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Spatial Analysis of Dengue Hemorrhagic Fever in the Working Area of the Puuwatu Health Center

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ABSTRACT

Introduction: Dengue Haemorrhagic Fever (DHF) is one of the infectious diseases that has high morbidity and mortality rates. Based on data obtained from the Kendari City Health Office, it is known that the prevalence of DHF in Kendari City in 2021 was 211 cases of DHF. In 2022, there were 230 cases of DHF. In 2023, the number of cases was 253 people.

Method: This type of research isquantitative descriptive with a spatial approach.The population in the study was 8,100 respondents with a sample of 99 respondents using a sampling technique. cluster sampling. The analysis used univariate analysis, and spatial analysis and was tested using the Chi-square test.

Result: Of the total 99 respondents, there were 7 cases of DHF, with 3 cases each in Puuwatu and Punggolaka Villages, and 1 case in Watulondo Village. Of the total 99 respondents, there were 34 respondents who did not reach the ABJ target with the most respondents from Punggolaka Village, 11 respondents. Of the 99 respondents, there were 17 respondents who did not meet the housing density requirements with the most respondents from Watulondo Village, 6 respondents. Of the 99 respondents, there were 43 respondents who had poor waste management with the most respondents from Punggolaka Village, 14 respondents.

Conclusion: The incidence of DHF in the Puuwatu Health Center working area was in Puuwatu Village as many as 3, Punggolaka Village as many as 3 and Watulondo Village as many as 1.

Introduction

Dengue Haemorrhagic Fever (DHF) is an infectious disease that has high morbidity and mortality rates.[1] In Indonesia, with a tropical climate that supports the growth of animals and plants, it is also a place for the development of various diseases, especially diseases transmitted by vectors such as mosquitoes.[2]

Based on the Ministry of Health of the Republic of Indonesia, in 2021, there were 73,518 cases of dengue fever with 705 deaths. Then in 2022 there was an increase in dengue fever cases, namely 143,266 cases with 1,237 deaths. And in

2023, there were 114,720 cases with 894 deaths.[3] Based on the 2023 Indonesian Health Survey, the prevalence of Dengue Fever in Indonesia was 0.64% or 877,531 cases.[4]

According to data obtained from the Southeast Sulawesi Provincial Health Office, the incidence of dengue fever has increased from 2020 to 2022. In 2020, the IR of dengue fever cases was 39/100,000 population, while in 2021 it was 29/100,000 population and in 2022 it was 32/100,000 population.[5] Based on the 2023 Indonesian Health Survey, the prevalence of Dengue Fever in Southeast Sulawesi Province was 0.58% or 8,664 cases.[4]

Based on data obtained from the Kendari City Health Office, it is known that the prevalence of DHF in Kendari City in 2021 was 211 cases of DHF with 4 deaths (IR = 53/100,000 population, CFR = 1.9%). In 2022, there were 230 cases of DHF with 6 deaths (IR = 57/100,000 population, CFR = 2.6%). In 2023, the number of cases was 253 people with 5 deaths (IR = 71/100,000 population, CFR = 2.0%).[6]

One of the Health Centers in Kendari City with the highest number of DHF cases is Puuwatu Health Center. According to data obtained from Puuwatu Health Center, in 2021 there were 63 DHF cases with 2 deaths (CFR = 3.2%). In 2022 there were 54 DHF cases with 1 death (CFR = 1.9%). In 2023 there were 80 DHF cases with 1 death (CFR = 1.3%).[7] Meanwhile, other health centers in Kendari City based on data obtained from the Kendari City Health Office in 2022, Poasia Health Center was recorded as having 10 cases of Dengue Fever and Kadia Health Center had 22 cases.[6]

To reduce the incidence of dengue fever, mitigation efforts need to be carried out based on spatial analysis using GIS (Geographic Information System) technology so that the location and phenomenon of dengue fever can be clearly identified and the results of the analysis can be used for decision making.[8]

GIS technology combined with remote sensing technology can produce spatial information based on three main components, namely location data, non-location data, and time dimensions that allow analysis of changes over time. Various types of data such as graphic data (maps, graphs), tabular information (tables) and text can be integrated by Geographic Information Systems to form new information in the form of thematic maps. With this capability, GIS can be used to observe dengue vectors that provide information about areas vulnerable to dengue fever events.[9]

Factors that can influence the increase and spread of DHF cases include host factors, environmental factors such as geographic conditions (weather and climate), demographic conditions (population density, mobility, community behaviour) and socio-economic status.[10] This is also one of the causes of the high incidence of DHF in the Puuwatu Health Center work area. The population density in the area reached 1047.6 people/km2 with the highest population density in Tobuuha sub-district, namely 3948.6 people/km2. With more residents, the density of houses occupied will increase. The comparison between the number of residents and the area of the house determines the density of occupancy, where the health standard is 10 m2 per person. The larger the floor area of the house, the higher the suitability of the dwelling.[11]

Method

This type of research is quantitative descriptive with a spatial approach. The population in the study was 8,100 respondents with a sample of 99 respondents using a sampling technique. Cluster sampling. The analysis used univariate analysis, and spatial analysis and was tested using the Chi-square test.

Results

Figure 1 shows the boundaries of the Puuwatu Health Center work area marked in yellow. The red dots indicate the locations of respondents who experienced DHF, while the green dots indicate respondents who did not experience DHF. Of the total 99 respondents, there were 7 cases of DHF, with 3 cases each in Puuwatu and Punggolaka Villages, and 1 case in Watulondo Village.

Figure 2 Shows the distribution of ABJ in the Puuwatu Health Center work area. The yellow part shows the boundary of the Puuwatu Health Center work area. The red dots indicate the location of respondents who did not reach the ABJ target, while the green dots indicate respondents who reached the ABJ target. Of the total 99

respondents, 34 respondents did not reach the ABJ target with the most respondents from Punggolaka Village as many as 11 respondents.

Figure 3. Shows the distribution of residential density of respondents in the Puuwatu Health Center work area. The yellow part shows the boundary of the Puuwatu Health Center work area. The red dots indicate the locations of respondents who meet the residential density requirements, while the green dots indicate respondents who do not meet the residential density requirements. Of the 99 respondents, 17 respondents did not meet the residential density requirements with the most respondents from Watulondo Village, as many as 6 respondents Puuwatu Health Center work area while the green dots indicate respondents who do not meet the residential density requirements.

Figure 4. Shows the distribution of waste management of respondents in the Puuwatu Health Center work area. The yellow part shows the boundary of the Puuwatu Health Center work area. The red dots indicate the location of respondents who meet the requirements for residential density, while the green dots indicate respondents who do not meet the requirements for residential density that out of 99 respondents, 43 respondents have poor waste management with the most respondents from Punggolaka Village as many as 14 respondents.

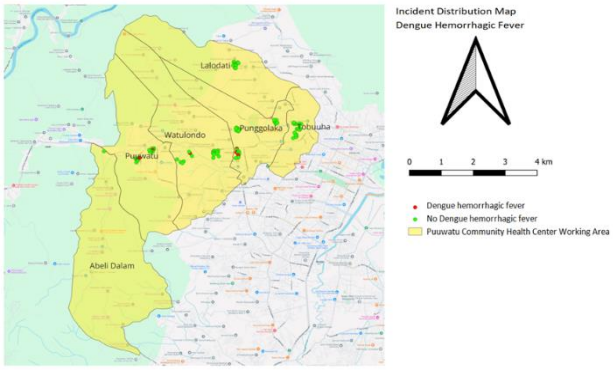

Figure 1. Map of the Distribution of DHF Incidents in the Puuwatu Health Center Work Area

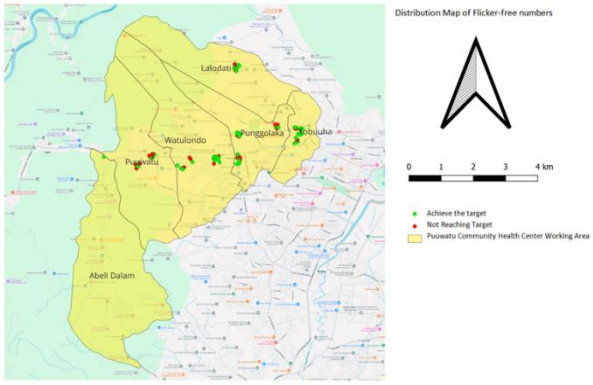

Figure 2. Map of ABJ Distribution in the Puuwatu Health Center Work Area

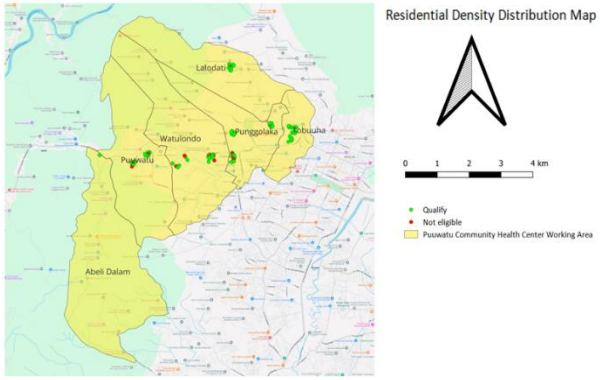

Figure 3. Map of Residential Density Distribution in the Puuwatu Health Center Work Area

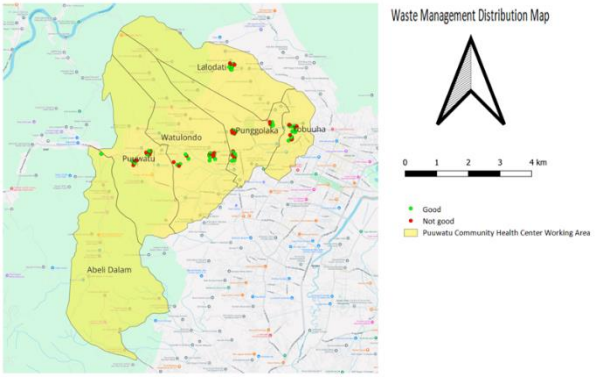

Figure 4. Map of Waste Management Distribution in the Puuwatu Health Center Work Area

Discussion

Free Mosquito Rate With Dengue Fever Incidents

The higher percentage of DHF incidence in this group indicates that low ABJ is associated with an increased risk of DHF. This may be due to the large number of uncontrolled mosquito breeding sites, both inside and outside the home, thus increasing the population of Aedes aegypti mosquitoes which are vectors of DHF.

Although the target of Free Larvae Rate was not achieved, the low incidence of DHF could be influenced by other variables such as housing density and waste management. If housing density is low and waste management is carried out properly, the potential for mosquito breeding can be reduced, so that the risk of DHF transmission is also lower even though ABJ does not reach the target.

Residential Density with Dengue Fever Incidents

Although there were cases of dengue fever in this group, the percentage of cases was relatively small, which may indicate that even though the housing density did not meet the requirements, other factors such as environmental cleanliness, preventive measures, and vector control could still play a role in reducing the risk of dengue fever. Even though the housing density met the requirements, dengue fever incidents still occurred, but with a lower percentage compared to the group that did not meet the requirements. This could be due to other conditions, such as the presence of open water containers and suboptimal preventive measures, which still allow mosquitoes to breed.

Based on the results of the study, residential density did not show a significant relationship with the incidence of DHF in the Puuwatu Health Center work area. This may be due to other factors that influence it besides the residential density itself. For example, even though respondents are in an area with high residential density, they may have many open water containers that can be a breeding ground for Aedes aegypti mosquitoes. In addition, poor waste management, such as not implementing the 3M Plus program (Draining, Covering, and Burying and Removing items that can hold water), can also increase the risk of DHF transmission. Therefore, it is important to consider other environmental and behavioral factors that can affect the risk of DHF in an area.

Waste Management with Dengue Fever Incident

The higher percentage of DHF cases in this group indicates that the lack of implementation of the 3M Plus program is associated with an increased risk of DHF. The 3M Plus program aims to eliminate mosquito breeding sites by draining water reservoirs, tightly closing water reservoirs, recycling or destroying items that can be breeding sites for mosquitoes, and making additional efforts such as the use of mosquito repellent or mosquito nets. When these steps are not implemented properly, the environment becomes more susceptible to DHF transmission because there are more breeding sites for Aedes aegypti mosquitoes.

The large number of respondents who did not experience DHF despite having poor waste management can be caused by several factors. One of them is that even though waste management is less than optimal, other factors such as the success of the health center program, the use of mosquito repellent, mosquito nets, and individual behavior in protecting themselves from mosquito bites can reduce the risk.

In addition, the distribution of Aedes aegypti mosquitoes may not be evenly distributed in each environment, so that even though waste management is poor, not all individuals are exposed to mosquitoes infected with dengue virus. Geographical conditions, climate, and frequency of contact with vectors can also affect the potential for transmission, so that some respondents still do not experience DHF.

Conclusion

Based on the results of research conducted on " Spatial Analysis of Dengue Hemorrhagic Fever In The Working Area of the Puuwatu Health Center " obtained the following conclusions:The incidence of DHF in the Puuwatu Health Center working area was in Puuwatu Village as many as 3, Punggolaka Village as many as 3 and Watulondo Village as many as 1.

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