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Spatial Analysis of Tuberculosis Patients' Health Access in Bandar Lampung

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1 Introduction

Reviews and researches stated that social determinants directly or through tuberculosis (TB) risk factor influence TB infection, TB transmission as well as outcome of TB treatment [1–4]. In the most studies, social determinants correlated with education, occupation, income and social class [5]. Meanwhile, TB risk factors is more related to housing condition, food security and health access, of the TB patients [1]. Studies related to the TB has been concluded that people with low social determinants tends to have poor housing condition, poor food security and poor health access, which then increasing risk to TB [1].

Research on poor health access shows that there is inequity of health in population [6]. People or community with poor TB health access indicate difficultness of people or community to obtain TB treatment of health services [1]. Research showed that geographic factors play an important role in reaching and utilize of health services [6]. In low-income countries, access to health services influenced by distance which have correlation with the time spent to access health services [7]. Moreover, poor health access also contributes in delays of decisions to look for health treatment and increases in household health's expenditure and loss of opportunity costs of income generating activities [8,9].

Bandar Lampung is one of the cities in Lampung Province with the highest prevalence of TB cases in 2018, with 1,676 smear positive TB patients [10]. Furthermore, research conducted by Wardani, also stated that most of TB patients in Bandar Lampung also had low social determinants [11]. The main objective of this research is to study linkage between health access of TB patients in Bandar Lampung, which represented by distance from community health centers (CHC) and TB cases. Data collected from four CHC were evaluated.

Two of the concerned CHC had the highest TB prevalence in Bandar Lampung; meanwhile the rest had the lowest TB prevalence in Bandar Lampung. Health access in this study refers to straight-line distance of TB patients' residence to health services.

2 Methods

This research was designed as a cross sectional study, which was conducted in four CHC namely Sukaraja, Pasar Ambon, Korpri and Susunan Baru, which have been implementing DOTS strategy. Sukaraja and Pasar Ambon represent CHC with a high TB prevalence, meanwhile Susunan Baru and Korpri represent CHC with low TB prevalence. Population of this research was all smear positive TB patients registered at four CHC during the year of 2016. Sample of this research was the whole population who recorded with an accurate address. The samples were recorded as 255 smear positive TB patients. In this research, health access was represented by distance to the nearest CHC and measured by straight-line distance from geographical coordinates of samples' residence to the concerned CHC. The distance is categorized into two groups, namely < 1 kilometer and 1 – 5 kilometers. Geographical coordinate's data were collected through ground check record using Geographical Positioning System (GPS) devices. Data was then visualized with Geographical Information System (GIS) software and was analyzed using spatial buffering analysis. This research has been receiving ethical approval from the Faculty of Medicine, University of Lampung. The respondents were also provided appropriate informed consent, and statement form that their participation is a voluntary basis.

3 Results

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Data analysis showed that more than half (53.2%) of TB patients residence located at less than one kilometer from their nearest CHC, as presented in Table 1 as well as in Figure 1, Figure 2, Figure 3 and Figure 4. Based on the table, percentage difference is slightly, not more than 20%.

Table 1 Distance of TB Patients to Community Health Centre in Bandar Lampung 2016

Community Health Centers	Distance	f (%)
Sukaraja	< 1 km	59 (53.2%)
	1 – 5 km	52 (46.8%)
Pasar Ambon	< 1 km	59 (55.1%)
	1 – 5 km	48 (44.9%)
Korpri	< 1 km	13 (59.1%)
	1 – 5 km	9 (40.1%)
Susunan Baru	< 1 km	9 (60.0%)
	1 – 5 km	6 (40.0%)

According to the Table 1 and Figure 1, Figure 2, Figure 3 and Figure 4, although CHC Sukaraja and CHC Pasar Ambon have the highest TB prevalence (59 cases), however proportion of TB patients regarding their distance to CHC are similar with it founded for CHC Susunan Baru and CHC Korpri, which have lower TB prevalence compare to both CHC Sukaraja and CHC Pasar Ambon. Figure 1, Figure 2, Figure 3 and Figure 4 showed that four CHC also have similar spatial pattern in distance, although with different number of TB patients.
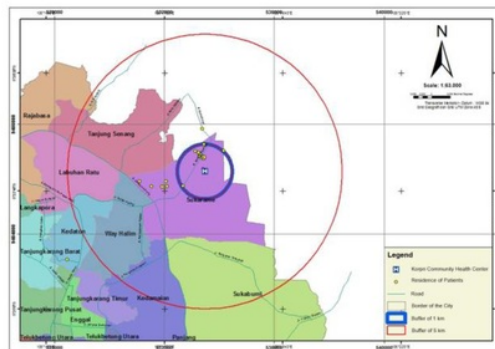

Fig.1 Buffering of TB Patients' Residences to Korpri CHC
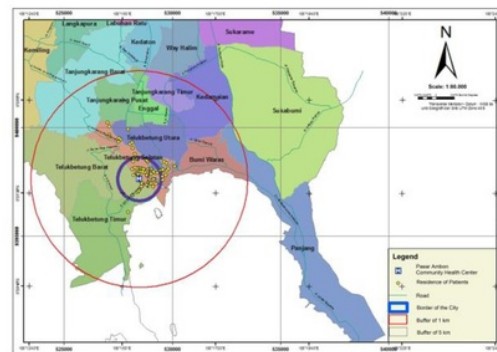

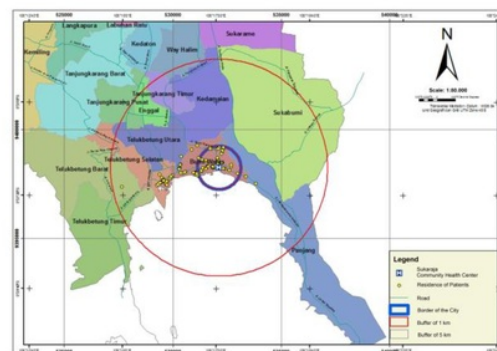Fig.2 Buffering of TB Patients' Residences to Pasar Ambon CHC

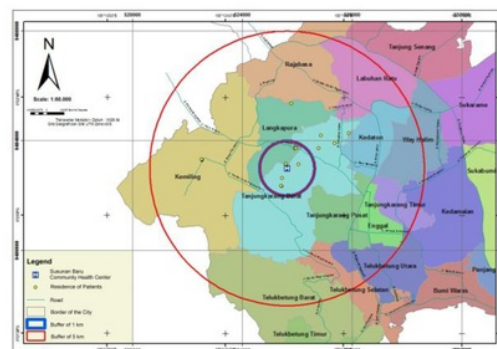Fig.3 Buffering of TB Patients' Residences to Sukaraja CHC

Fig.4 Buffering of TB Patients' Residences to Susunan Baru CHC

4 Discussion

In this research, generally more than 50% of TB patients live at categorized a short distance to their nearest CHC (less than one kilometer), with slightly proportion difference (less than 20%) from it on the long distance (1 – 5 kilometers). It is slightly differ from proportion (60% - 40%) on CHC Korpri and CHC Susunan Baru, which are considered have lower prevalence. These results are in accordance with the efforts made by Indonesian

government to bring health services closer to the community to a distance of less than one kilometer [12].

The mostly equal proportion of distance to CHC also indicates that TB patients in Bandar Lampung have no difficulties in accessing transportation to their nearest CHC. These results are also in concert with a study conducted in Itaborai, Brazil, which found that TB patients did not have transportation problems in reaching two Directly Observed Treatment Shortcourse (DOTS) health service [13]. In the other hand, the results is differ from the research in Burkina Faso which showed that TB patients in order to reach the DOTS health services has to ride bicycles, donkeys, camels or carts [14]. This research result also contrast with research evaluating active case finding in Chiapas, Mexico, which found variety in TB prevalence based on its distance to health services [15]. In this paper, it is found that although there is differences proportion of short distance and long distance, but the differences are insignificant.

In this paper, it is also found that although most of TB patients have low social determinants but they have a good access, particularly distance, to health service. It is implying that Bandar Lampung, the location of this study, is typically an urban area, indicating by the location of neighboring health services in straight-line is only approximately two kilometers. Moreover, the farthest distance between respondents and health services in this study in a straight line is only 6 kilometers. In addition, there are also other health services that make it possible to bring TB patients closer to health services implementing DOTS. With this condition, it is possible that even though the TB case finding is basically passive case finding, it does not only reach TB patients who have short distance but also who live relatively away from health services. Although not learning about distance of TB patients to health services, the condition accordance with research conducted in Afghanistan showing that patient delay in urban areas is shorter than in rural areas. Meanwhile research conducted in Yogyakarta claimed that patient delay in the city of Yogyakarta is relatively short because it is urban areas supported by the above conditions [9,16].

Conclusion

In this paper, it can be concluded that there is no significant obstacle to access the nearest CHS in Bandar Lampung. Most TB patients have a good access to health services, indicating by mostly equally proportion of distance from TB patients' residence to their nearest health services, its means regardless their residence distance, the concerned patients received an mostly equal access to health services. Therefore, a good access to health services can support TB control programs in reducing TB incidence, increasing cure rates and finding cases.

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