



Spatial Analysis of Pulmonary Tuberculosis Transmission Based on Social, Economic, Cultural Interactions in the Slum Areas the City of Makassar

Analisis Spasial Penularan Tuberkulosis Paru Berdasarkan Interaksi Sosial, Ekonomi, Budaya di Pemukiman Kumuh Kota Makassar

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ABSTRACT

The highest number of Tuberculosis (TB) cases was in Southeast Asia with a percentage of 45%, followed by Africa 25%, West Pacific 17%, the Middle East 7%, Europe 3% and American Countries 3%. In contrast, for the 5th rank, the highest Tuberculosis sufferers (56% world TB cases) are India, Indonesia, China, the Philippines and Pakistan. The purpose of this study was to observe the spread of pulmonary tuberculosis through spatial analysis by following the aspects of social, economic and cultural interactions in the slum areas of Makassar City. The study of the distribution of tuberculosis cases in Makassar City is still aggregated, not mapping. It requires identification in the form of spatial analysis. This type of research is qualitative research with the in-depth interview method. The informants in the study were tuberculosis patients and were determined by Snowball Sampling. The results showed that pulmonary tuberculosis transmission based on spatial analysis in slum settlements showed that houses close to each other and had settlements that tended to be clustered had a greater risk of case transmission. Based on spatial analysis, there is diffusion of pulmonary TB cases in these residential areas. The diffusion pattern that occurs explains the addition of new cases over time. The diffusion pattern that happens is a contagious diffusion type. Contagious Diffusion is an infection that spreads through direct contact with an individual infected with an infectious disease. Distance greatly affects the process of infectious disease transmission. If a person is close to the infection source, he will have a much greater probability of being infected when than individuals or areas far from the disease's source.

ABSTRAK

Jumlah kasus terbanyak Tuberkulosis (TB) berada di Asia Tenggara dengan persentase 45%, disusul dengan Afrika 25%, Pasifik Barat 17%, Timur tengah 7%, Eropa 3% dan Negara-negara Amerika 3%, sedangkan untuk peringkat 5 negara tertinggi penderita TB (56% kasus TB dunia) adalah India, Indonesia, China, Philipina dan Pakistan. Tujuan penelitian ini adalah untuk melihat bagaimana penyebaran Tuberkulosis Paru melalui analisis spasial dengan meninjau dari aspek interaksi sosial, ekonomi, dan budaya di Daerah Pemukiman Kumuh Kota Makassar. Saat ini analisis sebaran kasus tuberkulosis di Kota Makassar masih dalam bentuk agregasi bukan dalam bentuk pemetaan, untuk itu diperlukan identifikasi dalam bentuk analisis spasial. Jenis penelitian ini adalah penelitian kualitatif dengan metode wawancara mendalam. Informan dalam penelitian adalah penderita tuberkulosis dan ditentukan secara Snowball Sampling. Hasil penelitian menunjukkan bahwa penularan tuberkulosis paru berdasarkan analisis spasial di pemukiman kumuh menunjukkan bahwa rumah yang saling berdekatan dan memiliki pemukiman yang cenderung mengelompok mempunyai risiko penularan kasus menjadi semakin besar. Berdasarkan analisis spasial, terdapat difusi kasus TB Paru di wilayah pemukiman tersebut. Pola difusi yang terjadi menjelaskan terjadinya penambahan kasus baru dari waktu ke waktu. Pola difusi yang terjadi adalah tipe contagious diffusion (difusi menular). Contagious Diffusion merupakan infeksi yang menyebar melalui kontak langsung dari suatu individu yang terinfeksi penyakit menular. Jarak sangat memengaruhi proses penularan penyakit infeksius, sehingga

jika seseorang memiliki kedekatan jarak dengan sumber infeksi akan memiliki probabilitas yang jauh lebih besar untuk terinfeksi dibandingkan dengan individu atau wilayah yang jauh dari sumber penyakit.

INTRODUCTION

Data from World Health Organization (WHO), the Global Tuberculosis Report shows that the prevalence of Tuberculosis in the world has increased from 6.1 million cases in 2014 and 10.4 million TB cases in 2015. World Health Organization mentioned the prevalence of TB in Indonesia is included one of the six countries with the highest Tuberculosis prevalence in the world in 2015.¹ Indonesia is in the second highest ranking after India, followed by China, Nigeria, Pakistan, and Africa.²

Tuberculosis is caused by infection of *Mycobacterium Tuberculosis*. The infection source is a tuberculosis patient with positive acid-fast bacteria (AFB positive) through the sputum spatter released. Based on Sustainable Development Goals 2030, WHO targets reducing mortality because of tuberculosis by 90% and reducing incidence by 80% in 2030 compared to 2014.³

Tuberculosis is a disease that involves rapidly due to airborne transmission. Tuberculosis screening is essential considering that smear-positive tuberculosis patients have a high potential to become a transmission source to the people around them.⁴

Tuberculosis is one of the ten causes of death and the leading cause of infectious agents. In 2017, Tuberculosis caused about 1.3 million deaths (range 1.2-1.4 million) among people with HIV negative and there were about 300,000

deaths due to Tuberculosis (range 266,000-335,000) among people with HIV positive. It is estimated that there are 10 million cases of pulmonary Tuberculosis (range 9-11 million) equal with 133 cases (range 120-148) per 100,000 population.⁵

The research regarding Tuberculosis in China and its incidence shows specific regional disparities. Systematic searching of social and environmental factors that affecting Tuberculosis is necessary for prevention and controlling disease. Partial Least Square Modeling (PLS-PM) was used to analyze complex causal relationships and hysteresis effect between factors of Tuberculosis and prevalence of Tuberculosis, to investigate the structure of latent factor of data using Exploratory Factor Analysis (EFA).⁶

The achieving indicators of the goals for health development are by the increase of infectious disease control. The cases of Tuberculosis in South Sulawesi Province in 2015 were 13,029 cases, increased comparing to 2014 as many as 12,454 cases. Based on Case Notification Rate (CNR) of district/city, it is shown that Makassar City is the city/district with the highest CNR TB, 254/100,000 population.⁷

Specifically, in Makassar City in 2019, there were 4,300 cases. Based on data about the distribution of Tuberculosis cases in *Puskesmas*,

Puskesmas Kaluku Bodoa was the highest number of Tuberculosis patients with a total of 470 cases.⁸ *Puskesmas* Kaluku Bodoa is one of the health centers located in Tallo sub-District with the highest number of Tuberculosis cases, that is 470 case with the number of sputum smear positive pulmonary Tuberculosis as many as 190.⁹ Based on previous research, various factors affected Tuberculosis's prevalence related to individual differences, genetic predisposition, gender, education, race, migration, alcohol consumption, smoking, and other disease related Tuberculosis. At the level of ecology, geography, climate, and socio-economic factors impact Tuberculosis's prevalence, including the height of a region, climate, air pollution, national economic levels, unemployment rate, poverty, and social instability.¹⁰

One map-based information is the Geographic Information System (GIS), or a web-based geographic information system. The web of GIS can be used for providing information about the spreading of Tuberculosis in Makassar City. Through the web of GIS, it can be seen, the actions and policies need to be done to reduce the number of pulmonary Tuberculosis cases with the high tendency of sputum smear positive pulmonary Tuberculosis. Besides that, strategic planning for prevention and eradication of pulmonary Tuberculosis to be faster and on target are needed in Makassar City, that one way is by looking at the distribution pattern of pulmonary Tuberculosis patients in Makassar City.

Transmission and eradication of pulmonary Tuberculosis can not be separated from social and cultural aspects of community. Community culture is a form of accumulation of individual beliefs, family, and community norms reflected in society's stigma and myths. It is required to develop personal character, family, and community to shape behavior to prevent pulmonary Tuberculosis. Tuberculosis becomes a social problem because most of its patients are in productive age, low economic group, and low education level.¹¹ Economic status is related to family income, by a good income, the fulfillment of basic needs and health needs will be secured.

Based on the description, the purpose of this study is to obtain in-depth information using spatial analysis of pulmonary Tuberculosis transmission in terms of social, economic, and cultural interactions in the slum areas in Makassar City.

MATERIAL AND METHOD

The type of research is qualitative research with the design of case study research. Data collection was carried out by in-depth interviews with informants using in-depth interview guides, tape recorder, fieldnotes, and camera to assist the research process. This research focuses on the interaction of social, cultural, and economic and the characteristics of Slum Settlements to the transmission of pulmonary Tuberculosis.

Informants were selected by using the snowball sampling technique. The main informant was a positive smear pulmonary Tuberculosis patient who was the key informant.

The family informant was about five people of the family of pulmonary Tuberculosis patients in the Slum Areas in Makassar City. The data was collected using a data source triangulation technique involving the patient's family as informants. The family is the closest person who knows the whole informant's life to personal matters. Data analysis is used to verify the data collected and then presented in narrative text or scientific vocabulary. Then, spatial analysis is carried out on the distribution of pulmonary Tuberculosis cases to identify the risk factors of spreading pulmonary Tuberculosis.

RESULT

The result showed that the informants in this study were smear positive pulmonary Tuberculosis patients in the Slum Area in Makassar City, which was carried out from April to May 2020 and obtained five is one key informant four family informants.

Social conditions can be described as follows: When personal relationships have been intertwined in neighboring life for a long time, social contact still occurs, such as visiting each other. Understanding the realistic picture of neighborliness depends on whether the social relationships with someone are tight or not. As in the excerpt from the interview with the informant below:

"Yes, I always come to my neighbor house for sharing stories, sharing food, I often come to my neighbor house to arrange events." (JR, Female, 28 years)

"We often gathered together with our next-door neighbors, when something happened or any other things, just like help each other." (WR, Female, 39 years)

In friendship patterns, it is explained to adolescents because forming friendships in this residential area can go through various ways, including togetherness since childhood, which is the initial process of creating a friendship through socialization. After turning into adolescence, a social relationship is getting wider, sometimes there has been out from the living area. As in the following interview excerpt:

"Yes, I often go out and reach home late at night, sometimes have a conversation on the side road." (MA, Male, 22 years)

"I often gathered together with my co-workers, often do the same activities." (HU, Male, 36 years)

Most community livelihoods in this residential area are trading, they open a stall in front of their house. From 10 informants observed, some people did not work or as a housewife. The community income from 10 informants was in the range around Rp. 500.000-Rp.2.000.000. As in the following interview excerpt with informants:

"depending on the order, sometimes no orders in a month." (HU, Male 36 years)

"I am a private employee if within a month I am fully attend means I receive a full salary, but if not, my salary will be deducted." (SR, Male, 47 years)

Table 1. Characteristics of Respondent

Code	Initials	Age	Gender	Education	Occupation
R1	JR	28	Female	Senior High School	Housewife
R2	WR	39	Female	Senior High School	Housewife
R3	MA	22	Male	Junior High School	Entrepreneur
R4	HU	36	Male	Senior High School	Entrepreneur
R5	SR	47	Male	Senior High School	Private Sector Employee

Source: Primary Data, 2020

This community culture accumulates individual beliefs, family and community norms reflected in society's stigma and myths. As in the following interview excerpt with informants:

"yes, if I cough, I just sit there, and when I come out for having a conversation with my neighbor, I do not wear a mask because of hard to breathe." (HU, Male, 36 years)

"if I have a cough, I tend to go to the stall to buy medicine because I am embarrassed when people find out I have Tuberculosis." (MA, Male, 22 years)

"yes, if I want to go somewhere, I always wear a mask and my sputum when coughing, I spit in a certain place." (JR, Female, 28 years, March 2020)

According to the observation conducted in the research location, the result of the interview above.

"some patients did not use personal protective equipment (mask) to interact with others when they visited their neighbors, but some of them wore a mask when they went out or did their daily activity because they can infect people around them." (Observation, March 2020)

Based on the analysis result of physical environment data consisting of humidity, ventilation, occupancy density. A damp house is a suitable medium for microbial growth that can enter the body through the air. The following interview excerpt with informants:

"Yes, it is humid, this house is close to the sewage, thus it is a bit humid too." (WR, Female, 39 years)

"Yes, it is humid, but it is a rented house; thus, we still have to live in it." (JR, Female, 28 years)

"Because it is a slum area, the damp floor is no longer a problem." (HU, Male, 36 years)

The home ventilation owned by the informants is still insufficient for air exchange. Some of the informants only have ventilation

door; the window is not be opened. The following interview excerpt with informants:

"We rarely open the window; if it is needs to be brighter, turn on the light or open the door." (HU, Male, 36 years)

"The ventilation is deliberately made like that because the sewage smells bad; thus, only door is opened." (WR, Female)

The home lighting owned by the informants is still inadequate for the sunlight to enter into the house. Some informants thought that the home lighting from the lamp or the light from a door or ventilation are enough. It can be seen from the informant interview:

"The light came from a lamp; in the morning the door is opened so that the light will enter into the house." (HU, Male, 36 years)

"to open the door is rarely because of a lamp, only in the morning, we opened the door but half-opened only." (WR, Female, 36 years)

The occupancy density of some informants is still inadequate. It can be seen from the informant interview:

"Yes, not really, this is more than enough for sleep" (SR, Male, 47 years)

"This place is quite enough for resting, even though the situation is like this, but we have to be grateful" (HU, Male, 36 years)

The informants's bedroom is small, with the size 2 meters to 3 meters and only with a bed and a wardrobe. The bedroom is usually for 1 to 3 people. It can be seen from the informant interview:

"Two meters and a half with three people lived in here, my wife, my children, and I." (HU, Male, 36 years)

"It is small, two times two and a half meters with a small room, a small window, and I live with my husband." (JR, Female, 59 years)

"It is small, only a wardrobe and a bed fit in it; I live alone." (MA, Male, 22 years)

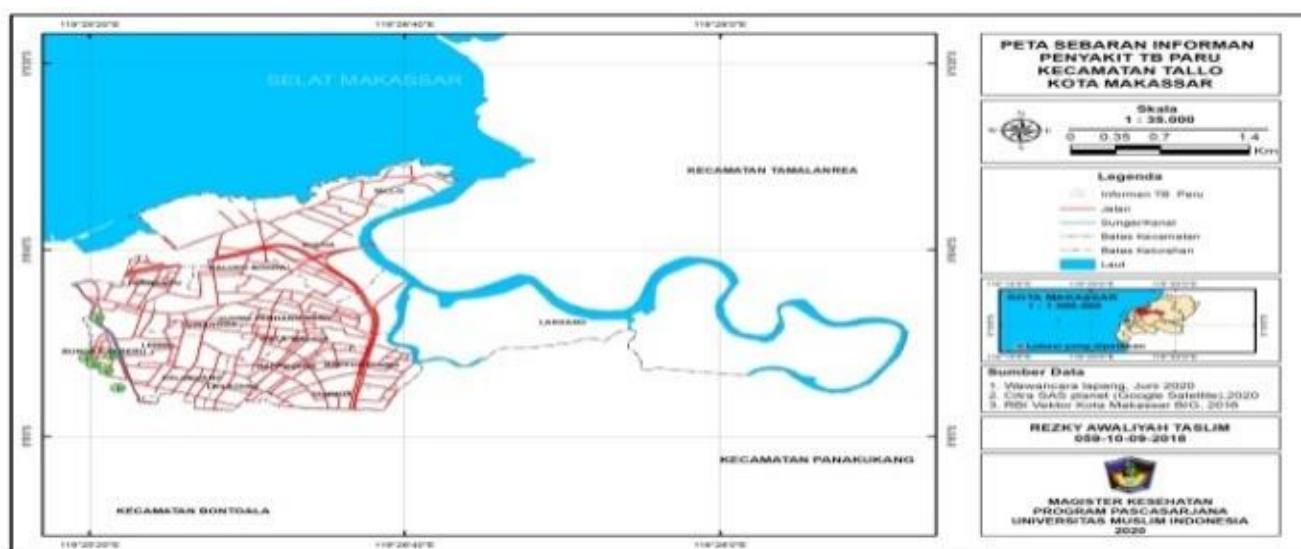
Based on the data above, the spatial distribution of pulmonary Tuberculosis transmission in the Slum Area in Makassar City 2020, can be seen in the Figure 1. The spatial distribution of pulmonary Tuberculosis transmission in Slums Area shows that the house that is closed to each other and has the settlements that tend to be in groups have a higher risk of case transmission. Based on spatial analysis, there is the diffusion of pulmonary Tuberculosis cases in these settlements areas. The diffusion pattern that was occurring explains the addition of new cases over time. The diffusion pattern that happened is a type of contagious diffusion.

Contagious diffusion is an infection that spread through direct contact from an individual infected with an infectious disease. Distance positively affected the process of infectious disease transmission. If an individual is close to

the infection source, he will have a high probability of being infected than an individual or an area far from the disease's source.

DISCUSSION

Pulmonary Tuberculosis is a contagious infectious disease caused by *Mycobacterium tuberculosis*, which most often manifests in the lungs. These *Mycobacterium* are transmitted through airborne droplets, so that an individual with pulmonary Tuberculosis is a source of pulmonary Tuberculosis transmission to the surrounding population. Tuberculosis's preventive action has been done through various health programs at the Puskesmas levels, such as developing a preventive strategy of Tuberculosis, that known as the DOTS strategy (Directly Observed Treatment, Shortcourse). It has been proven to reduce transmission, as well as to prevent development of MDR (Multi Drugs Resistance) Tuberculosis.¹²



Source: Primary Data, 2020

Figure 1. The Spatial Distribution of Pulmonary Tuberculosis Transmission in the Slum Area in Makassar City

Considering that Tuberculosis (TB) cases in the world are severe health problem, then World Health Organization (WHO) recommended a prevention strategy of Tuberculosis, known as Directly Observed Treatment Shortcourse (DOTS).¹⁰

Based on the result of this study, the informants mentioned their settlement is a Slum Area. A slum area means a house with a ditch with sewage and dirty puddle resulting from household waste. The environment of Slum Settlement is most statement mentioned by the informants. It can be concluded that a slum area can affect the transmission of pulmonary Tuberculosis. It may occur because the settlement environment concentrates specifically on the population at the same time.¹¹

Based on the map of pulmonary Tuberculosis cases, it is known that the location of the house of cases is not far from one case to another case. The density of distribution point of pulmonary Tuberculosis cases in this area is very risky for the spread of pulmonary Tuberculosis cases; this is compounded by environmental conditions and community behavior that can quickly spread pulmonary Tuberculosis cases. The occupancy density requirement for all housing can be expressed in m² per person. In general, the minimum area of a bedroom is 8 m² and it is not recommended to be used for more than two people, except for children under five years. It means the occupancy density of a bedroom that does not meet the requirements (<4m²/person excluding children) will prevent the clean air exchange

process so that the clean air needs are not fulfilled and can cause more the number of occupants of the room. The faster air pollution in the room and the number of bacteria in the air will increase.¹³

Based on this study result, the informants stated that the room they lived in was small, around 2 meters to 3 meters, and only filled with a bed and a wardrobe. About 1 to 3 people who lived in a room means one informant sleeps alone, and one informant sleeps with his/her wife/husband, one informant sleeps with his/her wife/husband and one child. Therefore, the informant bedroom is a bedroom with a density of residents that do not meet the requirements recommended by the Head of Indonesian Ministry of Health.¹³

The respondent statement above is by Fatimah stated that respondents who have unqualified the occupancy density have a higher risk eight times to get smear positive pulmonary Tuberculosis than respondents with qualified the occupancy density.¹⁴ Also, the study conducted by Dewi about the distribution of occupancy density shows most of the respondents with pulmonary Tuberculosis have unqualified occupancy density. Based on the frequency distribution of pulmonary Tuberculosis, many respondents sleep with >2 people in one room, with the minimum requirement a space is unneeded for 3 m²/ person.¹⁵

Patients with pulmonary Tuberculosis should not sleep in the same room with other family members because it causes cross infection among the room occupants. Direct transmission can occur from person to person

because droplets from a person infected with Tuberculosis germs will be inhaled by another room occupants when breathing.¹⁶ Ventilation is an indicator of a healthy house. Home ventilation maintains the air circulation still fresh, free up the room air from bacteria, especially pathogenic bacteria such as *Mycrobacterium tuberculosis*, keeping the house in optimal humidity and access to daylight entering. Ventilation area is one of the factors related to the incidence of pulmonary Tuberculosis, which was proven by the result of the study conducted by Amelia and Sudari in the working area of Puskesmas Kaluku Bodoa with *p-value* = 0.045 ($p < 0.05$).¹⁶

Rukmini's study also stated that room condition is related to pulmonary Tuberculosis. The community with unqualified room condition has a 1.18 times chance of getting pulmonary Tuberculosis compared to qualified room condition. It means that the unqualified room occupancy can affect the transmission of pulmonary Tuberculosis.¹⁷ The explanation above is in line with Rusnoto's research that a house with unqualified ventilation had a high risk 16.9 times for smear positive pulmonary Tuberculosis happened than a home with qualified ventilation. It is concluded that unqualified ventilation can affect pulmonary Tuberculosis.¹³

This study result is in line with the research conducted by Indriyani shown lighting was a risk factor related to the incidence of pulmonary Tuberculosis. The bivariate analysis showed $OR=4.214$, which means someone who

lives in a house with unqualified lighting has a high risk 4.214 times to get pulmonary Tuberculosis than someone who lives in a house with qualified lighting.¹⁸

Besides that, some people also perceive that pulmonary Tuberculosis is not dangerous, but only as common cough and does not need severe treatment. This situation is also found in a study in Tobing, North Tanapuli, where some people think that pulmonary Tuberculosis is a shameful illness; thus, they do not visit health services immediately for any treatment. Furthermore, the community still believes in supernatural powers; hence the patients of pulmonary Tuberculosis do the traditional medicine.¹⁹

The study conducted by Amelia and Sundari found that income is very closely related to the fulfillment of primary, secondary, and tertiary needs. The underprivileged income will be a problem for them because they lack the purchasing power to consume food will affect their nutrition status. If the nutrition status is low, it will cause the immune system decrease, thus easily get infected by pulmonary Tuberculosis.¹⁷

Based on the interview result, some people with pulmonary Tuberculosis wear a mask in their daily activities, but others do not wear a mask because of difficulty breathing. In this case, Noor, in the study of Simbolon stated that people who unemployed would have more time to have household contact with people with pulmonary Tuberculosis. It will be easier to transmit pulmonary Tuberculosis through household

contact with pulmonary Tuberculosis patients than a working person. The type of job affects family income, which impacts the food consumption system and health care. People with less income are more likely to have unqualified in health aspects, and disease transmission will quickly happen.²⁰

According to the study conducted by Indriyani, Istiqomah, and Anwar that a room with house lighting < 60 Lux has 3.273 times chance higher of getting pulmonary Tuberculosis than someone in a house with a lighting level less than 60 Lux.¹⁸

This study result is in line with research by Amelia et al stated that there is a correlation between population density and the incidence of family pulmonary Tuberculosis in their neighborhood because the measurement result shows $p\text{-value} = 0.027$ ($p < 0.05$).¹⁹ The research conducted by Amelia et al, showed that there was a significant correlation between natural lighting of the room and the incidence of pulmonary Tuberculosis with $p\text{-value} = 0.007$ ($p < 0.05$), so that unqualified lighting correlated with the incidence of pulmonary Tuberculosis.¹⁹

The research by Rahmawati also stated that transmission time, place of transmission, and risk population are some of the information might be gained. By knowing the diffusion pattern of disease, risk factors, and access to health services, health workers will know the general pattern of pulmonary Tuberculosis transmission so that they can figure out interventions according to local situation.²¹

According to the study result, the condition of the respondent's house ventilation is unqualified. The vents and windows are only made at the front of the house due to the distance between them next to; the airflow is stagnant, there is no air exchange. This condition was worsened by the informants who did not open the windows and cover the vents with fabric, irregular placement of furniture, and no vents and windows in the bedroom.

The study result showed the informants who mentioned that their house lighting only focused on artificial light such as lamp, without realizing that their lighting is unqualified and could cause pulmonary Tuberculosis. Because many types of bacteria can be killed if it gets direct sunlight, Tuberculosis germs can die because the sunlight contains ultraviolet can enter the room. In this case, the morning sun is prioritizing because it has ultraviolet, which can kill Tuberculosis germs so that there is no possibility Tuberculosis infection occurred in the house occupants.

Based on the study result, the informants stated that the air humidity in their environment is very humid; thus, the *Mycobacterium Tuberculosis* bacteria can grow fastly. With the increasing of humidity in rooms due to liquid evaporation from the skin and absorption, the limited sunlight entering the house through ventilation holes, *Mycobacterium Tuberculosis* can survive. In a humid and dark environment, *Mycobacterium Tuberculosis* can survive from days to months.

Based on the study results, some informants usually tended to buy medicine at the stall when they got a cough symptom. In contrast, the others immediately visited health workers to get a treatment. The reason informants bought the medicine at the stall because it is classified as mild coughing. Besides that, informant stigma about pulmonary Tuberculosis was a shameful illness for going to the Puskesmas and was afraid of being diagnosed with pulmonary Tuberculosis. Meanwhile, informants who visited *Puskesmas* because they got severe coughing, contagious, and only could be cured through medical treatment by getting treatment or taking medication for six months. This condition was augmented with the informant's desire to recover quickly and did not want to have pulmonary Tuberculosis for a long time.

Some communities in the research location believe in healing to the health workers, free treatment; health workers play an essential role in pulmonary Tuberculosis treatment. Nevertheless, some other communities believe in the recovery of traditional therapy or shaman due to non medical disease, reducing the other gossip, and the immediate treatment. The procedure does not need a tedious time for the patients. It is a habit or family tradition, and the service is familial.

According to the research results, it can be known, some of the informants with pulmonary Tuberculosis are from underprivileged. With the economic limitations, even though they got free treatment in *Puskesmas*, but they have another

thought about costs such as transportation moreover pulmonary Tuberculosis treatment for about six months, becomes an obstacle and another consideration for them in looking for a cure. In this case, they tend to choose a relatively inexpensive treatment.

Regarding the economy of Tuberculosis patients, it is more about the fulfillment of primary and secondary needs. A family with good economic status will be more easily fulfilled than a family with a low financial rate.

The study results showed that some informants with pulmonary Tuberculosis still had social interaction, both among Tuberculosis patients and non-patients. Some informants had the same workplaces; some informants had probably been together since childhood. It can cause the transmission of pulmonary Tuberculosis very fast because when doing social interaction with others, they do not use personal protective equipment (mask). Pulmonary Tuberculosis transmission mode is through breathing and droplets when coughing or sneezing.

CONCLUSION AND RECOMMENDATION

According to the study and the discussions, it can be concluded that social, cultural, and economic interaction greatly affected pulmonary Tuberculosis transmission due to some communities from underprivileged economic groups. Some communities about pulmonary Tuberculosis's perception experienced that it is not a dangerous disease, only a common cough, which affects the lack of community care regarding the effect caused by

pulmonary Tuberculosis. Besides that, unqualified environmental factors also contributed to the occurrence of pulmonary Tuberculosis transmission. Public understanding and awareness of the community about pulmonary Tuberculosis should be increased by intensively counseling; because of that, health workers with communication skills following the local community socio-cultural are needed. The differences in health and illness concept in society and then a holistic and integrative understanding in various parties are required, especially in pulmonary Tuberculosis controlling. Any interventions that are carried out are community needs.

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