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Spatial Distribution of Animal Bite Cases Transmitting Rabies (GHPR) in Kolaka Utara Regency

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ABSTRACT

There were 111 cases of Rabies Transmitter Animal Bites from January to December 2018 in North Kolaka Regency and 1 positive case of rabies (lyssa), to be precise in Lapai Village. In 2019, another GHPR case was found in North Kolaka Regency. There were 8 cases in February 2019, 22 cases in March 2019 and 1 case tested positive for rabies (lyssa), and 12 cases in April 2019. This type of research is descriptive observational with a spatial approach to determine the distribution of rabies transmitting animal bites in humans based on geographic information systems. The objects in this study were 42 cases of which were recorded in the 2019 KolakaUtara Regency Health Office report and 4 new cases which were found when the study was carried out. The total number of research objects was 46 cases of rabies transmitting animal bites. The results showed that rabies transmitter animal bites cases were spread throughout the Kolaka Utara Regency with the most distribution in Tandaumera Village with 8 cases (17.39%), while the lowest distribution of cases was in Sulaho, Lapai, Watumotoha, Tiwu, Tolala, Lawolatu, Puncak Monapa, Sarambu. , Pohu, Lapasi-pasi, Woise, Patowonua, Tahibua, Lawaki, Lawakara, Latowu each 1 case (0.22%).

Keyword: Spatial, Distribution, Rabies, Indonesia

INTRODUCTION

Rabies is estimated to cause 59,000 human deaths each year in more than 150 countries, with 95% of cases occurring in Africa and Asia. However, due to the large number of unreported cases and uncertain estimates of cases, this figure is likely to be a significant underestimate of the true burden of the disease. Ninety-nine percent of rabies cases are mediated by dogs and the disease is prevalent in rural, impoverished areas, with about half of cases occurring in children under 15 years of age [1]. Rabies is a contagious disease caused by animal bites. Animal bites are a significant cause of morbidity and mortality worldwide, but can be prevented with proper and timely treatment [2].

Sulawesi Tenggara is one of the provinces that has Animal Bite Cases Transmitting Rabies (GHPR) in Indonesia. One of the districts with GHPR cases is North Kolaka Regency. The number of GHPR cases from January-December 2018 was 111 cases and there was 1 positive case of rabies (lyssa) precisely in Lapai sub-district, where in January there were 6 cases, February 7 cases, March 8 cases, April 9 cases, May 8 cases, June 6 cases, July 8 cases, August 15 cases, September 2018 there were 13 cases, October 2 cases were found, November 2018 there were 16 cases, December 13 cases were found. Based on gender, the average GHPR case in men is higher than in women, namely 62% compared to 38%. Meanwhile, the number of GHPR cases in February 2019 was 8 cases, in March 2019 22 cases were found and 1 case was declared positive for rabies (lyssa), in April 2019 12 cases were found [3].

Planning a strategy for preventing and eradicating GHPR is very necessary where the planning of the strategy should be faster and more targeted. One of them is by looking at the distribution pattern of GHPR sufferers, especially in North Kolaka district. By using the Geographic Information System, it can help Infectious Disease Eradication programmers to make spatial analysis of GHPR cases in North Kolaka district. Where spatial analysis is an analysis and description of disease data geographically that can be seen in the form of a map. So that in the use of GIS studies in identifying demographics and geography of the distribution of GHPR cases can provide clues to effective public health interventions.

Data collection related to GHPR cases is very important for health workers in conducting more accurate monitoring and risk assessment. Differences in temporal and spatial trends based on the species of rabies carriers and to ensure diagnostic testing is needed [4]. The use of spatial data allows for intervention and prevention so that cases do not spread and claim more victims. In the analysis, for example, of rabies cases due to dog bites, spatial analysis will consider the distance between sufferers, both the time of the incident and the distance between the location of the house and the location of the bite. Spatial rabies requires data on the time of infection, location of the case and WGS samples of the pathogen from each case [5]. The results of spatial analysis can be translated into policies related to public health [6].

The susceptibility of infectious disease cases depends on the contact structure of the host population, although it is often difficult for us to capture the contact structure in wild animals. Technology allows for detailed temporal information on the social contacts of wild animals to be obtained, with the technology being able to indicate the population of wild animals that are susceptible to rabies outbreaks. The dynamics of rabies obtained have important implications for disease control [7].

Spatial can help overcome unreported rabies cases because spatial is able to document in detail the location points where GHPR cases often occur. Continuous surveillance is able to document the current status and trend of rabies transmission, especially those caused by dog bites, both domestic and wild animals, in areas with quite high population density. So that areas with rabies cases with a fairly high prevalence can be prioritized for intervention [8].

METHOD

This type of research is observational with a spatial approach to determine the distribution of cases of animal bites that transmit rabies (GHPR) in humans based on geographic information systems. The objects in this study were GHPR cases recorded in the report of the North Kolaka District Health Office as many as 42 cases and new cases of GHPR found during the study as many as 4 cases. The total number of research objects was 46 GHPR cases. Each GHPR case was taken using GPS coordinate points. The area of North Kolaka Regency includes 15 Districts, namely: Tolala, Batu Putih, Porehu, North Pakue, Central Pakue, Pakue, Watunohu, Ngapa, Tiwu, Kodeoha, Katoi, Lasusua, Lambai, Ranteangin and Wawo Districts.

RESULTS AND DISCUSSION

Rabies is an animal disease caused by a virus, is acute and attacks the central nervous system. Warm-blooded animals and humans. Rabies is zoonotic, meaning the disease can be transmitted from animals to humans and causes death in humans with a CFR (Case Fatality Rate) of 100%. The rabies virus is excreted with the saliva of infected animals and is spread through bite wounds or licks.

GHPR cases found at the research location were 42 cases registered in the registration book, in addition, researchers found new cases in the field that were not registered in the registration book, namely 4 cases so that the number of GHPR in Kolaka Utara Regency was 46 cases. Where 7 cases there was one victim who died who was found by researchers through community reports and direct surveys by researchers in the field. The victim who died was caused by a bite from his neighbor's dog. The dog bit 2 victims including the owner, causing wounds and even bleeding, because he was worried about the dog bite, the victim went straight to the Health Center to be given help by health workers at the Health Center and given vaccine injections in stages.

In contrast to the second victim who did not report the incident to health workers because he thought the bite was just an ordinary bite and only needed to be washed with warm water. But after a few months later the victim began to feel symptoms such as a hot body even to the stage of excitement, namely the victim felt photophobia / fear of light stimulation, hallucinations, confusion and anxiety and convulsions until the victim finally died. Meanwhile, the dog that bit the 2 victims had been killed by its owner a few moments after the victim was bitten. The distribution of cases based on village / sub-district is as in the following table:

Table 1. *Distribution of Rabies Transmitted Animal Bites Cases by Village in Kolaka Utara Regency*

No	village/sub-district	Number of Cases	Percentage (%)
1.	Sulaho	1	2.17
2.	Lapai	1	2.17
3.	Watumotoha	1	2.17
4.	Tiwu	1	2.17
5.	Tolala	1	2.17
6.	Puurau	2	4.35
7.	Parutellang	1	2.17
8.	Indewe	1	2.17
9.	Lapolu	1	2.17
10.	Pitulua	2	4.35
11.	Lasusua	4	8.7
12.	Lawolatu	1	2.17
13.	Puncak Monapa	1	2.17
14.	Tandaumera	8	17.4

15.	To'Bela	3	6.52
16.	Sarambu	1	2.17
17.	Torotuo	2	4.35
18.	Pohu	1	2.17
19.	Lapasi-pasi	1	2.17
20.	Woise	1	2.17
21.	Patowonua	1	2.17
22.	Batuganda	2	4.35
23.	Latawaro	4	8.7
24.	Tahibua	1	2.17
25.	Lawaki	1	2.17
26.	Lawakara	1	2.17
27.	Latowu	1	2.17
Total		46	100

GHPR cases are spread throughout the North Kolaka Regency with the largest distribution in Tandaumera Village with 8 cases (17.39%), while the lowest distribution of case points is in Sulaho, Lapai, Watumotoha, Tiwu, Tolala, Lawolatu, Puncak Monapa, Sarambu, Pohu, Lapasi-pasi, Woise, Patowonua, Tahibua, Lawaki, Lawakara, Latowu Villages with 1 case point (0.22%). The location of GHPR is mostly not far from the patient's address, most sufferers who are in the age group under 15 years old are bitten in the area around their homes. While adults mostly experience GHPR far from their homes which occurs in plantation areas, because some sufferers in the adult age group are farmers. The spatial distribution of GHPR cases can be seen in the following image:

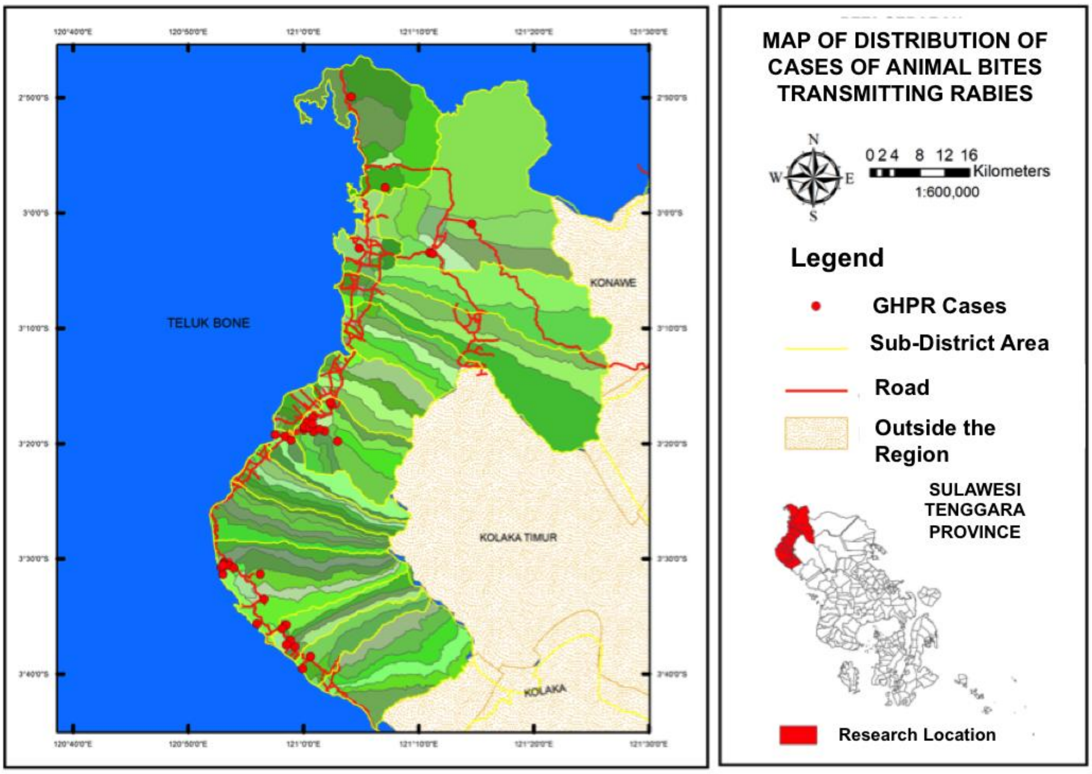

Figure 1. Distribution of Rabies Transmitted Animal Bites Cases based on Bites Location in Kolaka Utara Regency

GHPR cases in North Kolaka Regency are due to bites from 3 types of animals, namely dogs, cats and monkeys. The distribution of GHPR cases based on the type of Rabies Transmitting Animal (HPR) shows that the highest cases of GHPR bites in humans are caused by dog bites as many as 39 cases (84.79%) and the lowest are caused by monkey bites as many as 1 case (0.22%). Dog bite cases are spread in almost all areas in North Kolaka

Regency, especially in Ngapa District, Lasusua District and Wawo District. These three areas are densely populated areas and have the highest cases of dog bites, so they are declared prone to GHPR cases.

GHPR was caused by a monkey caught in the forest by one of the residents in Latuwo Village to be kept as a pet, but because the monkey was not used to being in the community environment, plus the nature of children who wanted to play and disturb the HPR, the HPR was bitten even though there was no indication of rabies. It was different with the victim of a bite from his grandmother's pet cat in Tahibua Village, where the victim was bitten next to his grandmother's house because the victim disturbed the HPR until the cat felt disturbed and immediately bit the victim on the left leg. Because they were worried, the victim's parents immediately took the victim to the Health Center to be given preventive measures, namely by giving the victim 3 vaccine injections in different weeks.

Meanwhile, HPR (dog) bites on children also occurred in Lawaki village, where the victim was feeding his grandfather's pet dog, but the dog bit the victim's little finger. According to the victim's parents' report, the dog that bit the victim was a dog that had recently given birth, the indication is that the dog became aggressive after giving birth but there is no indication of rabies because until now the dog is still alive and still roaming around the house and is still the victim's grandfather's pet. The spatial distribution can be seen in the following image:

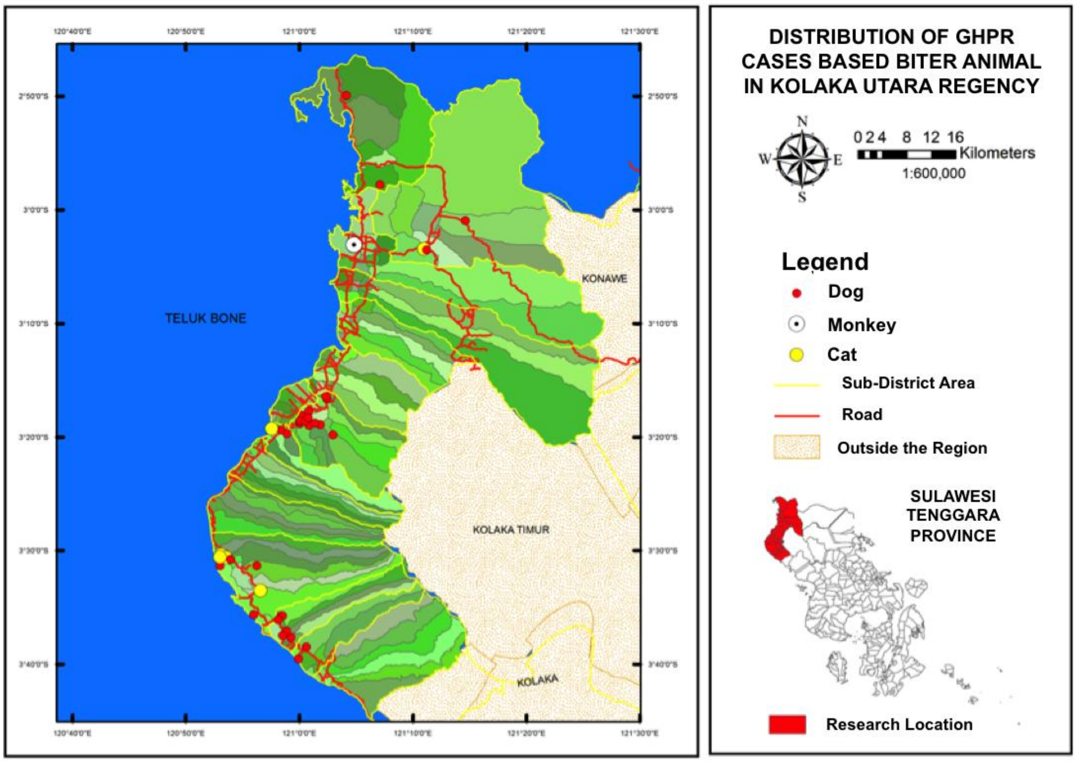

Figure 2. *Distribution of GHPR Cases based Biter Animal in Kolaka Utara Regency*

Clustering of GHPR cases in humans using the Space Time Permulation Model Linkelhood Ratio Test (Kulldorf Restrospective Method) approach using SatScan software version 9.6. The results of the analysis using SatScan indicated 3 clusters in the distribution of GHPR events in humans (details attached). However, based on the results of the p-value analysis of the 3 clusters, it was stated negative because it was more than 0.05. The three clusters that have significant values are as follows:

1. First Cluster is centered at coordinates 3˚ 18' 54.7" LS and 121˚ 1' 50.51" BT, with a radius of 3.15 km. In this cluster there are 4 cases of GHPR in humans, with a p-value = 0.338, it can be concluded that this cluster is declared negative because it exceeds 0.05. This cluster is located in Watumotoha, Parutellang, Lawolatu and Lapai Villages.
2. Second Cluster is centered at coordinates 3˚ 35' 38.20" LS and 120˚ 55' 57.80" BT, with a radius of 10.89 km. In this cluster there are 17 cases of GHPR in humans, with a p-value = 0.804, it can be concluded that this cluster is declared negative because it exceeds 0.05. This cluster is located in Sulaho Village, Puncak Monapa, Latawaro, Woise, Lapasi-pasi, Batuganda, Pitulua, Torotuo, Lawekara, Patowonua and Lasusua Village.
3. Third Cluster is centered at coordinates 3˚ 18' 34.90" LS and 121˚ 0' 16.0" BT, with a radius of 0.46 km. In this cluster there are 7 cases of GHPR in humans, with a p-value = 0.986, it can be concluded that this cluster is declared negative because it exceeds 0.05. This cluster is located in Tandaumera Village, Puncak Monapa, Latawaro, Woise, Lapasi-pasi, Batuganda, Pitulua, Torotuo, Lawekara, Patowonua and Lasusua Village.

The results of the Cluster analysis with the Space Time Permulation Model Linkelhood Ratio Test (Kulldorf Restrospective Method) above show that the locations of each case are spread across quite distant areas/regions. This indicates that the animals that bite are different animals, meaning that many animals, especially dogs, in North Kolaka Kolaka Utara especially in rural areas [10].

CONCLUSION

GHPR cases are spread throughout North Kolaka Regency, with the largest distribution in Tandaumera Village with 8 cases (17.39%), while the lowest distribution of cases was in Sulaho, Lapai, Watumotoha, Tiwu, Tolala, Lawolatu, Puncak Monapa, Sarambu, Pohu, Lapasi-pasi, Woise, Patowonua, Tahibua, Lawaki, Lawakara, Latowu Villages, each with 1 case (0.22%). The biting animal is indicated to be a different animal from each bite case based on the results of the cluster analysis. Interventions for GHPR cases are prioritized in areas with high cases which are areas vulnerable to rabies cases and in areas where spatial clusters are formed.

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