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# Paper 3

*by* Abdul Muhith 3

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## PREFACE

Proceeding of Health Sciences “FK-DIKUA” is part of the launching event of The Alumni Communication Forum of Doctoral Program in Health Sciences of Airlangga University, Indonesia. In this event presented scientific articles in the areas of health, written by researchers from several countries, namely Indonesia, the Philippines, Thailand, and India. Scientific publication also involves the editors of several countries, namely Indonesia, the Philippines, Thailand, and Ghana.

We hope that these proceedings can contribute significantly to the development of science and technology in the field of health.

Surabaya, April 22, 2017

Editors

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**1**  
**THE CORRELATION BETWEEN HEALTHY HOUSE CONDITION AND DYSPNEA  
FREQUENCY OF PULMONARY TUBERCULOSIS PATIENTS**

**Abdul Muhith<sup>1</sup>, Himawan Saputra<sup>1</sup>, Sandu Siyoto<sup>2</sup>**

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**ABSTRACT**

**4**  
In Indonesia, pulmonary tuberculosis was a major problem of public health. The purpose of this study was to analyze the correlation between healthy house conditions (population density, ventilation, house floor types, lighting, temperature, and humidity) and dyspnea frequency of pulmonary tuberculosis patients at Ujungpangkah Public Health Center Gresik by using Cross Sectional design. The samples of this research were 76 respondents. The data were collected and analyzed by using Logistic Regression Test. The results of the analysis concluded that healthy house condition correlated with dyspnea frequency of pulmonary tuberculosis patients which were population density ( $p = 0.031$ ), ventilation ( $p = 0.046$ ), house floor types ( $p = 0.025$ ), lighting ( $p = 0.004$ ), and temperature ( $p = 0.015$ ).

**Keywords:** Healthy house, Tuberculosis, Dyspnea Frequency

**INTRODUCTION**

**2**  
Pulmonary tuberculosis was an infectious disease that became a public health problem in the world because Mycobacterium tuberculosis had infected one third of the world's population. In Indonesia, pulmonary tuberculosis was a major problem of public health. The number of patients with pulmonary tuberculosis in Indonesia placed the 3<sup>rd</sup> number highest in the world after India and China with the number of patients approximately 10% of the total number of pulmonary tuberculosis patients in the world. The case of positive pulmonary tuberculosis TBA was about 110 per 100,000 populations. At Ujungpangkah public health center, Gresik, East Java, Indonesia the case of pulmonary tuberculosis in last two years showed an addition of positive pulmonary tuberculosis patients from 2014 which was 88 cases to 93 cases in January to October 2015.

Mycobacterium tuberculosis as well as other bacteria would thrive generally in high humidity environments. Water made up more than 80% bacterial cells volume and became an essential thing for the growth and survival of bacterial cell. An increase of air humidity was a good medium for pathogenic bacteria including tuberculosis. According to Blum cit. Notoatmodjo (2013), the factors which affected health status were environmental factors, behavior, health care, and descent. House environment was one of major factors that influenced the health status of the residents. House environment was one of factors in the tuberculosis germs transmission. TB germs could live for 1-2 hours or even up to a few days to weeks depending on the presence or absence of ultraviolet, good ventilation, humidity, temperature, and population density.

The house was a dwelling that had to qualify health or technical provisions in order to protect dwellers from harm or health disorders, hence, it was possible for dwellers to have optimal health degree. House and environment that did not qualify the health requirements would have a risk to be a source of various types of diseases transmission. Therefore, the standard of public house building architecture was basically intended to provide good home to stay in design form, layout, and spacious rooms and other facilities in order to fulfill the family needs or to qualify the requirements of a healthy house. House or a place to stay that did not qualify health requirements could favor the occurrence of diseases and various health problems such as respiratory tract infections, tuberculosis infections, skin infections, and infections which were caused by rat infestations and infections due to mental accidents (Chandra, 2007).

**METHOD**

This study aimed at analyzing the correlation between healthy house conditions (population density, ventilation, house floor types, lighting, temperature, and humidity) and dyspnea frequency of pulmonary tuberculosis patients at Ujungpangkah public health center Gresik in 2015 by using cross sectional design. The population was all TB patients who registered at Ujungpangkah public health center

Gresik in January-November 2015 (93). The sample size was 76 people who were selected by simple random sampling technique. The collected data were analyzed by using Logistic Regression test.

## RESULTS

Table 1. Population Density in Work Area of Ujungpangkah Public Health Center Gresik 2015

No.	Population Density	Frequency (f)	Percentage (%)
1.	Poor	47	61.8
2.	Good	29	38.2
	Total	76	100

Table 2. Ventilation distribution in Work Area of Ujungpangkah Public Health Center Gresik 2015

No.	Ventilation	Frequency (f)	Percentage (%)
1.	Poor	40	52.6
2.	Good	36	47.4
	Total	76	100

Table 3. House Floor Types Distribution in Work Area of Ujungpangkah Public Health Center Gresik 2015

No.	House Floor Types	Frequency (f)	Percentage (%)
1.	Poor	29	38.2
2.	Good	47	61.8
	Total	76	100

Table 4. Lighting Distribution in Work Area of Ujungpangkah Public Health Center Gresik 2015

No.	Lighting	Frequency (f)	Percentage (%)
1.	Poor	49	64.5
2.	Good	27	35.5
	Total	76	100

Table 5. Temperature Distribution in Work Area of Ujungpangkah Public Health Center Gresik 2015

No.	Temperature	Frequency (f)	Percentage (%)
1.	Poor	34	44.7
2.	Good	42	55.3
	Total	76	100

Table 6. Humidity Distribution in Work Area of Ujungpangkah Public Health Center Gresik 2015

No.	Humidity	Frequency (f)	Percentage (%)
1.	Poor	37	48.7
2.	Good	39	51.3
	Total	76	100

Table 7. Dyspnea Frequency Distribution in Work Area of Ujungpangkah Public Health Center Gresik 2015

No.	Dyspnea Frequency	Frequency (f)	Percentage (%)
1.	Seldom	47	61.8
2.	Often	29	38.2
	Total	76	100

Table 8. Logistic Regression Analysis Results of **Correlation between Healthy House Condition and Dyspnea Frequency of Tuberculosis Patients** at Ujungpangkah Public Health Center Gresik

No	Variable	$\beta$	p value	P	Note
1	Population Density	-2.788	0,031	p<0,05	Significant
2	Ventilation	-2.566	0,046	p<0,05	Significant
3	House Floor Types	-3.689	0,025	p<0,05	Significant
4	Lighting	-5.146	0,004	p<0,05	Significant
5	Temperature	-3.423	0,015	p<0,05	Significant
6	Humidity	0,240	0,053	p>0,05	Not Significant

## DISCUSSION

### House Condition

The results showed that residential population density of tuberculosis patients at Ujungpangkah public health center Gresik mostly was in poor category (61.8%). Population density correlated with spacious floor area of houses that should be adapted to the number of dwellers in order to not cause *overload*. This was conducted to minimize the contact of pulmonary tuberculosis disease transmission to family members. The denser the dwellers, the faster transmission were occurred.

Home ventilation existence of Tuberculosis patients at Ujungpangkah public health center Gresik mostly was mostly in not good category (76.6%). Natural permanent ventilation was at least 10% of floor spacious. Ventilation condition greatly affected air circulation and diluted pulmonary tuberculosis germs which were carried out.

The existence of house floor type of Tuberculosis patients at Ujungpangkah public health center Gresik was mostly in good category (61.8%). Dwellers' behavior factor in cleaning their home environment one of which was floor greatly affected the cause of pulmonary tuberculosis. House floor type that was made from soil was a good medium for the growth of mycobacterium tuberculosis. A poor house-floor-type could be an indirect cause of pulmonary tuberculosis, weak economic conditions, for example was one of factors that made family to not plaster their home floor.

The existence of house lighting of tuberculosis patients at Ujungpangkah public health center Gresik was mostly in poor category (64.5%). This meant that most of the respondents' home lighting did not qualify the requirements of healthy house. This might be influenced by the presence or absence of ventilation or windows that allowed sunlight entered into house in order to kill tuberculosis germs. Natural or artificial lighting could either directly or indirectly illuminate the whole room with minimum intensity of 60 lux and could not dazzle the eyes.

The existence of house temperature of tuberculosis patients at Ujungpangkah public health center Gresik was mostly in good category (55.3%). The triggering factors that could increase house temperature were air circulation system and population density.

House humidity of tuberculosis patients at Ujungpangkah public health center Gresik was mostly in good category (51.3%). Factors that led high humidity in respondents' house were for example, house floor types, wall types, lighting, and ventilation.

### Dyspnea Frequency

The results showed that most respondents had a seldom dyspnea frequency (61.8%). Tuberculosis was a contagious disease that was caused by bacteria (bacillus) infection. One of the clinical symptoms of pulmonary tuberculosis was dyspnea; encountered if the disease was in advanced level and there was extensive lung damage.

### The Correlation between Population Density and Dyspnea Frequency

Based on the analysis result, there was a correlation between population density and dyspnea frequency of pulmonary tuberculosis patients at Ujungpangkah public health center Gresik. The spacious room closely correlated with the incidence of pulmonary tuberculosis. Besides, the association of pulmonary tuberculosis prevention, Bradbury, statistically concluded that the incidence of pulmonary tuberculosis was mostly the result of unqualified house in spacious room case. According to Soemirat (2010) spacious floor of healthy house should be sufficient for the dwellers inside, which meant that

spacious floor area of house had to be adapted to the number of dwellers in order to not cause overload. Moreover, it was unhealthy because it did not only cause lack of oxygen consumption but also if one of family member suffered infectious disease, it would be easier to transmit the disease to other family members. In addition, population density greatly affected the transmission of pulmonary tuberculosis because pulmonary tuberculosis was a contagious disease that could be transmitted through the air. The denser the dwellers, the faster transmission were occurred. If the house was not dense, the air circulation became smooth so the patient and other family members could prevent pulmonary tuberculosis transmission. Population density could also have an impact on appearance of clinical symptoms of pulmonary tuberculosis that was emergence of dyspnea.

#### **The Correlation between Ventilation and Dyspnea Frequency**

<sup>2</sup> Based on the results, it could be concluded that there was a correlation between Ventilation and dyspnea frequency of tuberculosis patients at Ujungpangkah public health center Gresik. According to Achmadi (2010), he stated that ventilation was beneficial for air changes in the house and it could reduce humidity inside the room. One that caused humidity was human perspiration, the more people in one room, the higher the humidity of the room. Ventilation affected air dilution process, which in other word was diluting the concentration of tuberculosis germs and other bacteria to be carried out and died due to ultraviolet from the sun. According to Azwar (2009), he stated that ventilation had a function to liberate the air from bacteria, especially tuberculosis. Spacious ventilation that did not qualify health requirements would lead to obstruction of air and sunlight exchange process into house. As the consequent, tuberculosis germs in the house could not be sucked out and it was absorbed together with air breathing. The spacious vent area of a qualified health was  $\geq 10\%$  of the floor area of the house. From the results and some studies, it could be concluded that ventilation had a major influence on dyspnea frequency of pulmonary tuberculosis patient because the existence or inexistence of ventilation affected other factors that triggered tuberculosis bacteria's growth and breeding well.

#### **The Correlation between House Floor Types and Dyspnea Frequency**

Based on the analysis result, there was a significant correlation between house floor types and dyspnea frequency of Pulmonary Tuberculosis patient at Ujungpangkah public health center Gresik. According to Achmadi (2010) who stated that hypothetically, ground house floor types had a role on incidence of pulmonary tuberculosis against humidity at room. Ground floor tended to cause humidity. Therefore, the viability of tuberculosis germs in environment was also very influenced by house floor type that was made from soil (ground). When tuberculosis was at the soil, it would be difficult to clean and also difficult to minimize the humidity in room that was from ground.

#### **The Correlation between House Lighting and Dyspnea Frequency**

<sup>2</sup> Based on the results, it could be concluded that there was a significant correlation between lighting and dyspnea frequency of Pulmonary Tuberculosis patient at Ujungpangkah public health center Gresik. Tuberculosis germs could survive in a damp place, dark place with no sunlight for years and would die when was exposed by the sunlight, lisol soap, carbolic acid, and fire heat (Atmosukarto 2008). According to Azwar (2007), sunlight was not only useful to illuminate the room but also had power to kill bacteria. This was proven by Robert Koch (1843-1910) who concluded that sunlight could be used for pulmonary tuberculosis prevention by ensuring the entry of sunlight. Sunlight was an important component for the development of tuberculosis germs, because sunlight contained UV rays that could kill tuberculosis germs. The more sunlight in the house, the smaller chance for bacteria to live and breed. Thus, it caused smaller chance for dyspnea of tuberculosis patients.

#### **The Correlation between Temperature and Dyspnea Frequency**

<sup>2</sup> Based on the results, it could be concluded that there was a significant correlation between temperature and dyspnea frequency of Pulmonary Tuberculosis patient at Ujungpangkah public health center Gresik. According to Goul and Brooker in Nurhidayah (2007), mycobacterium tuberculosis had a preferred temperature range. Within this range, there was an optimum temperature when they grew rapidly. Mycobacterium tuberculosis was a mesophilic bacteria that thrived in range of 25-40°C, but it



would grow optimally at temperatures 31-37°C. Tuberculosis bacteria could live for 1-2 hours or even up to a few days to weeks, depending on the presence or absence of ultraviolet light, good ventilation, humidity, temperature and population density (Notoatmodjo, 2007).

#### The Correlation between Humidity and Dyspnea Frequency

It could be concluded from the result that there was no significant correlation between humidity and dyspnea Frequency of Pulmonary Tuberculosis patient at Ujungpangkah public health center Gresik. According to Achmadi (2010), humidity was a good medium for the bacteria's growth, including tuberculosis. Notoadmojo (2007) stated that tuberculosis bacteria lived in environments with high humidity. Water made up more than 80% bacterial cells volume and was an essential thing for the growth and survival of bacterial cell. In this research, humidity had no direct influence on dyspnea frequency of pulmonary tuberculosis patient at Ujungpangkah public health center Gresik and this could be caused by humidity conditions that mostly were in good category.

#### CONCLUSION AND SUGGESTION

From this study, it could be concluded that dyspnea frequency of tuberculosis patients at Ujungpangkah public health center Gresik was determined by population density, ventilation, house floor types, house lighting, and house temperature. Further, it was suggested that: a) For people at Ujungpangkah public health center Gresik to seek health residential neighborhood modifying house design that its air circulation system or ventilation could qualify health requirements in order to decrease the incidence rate of pulmonary tuberculosis, b) Ujungpangkah public health center Gresik was expected to increase services and elucidation to public regarding a prevention and treatment for pulmonary tuberculosis which was environmentally based disease.

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