(15). A high mosquito population supported with proper air humidity increases people's risk of contact with the mosquito (16). Dengue peak in Jetis PHC, which occurred in June, is following literature that reported in some big cities in Indonesia dengue transmission season occurred in March to August with peak happened in June (16). However, a previous study showed the relationship between the dengue case and the climatic variable was not consistent (5). In 2017 and 2018, dengue cases in Jetis PHC were declining from 32 to 5 cases. The decline of dengue cases in the period is probably related to the decrease of vector existence because of the development of larva free rate achievement (13).

Trend analysis

During 2013-2016, dengue cases occurred throughout the year that mostly dengue peaks occurred in June, then decreasing and ups-down in the following month. Some references reported the association between dengue and rainfall (14)-(15). Climate change means changing climate pattern is recognized as a factor that leads to death, injury, and fatality for some climate-sensitive infectious diseases (3)

Indonesia is experiencing high rainfall intensity from February to March and potential flooding in some areas, including Yogyakarta (9). Yogyakarta has a dengue transmission season from March to August, and usually, the peak occurred in June (16). This situation is following the case that happened in the work area of Jetis PHC. However, the literature indicates no direct correlation between monthly dengue cases with monthly rainfall and the average temperature (17). Therefore, it is necessary to maximize the early warning system and conduct appropriate studies to reduce future cases. Literature mentions that proper Bayesian Spatio-temporal models allow the identification of various regional groups and climate covariate impact. Prediction of high-risk areas and the mutual influence between areas, climate variables, and temporal data will help policymakers retrieve dengue prevention measures (18).

Case distribution by place

The increasing dengue case could be associated with the rising vector existence, closely related to human risk factors such as population density, mobility, and housing (19). In 2016, population densities in Jetis PHC were 16,074 per km², categorized as high density (20). Rapid urban population growth, population mobilization, and low population control allow the dengue outbreak to increase the probability of more fabulous mosquito presence in populated areas, with habitat expansion in the future (21). Jetis sub-district is among five other subdistricts in Yogyakarta City with a high dengue case (13) because it has increased population density and is located on the riverbank.

Case distribution by the people

Dengue disease in the Jetis Health Center area mainly attacks people aged over five years (85.58%). Literature states that there has been a change in dengue patterns from children under 5 to all age groups, even more in the productive age or adolescent and adult groups (22). Changes in dengue epidemiology are also influenced by environmental health factors (16). Our research also found that most of the dengue cases occur in the female of 57.69%, it might be because women spend more time with their domestic affairs than men who primarily work out the region.

Comparative analysis

The dengue transmission dengue is closely related to vector control measures implemented to speed up community participation (23). The process requires persistence of patience, and effort to continuously provide understanding and motivation to individuals, groups, and society. A study showed that the public's counselling does not affect the community's behaviour in vector control activities (PSN) because the community has various characteristics that potentially influence their understanding, making them unable to implement dengue vector control (22) independently. As a result, PSN activities need to be run maximally with guidance from the key stakeholders, such as the primary health centre.

On vector control (PSN), education and economic status are important factors that influence community participation. Education and financial situation have a positive correlation to the prevention behaviour of dengue (24). Moreover, the family size, the adults, the income, and perception are significantly associated with reducing dengue cases (25). People who have suffered from dengue fever are very likely to use adaptation measures than people who do not experience dengue fever. Noting that factors may be beneficial to public health authorities

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to develop an awareness of dengue fever in the community and population sensitivity to use measures adaptation (25).

Mosquito-nest eradication (PSN) is part of the dengue early warning system under the health regulation ministry (10). Labours in improving dengue early warning systems and control need to be improved, especially on systematic surveillance of diseases and vectors in PHC, city/district, provincial, and central government levels. Cooperation across sectors requires finding a proper approach aimed to reach a broader community (26).

CONCLUSIONS

Dengue case in 2016 was the highest case during 2013-2016, with a peak that occurred in June. Most of the dengue cases happened in women and people aged \geq five years. Bumijo was the hotspot of dengue during that period. Larva free rate (ABJ) in the Jetis sub-district has not reached the target. Active early warning systems between primary health center staff and the community need to be done to achieve ABJ targets and maximize efforts to prevent and reduce dengue cases.

Authors' Contribution

¹
AHA contribute¹ to the data collection, data analysis, report writing, and manuscript publication, RR contributed to licensing, data analysis, and report writing. SS participated as a provider of data and information, data analysis, and report writing. YP participated in data analysis and writing.

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Conflict of Interest

There are no conflicts of interest.

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