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Abstract: At this time 13 provinces and 147 districts/cities with a prevalence rate of more than 1/10,000 population, one of which is Barru South Sulawesi province where the discovery of a case in 2015 year as many 25 people (prevalence of 1.5/10,000 population). This research aimed (1) to investigate the spatial spread pattern of leprosy patients using Geographic System Information (GIS) and (2) to describe the risking factors correlated with the leprosy incidences in Barru Regency in 2013-2015. A descriptive analytical survey was applied in this research with the design of cross-sectional study. The study was commenced in Barru Regency. It is to investigate the cases of leprosy patients which was 1/100,000 people. All leprocy patients were became respondents of this research who are living in Barru Regency in the period from 2013 to 2015. The data collection was carried out using observation and interviews methods. The data were analyzed using statistically SPSS program and the spatial analysis applied ArcView GIS version 10.1. The research results indicated of the leprosy disease in Barru Regency in 2013 was random in the entire sub-districts area, while in 2014 and 2015 was clustered, the map buffer distance between the residences of the lepers were approximately still within the radius of 2-6 km and the health centers. The individual characteristics of the leprosy were about >29 years old: 79.3% in 2013, 64% in 2014 and 73.1% in 2015, male gender: 69% in 2013 and 52% in 2014: race/ethnicity: 100% Bugis in 2013-2015, poor knowledge: 100% in 2013, 88% in 2014 and 92.3% in 2015, bad personal hygiene: 82.8% in 2013, 68% in 2014, BCG vaccine reception 72% in 2013 & 2014 and 53.8% in 2015, and ≤2 years of contact time: 19% in 2013, 72% in 2014 and 69.2% in 2015. Socio- economic characteristics of patients who had in average low education: 100% in 2013, 96% in 2014 and 96.2% in 2015, job with risks: 100% in 2013, 96% in 2014 and 96.2% in 2015, income less than UMR: 100% in 2013 & 2015 and 92% in 2014. The conditions of the patients homes being in average fairly damp, fairly lighted, and having ventilations

still met the requirement as prescribed by Kepmenkes, RI No. 29/Menkes/SK/VII/1999.

SPATIAL PATTERN AND SOCIAL EVIRONMENTAL RISK FACTORS OF LEPROSY OCCURRENCE IN BARRU, INDONESIA

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ABSTRACT

At this time 13 provinces and 147 districts/cities with a prevalence rate of more than 1/10,000 population, one of which is Barru South Sulawesi province where the discovery of a case in 2015 year as many 25 people (prevalence of 1.5/10,000 population). This research aimed (1) to investigate the spatial spread pattern of leprosy patients using Geographic System Information (GIS) and (2) to describe the risking factors correlated with the leprosy incidences in Barru Regency in 2013-2015. A descriptive analytical survey was applied in this research with the design of cross-sectional study. The study was commenced in Barru Regency. It is to investigate the cases of leprosy patients which was 1/100,000 people. All leprocy patients were became respondents of this research who are living in Barru Regency in the period from 2013 to 2015. The data collection was carried out using observation and interviews methods. The data were analyzed using statistically SPSS program and the spatial analysis applied ArcView GIS version 10.1. The research results indicated of the leprosy disease in Barru Regency in 2013 was random in the entire sub-districts area, while in 2014 and 2015 was clustered, the map buffer distance between the residences of the lepers were approximately still within the radius of 2-6 km and the health centers. The individual characteristics of the leprosy were about >29 years old: 79.3% in 2013, 64% in 2014 and 73.1% in 2015, male gender: 69% in 2013 and 52% in 2014: race/ethnicity: 100% Bugis in 2013-2015, poor knowledge: 100% in 2013, 88% in 2014 and 92.3% in 2015, bad personal hygiene: 82.8% in 2013, 68% in 2014, BCG vaccine reception 72% in 2013 & 2014 and 53.8% in 2015, and ≤2 years of contact time: 19% in 2013, 72% in 2014 and 69.2% in 2015. Socio- economic characteristics of patients who had in average low education: 100% in 2013, 96% in 2014 and 96.2% in 2015, job with risks: 100% in 2013, 96% in 2014 and 96.2% in 2015, income less than UMR: 100% in 2013 & 2015 and 92% in 2014. The conditions of the patients homes being in average fairly damp, fairly lighted, and having ventilations still met the requirement as prescribed by Kepmenkes, RI No. 29/Menkes/SK/VII/1999.

Keywords: leprosy, spatial analysis, risk factors

1. INTRODUCTION

Leprosy is one of the infectious diseases that is still a public health problem, where some areas in Indonesia Prevalens Rate is still high and the problems posed are very complex. The problem is not only from the medical point of view but extends to the socio-economic, cultural, security and social security issues (Kemenkes RI, 2012). Age is factor that play an important role in the transmission of leprosy in which children are more sensitive compared to adults (3 : 2), in addition, more males infected by leprosy than women. Race affects the incidence of leprosy where in the black race the incidence of tuberculoid form is higher in white skin is more likely to type lepromatosa. People living in poverty usually have poor health, due to high occupational exposure due to occupant density, inadequate food or unhealthy working environment (Siregar, 2005, Suparyanto, 2012). Level of knowledge as one part of the behavior with the process of transmission and healing in people with leprosy, people who have a high knowledge of leprosy will certainly try to distance itself from the factors that can be a source of transmission of this disease. In addition, knowledge of the disease must also be in line with the behavior of one's hygiene in everyday life. (Yuniarasari, 2011). A long-term child in a leprosy endemic area also has a greater chance of making contact with an infectious type of leprosy patient (Awaluddin, 2004; Rismawati, 2013).

In 2014, the number of new leprosy cases in Indonesia is 17,025 people. The new case finding figures make Indonesia ranked third in the world after India and Brazil. Data 2014 shows that 83% of new cases are MB (Multi Basiller) cases, 9% of cases of disabled tk 2, and 11% of child cases. Currently 13 provinces and 147 districts / cities with a prevalence rate of more than 1 / 10.000 inhabitants (Ministry of Health RI, 2016). In South Sulawesi, the leprosy situation is similar to the National pattern, where the number of patients and it is obviously that magnitude of the prevalence per 10,000 population decreased significantly from year to year. The number of new leprosy cases registered in South Sulawesi in 2012 is 1,115 people, 685 men and 430 women. Patients new leprosy PB (Pausi Basiler) aged 0-14 years as many as 19 people, 11 men and 8 women. Patients with new leprosy PB of 171 people, 95 men and 76 women. While new patients MB (Multi Basiler) age 0-14 years as many as 48 people, 27 men and 21 women. New lepers MB ≥15 years as many as 896 people, 563 men and 333 women (Health Profile of South Sulawesi Province, 2012).

The findings of data collection results / performance indicators of MSS in the district of Barru, reported that the discovery of new cases of leprosy patients in 2013 as many as 29 people with leprosy prevalence rate of 1.7 / 10.000 population, as many as 2014 25 people with leprosy prevalence rate of 1.5 / 10.000 population, and, in 2015 as many as 26 people with leprosy prevalence rate of 1.5 / 10.000 population. Leprosy prevalence rate in Barru Regency from year 2013-2015 is still high and not on target of Ministry of Health RI, which is more than 1 / 10.000 population (Barru District Health Office, 2015). Until the end of 2015, leprosy data processing in Barru Regency is still limited in the form of tables and graphs and no mapping yet. Mapping the spread of disease is important, especially mapping the spread of infectious diseases and infectious diseases. By using spatial analysis, it is not only to know the pattern of disease distribution, high risk areas and disease risk factors regionally, but to find the cause or source of disease transmission so that the controlling and cutting of the disease chain can be done correctly (Achmadi, 2012). Based on these facts it supports the authors to conduct research on spatial distribution patterns of leprosy patients using GIS and describe the risk factors associated with leprosy cases in Barru regency in 2013-2015.

2. MATERIALS AND METHOD

2.1 Location and Research Design

The study was conducted in Barru District with the discovery of leprosy cases of more than 1 / 10.000 population. The sample were those leprosy patients within 2013-2015. This type of research is a descriptive survey with cross sectional study design.

2.2 Population and Sample

The population of subjects in this study is all data reports of leprosy patients in Barru regency in 2013-2015. While the population of the object is the home environment where the resident population of the subject studied. All leprosy patients were become the subject samples both lepers Multi basiller (MB) and Pausi basiller (PB) in Barru District in period of 2013-2015.

2.3 Data collection technique

Data about environmental condition, socioeconomic and characteristic of respondent related to leprosy incident are primary data obtained by questionnaire through interview, direct observation and measurement. Determination of coordinate house of leprosy patient, place of health service and mapping of surrounding area of environment done by using GPS Receiver.

2.4 Data analysis

Data on the environmental, socioeconomic conditions and the characteristics of respondents related to leprosy events were analyzed by statistical analysis by SPSS application and the GIS program version 10.1 was used to map the leprosy cases.

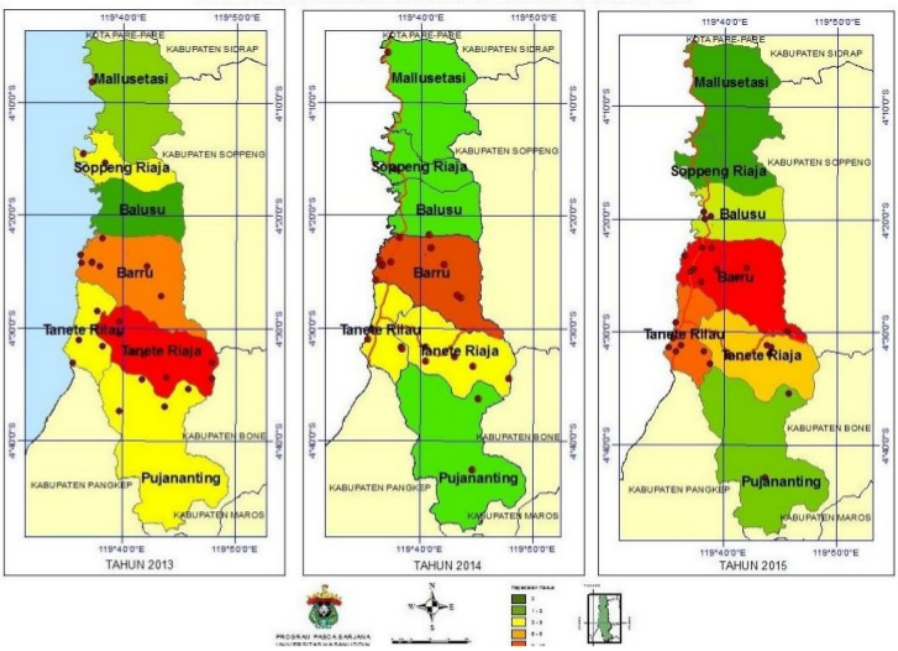

Figure 1. Map of Leprosy Patients Distribution in Regency of Barru within 2013-2015

3. RESULTS

From the map can be seen the distribution of leprosy patients in Barru regency per year and kecamatan, in the year 2013 there are 6 districts that become the leprosy spread, Tanete Riaja Sub-district 9 points, Barru District 8 dots, Pujananting and Tanete Rilau sub- point, District Soppeng Riaja as much as 3 points and District Mallusetasi as much as 1 point. In 2014, there are 7 districts where leprosy is distributed, Barru Sub-district with 10 points, Tanete Riaja and Tanete Rilau Sub-districts of 5 points each, Pujananting Sub-district with 2 points, Balusu, Soppeng Riaja and Mallusetasi Sub-districts of 1 point. In 2015, there are 5 sub-districts where leprosy is distributed, Barru Sub-district with 9 points, Tanete Rilau Sub-district 7 Point, Tanete Riaja Sub-District and Balusu Sub-district with 4 Point, and Pujananting Sub-District 2 points. Results based on individual characteristics of leprosy patients in Barru regency 2013-2015 can be seen in Table 1.

Table 1. Description of Individual Characteristics of Leprosy Patients

Individual Characteristics	2013		2014		2015	
	n	%	n	%	n	%
1. Age						
Risk (15-29 year)	6	20.7	9	36.0	7	26.9
Not risk (>29 year)	23	79.3	16	64.0	19	73.1
2 sex						
Male	20	69.0	13	52.0	13	50.0
Female	9	31.0	12	48.0	13	50.0
3. Ras/ethnic						
(bugines & Madura)	29	1000	25	100.0	26	100.0
(other)	0	0	0	0	0	0
4. Knowledge						
Risks	29	100.0	22	88.0	24	92.3
Not risk	0	0	3	12.0	2	7.7
5. Vaccination of BCG						
Risks	16	55.2	7	28.0	12	46.2
Not Risks	13	44.8	18	72.0	14	53.8
6. Personal hygiene						
Worse	24	82.8	17	68.0	20	76.9
Good	5	17.2	8	32.0	6	23.1
7. Contac duration						
Risks (>2 year)	10	34.5	7	28.0	8	30.8
Not (≤ 2 year)	19	65.5	18	72.0	18	69.2

Results based on socio-economic factors of leprosy patients in Barru regency 2013-2015 can be seen in Table 2.

Table 2. Description of Socio-Economic Leprosy in Barru District

Socioeconomic Factors	2013		2014		2015	
	n	%	n	%	n	%
1. Education						
Low	29	100.0	24	96.0	25	96.2
High	0	0	1	4.0	1	3.8
2. Occupation						
Risks	29	100.0	24	96.0	25	96.2
Not Risks	0	0	1	4.0	1	3.8
3. Income						
Less (< Rp.2.000.000)	29	100.0	23	92.0	26	100.0
Enough (≥ Rp.2.000.000)	0	0	2	8.0	0	0

Results based on environmental factors of leprosy patients in Barru regency 2013-2015 can be seen in Table 3.

Table 3. Description of the Home Environment of Leprosy Patients in Barru District

House environment	2013		2014		2015	
	n	%	n	%	n	%
1. Humidity						
(<40% or >60%)	11	37.9	5	20.0	11	42.3
(40%-60%)	18	62.1	20	80.0	15	57.7
2. Temperature						
(<18^{0}C or > 30^{0}C)	28	96.6	22	88.0	24	92.3
(18^{0}C–30^{0}C)	1	3.4	3	12.0	2	7.7
3. Lighting						
(< 60 lux)	10	34.5	9	36.0	10	38.5
(≥60 lux)	19	65.5	16	64.0	16	61.5
4. Ventilation						
(<10% wide of floor)	11	37.9	11	44.0	10	38.5
(≥ 10% wide of floor)	18	62.1	14	56.0	16	61.5

4. DISCUSSION

This study shows that the distribution pattern of leprosy patients in Barru District is random and clustered as well as some risk factors of individual, socio-economic and environmental characteristics related to leprosy. The number of leprosy patients from 2013-2015 tends to remain, in 2013 as much as 29 points with the prevalence of leprosy of 1.7 / 10.000 population, in 2014 were 25 points and in 2015 were 26 points with leprosy prevalence rate of 1.5 / 10.000 population, respectively. The pattern of leprosy spread in Barru Regency in 2013 is randomly distributed in all sub-districts whereas in 2014 and 2015 the distribution of leprosy cases is clustered in Barru. The District of Barru occupies the first level of cases of most leprosy cases, this is because Barru District is a densely populated district capital district and many migrants both from within the region and from outside the district.

The buffer result shows that in more than 6 km distance from puskesmas there are 3 patients (2013) and each 2 patients (2014 & 2015) in Tanete Riaja sub-district, while most other patients are still more than 2-6 km from nearest health center. This means that leprosy patients in Barru District are still within reach to health care facilities. According to Rohmad (2012), access to health-care facilities is closely linked to the discovery of leprosy patients, the closer

and easier accessible healthcare facilities will allow people to obtain health information and regularity in taking medicines and the further distance health services will slow people to get information health and regularity in taking medication.

Leprosy is chronic because leprosy bacteria take 12-21 days to divide and have an average incubation period of 2-5 years and even more than 5 years (Ministry of Health RI, 2012). The sex of the lepers is more common in men than women, the results of which are in line with Suparyanto's (2012) and Saragih (2014) studies, suggest that lepers are more male than female, this is because more contact many in men compared to women. All leprosy sufferers have Bugis ethnicity where in Indonesia, ethnic Madurese and Bugines suffer more leprosy than other ethnic (Kemenkes RI, 2012). Level of knowledge of most lepers are categorized as risky (low knowledge). The results of this study are in accordance with Green theory which states that a person with high knowledge is more likely to behave well in the field of health in this case preventing the disability of his family who suffer from leprosy (Notoatmodjo, 2003). BCG vaccination in leprosy patients in 2013 showed the average respondent did not get the vaccine while in 2014 and 2015 the average has been getting the vaccine. The results of a study in Malawi in 1996 showed that giving a single dose of BCG vaccine could provide 50% protection, and the dosing area could provide protection against leprosy up to 80% (Kemenkes RI, 2012). Personal hygiene most lepers are categorized bad because of the low knowledge of respondents to behave well on their personal health. In line with the Yuniarasari (2011) study, respondents with poor hygiene have a 5.333 times greater risk of leprosy than those who have good personal hygiene. The duration of contact from the results showed that the average leprosy patient had no history of contact with other leprosy patients. The results of this study are in line with the Yuniarasari (2011) study, that there is no long contact relationship with leprosy occurrence (p 0.703> α 0.05).

Description based on socio-economic factors of leprosy patients in Barru regency 2013-2015, leprosy educational level is categorized as low educated (not finished primary school, junior high). Patients with low levels of education tend to be slow to seek treatment so slowly to be diagnosed with leprosy so that most of those who come to seek treatment have been included in MB type leprosy grouping or even come in disability (Saragih, 2014). The work of lepers is categorized in risky occupations (construction workers, laborers, masons, workshop workers, tailors, transport workers, maids, farmers and fishermen). The results of this study are in line with the results of the Yuniarasari (2011) study, which shows that there is a relationship between the type of work and the incidence of leprosy. Leprosy patients have on average less than UMR. The results of this study are in line with the results of research Rohmad (2012), that the income of leprosy patients in Kabupaten Rembang less than the UMR in Rembang.

Description of the environment of leprosy patients in Barru regency in 2013-2015 shows that the average humidity of chamber patients still meet health requirements according to Kepmenkes that is between 40% -60%, if below 40% or above 60% can be a good medium for bacteria. Room temperature of the patient does not meet the health requirement according to Kepmenkes that is below 18C or above 30C. The incidence of leprosy is usually high in hot and humid tropical and subtropical regions (Apriani, 2014). Room lighting average patients meet health requirements according to Kepmenkes that is ≥60 lux. Sunlight has the properties of killing bacteria, especially the bacteria M. tuberculosis and leprae. Houses that do not enter the sun have a risk of suffering from tuberculosis as well as leprosy 3-7 times compared to the house entered the sun (Notoatmodjo, 2003). The average patient ventilation meets the health requirement according to Kepmenkes that is ≥10% of the floor area. The Faturrahman (2011) study, which resulted in poorly ventilated respondents, had a 4.3 times greater risk of leprosy than a well-ventilated respondent.

5. CONCLUSIONS AND RECOMMENDATIONS

The pattern of distribution of leprosy patients in Barru Regency in 2013 is shaped randomly in all sub-districts whereas in 2014 and 2015 the spread of leprosy cases is clustered in the regency of Barru. The buffer map of the distance between the dwelling of the lepers is within a radius of 2 to 6 km from the puskesmas in Barru District. Based on individual characteristic risk factors, leprosy patients in Barru District are more than 29 years old, more males than females, all have bugic races / ethics, low average knowledge and poor personal hygiene, most get BCG vaccinations , and the average length of contact is less than 2 years.

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