OVERVIEW OF THE QUALITY OF THE PHYSICAL ENVIRONMENT OF TUBERCULOSIS PATIENTS IN THE WORKING AREA OF THE AIR TIRIS HEALTH CENTER KAMPAR DISTRIC

Resty Noer Azila[1*], M.Zul'Irfan[1], Wardah[2,], Ulfa Hasana[1]
[1] Program Study of Profesi Ners, Faculty of Nursing, Institut Kesehatan Payung Negeri, Pekanbaru, Indonesia.
*Corresponding authorl : restyrestynoerazila@gmail.com

Abstract
The impact of tuberculosis is not only limited to the individual level but also has a broad impact on the overall well-being of the community. Environmental factors play an important role in the transmission of TB, especially in homes that do not meet health standards. The purpose of this study is to analyze the quality of the physical environment of tuberculosis patients in the working area of the Air Tiris Health Center, Kampar Regency. This research is a quantitative study with a cross-sectional design. The sampling method used is total sampling, with 40 tuberculosis patients as participants. Overall, of the 40 houses surveyed, only 7 houses met the standards, while the remaining 33 houses did not meet the standards, highlighting the importance of improving the physical environment conditions for tuberculosis patients to support the healing process and prevent further transmission. The researcher hopes that this study can serve as a reference for further research and can be developed by studying the relationship between the quality of the physical environment of homes and the occurrence of tuberculosis.
Keyword: Tuberculosis 1; 2; Home Environment 3; Nursing Student

INTRODUCTION

The impact of tuberculosis is not limited to individuals; it also has a significant impact on the overall well-being of society. The high number of cases is a key factor in this (Yeni et al., 2024). Currently, tuberculosis infects around a third of the 1.9 billion people worldwide. Every year, 8 million new cases are reported, resulting in around 3 million deaths. It is estimated that approximately 1% of the global population becomes infected with tuberculosis each year, with an individual potentially transmitting the disease to 10–15 others within a year (Hasbi et al., 2023). Data released by the WHO on 7 November 2023 shows that Indonesia remains second in the world for the number of tuberculosis (TB) cases.

According to data from the Indonesian Ministry of Health, the total number of tuberculosis (TB) cases in Indonesia reached 658,543 by 3 November 2023. The 2021 Health Profile of Riau reported 8,708 cases of tuberculosis in adults and 682 cases in children aged 0–14 years. There was a significant increase in 2022, with 11,626 cases in adults and 1,142 cases in children aged 0–14 years. The recovery rate was recorded at 36.4%, while 4.1% of patients died during treatment.

According to the 2021 report from the Kampar District Health Office, the number of tuberculosis cases increased between 2020 and 2021. While there were 938 cases in 2020, this figure increased to 940 in 2021. There was also an increase in the number of tuberculosis patients in Kampar in 2022, with 1,072 cases recorded. The number of tuberculosis patients continued to increase in 2023, reaching 1,123. Puskesmas Air Tiris had the second highest number of cases in 2023, with 40 people affected.

Environmental factors play an important role in the transmission of TB, particularly in households that do not meet the required standards. Factors that influence the spread of TB in homes include overcrowding, ventilation, flooring, humidity, and lighting. TB is usually

more likely to be transmitted in dark, poorly ventilated rooms where droplets can linger in the air for longer. The spread of tuberculosis bacteria tends to be faster in damp, dark, and dimly lit homes. Overcrowding can also increase the risk of TB transmission, as more frequent contact between patients and other family members in a small room can accelerate transmission (Sabila et al., 2024).

Environmental factors, particularly the places where people interact on a daily basis, are the main route of transmission. Unhealthy conditions, such as poor ventilation and inadequate natural lighting, as well as overcrowded housing, can trigger the development of various infectious diseases and increase the risk of tuberculosis transmission within a population (Hazrina & Nursanti, 2024).

RESEARCH METHODS

This study is a quantitative study with a cross-sectional design. Cross-sectional study designs involve measuring variables at the same time in several different sample groups (Widodo et al., 2023). The population in this study was 40 people, and the sample used in the study consisted of 40 respondents. The sampling technique used was total sampling.

RESEARCH RESULTS
1.   Respondent characteristics

Table 1: Distribution of respondents by gender in the working area of the air tiris health center Kampar distric

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male		
Female	21	52,5
	19	47,5
Total	**40**	**100**
Age		
Early Adulthood (26-35 years old)	12	30,0
Late Adulthood (36-45 years old)	7	17,5
Early Old Age (46-55 years old)	8	20,0
Late Old Age (56-65 years old)	7	17,5
Senior Citizen (>65 years old)	6	15,0
Total	**40**	**100**
Highest Level of Education	19	47,5
Elementary School	4	10,0
Junior High School	14	35,0
High School / Equivalent	3	7,5

Characteristics	Frequency (n)	Percentage (%)
College		
Total	**40**	**100**
Occupation		
Private sector	3	7,5
Self-employed	5	12,5
Farmer	11	27,5
Farm laborer	2	5,0
Not working	1	2,5
Housewife	18	45,0
Total	**40**	**100**
Family members with tuberculosis		
Yes		
No	15	37,5
	25	62,5
Total	**40**	**100**
Duration of Tuberculosis Diagnosis		
1 Month	4	10,0
3 Months	4	10,0
4 Months	3	7,5
5 Months	11	27,5
6 Months	16	40,0
8 Months	1	2,5
1 Year	1	2,5
Total	**40**	**100**

(Source: Primary Data, 2025)

As can be seen from the table above, most of the respondents were male (21 people, or 52.5%), while 19 people (47.5%) were female. Almost half of the respondents were in the early adulthood age group (26-35 years old), with 12 people (30.0%) falling into this category. The age groups were as follows: early adulthood (46-55 years old) – 8 people (20.0%); late adulthood (36-45 years old) – 7 people (17.5%); late adulthood (56-65 years old) – 7 people (17.5%); and old age (>65 years old) – 6 people (15.0%), Almost half of the respondents had completed their education at the primary level, with 19 people (47.5%) having reached this level, Respondents with SMA/Sederajat qualifications made up 35.0% of the sample, followed by those with SMP qualifications (10.0%) and those with higher education qualifications (7.5%). Almost half of the respondents were housewives (45.0%), followed by farmers (27.5%), five people were self-employed (12.5%), three were in the private sector (7.5%), two were agricultural workers (5.0%), and one was unemployed (2.5%), How many of your family members have been diagnosed with tuberculosis? Some respondents had no family members with tuberculosis (25 people, 62.5%), while others did (15 people, 37.5%).How long have you been diagnosed with tuberculosis?Almost half of the respondents had been diagnosed for six months (16 people, 40%), followed by five months (11 people, 27.5%), one month (four people, 10%), three months (four people, 10%), eight months (one person, 2.5%), and one year (one person, 2.5%).

2.   The physical environment of the house

Table 2. Frequency distribution of population density of respondents in the working area of the air tiris health center Kampar distric

Characteristics	Frequency (n)	Percentage (%)
Population Density		
Does Not Meet	23	65,0
Requirements	17	35,0
Meets Requirements		
Total	40	100

(Source: Primary Data, 2025)

Based on Table 2, the distribution frequency of population density in some areas the majority of respondents did not meet the the majority of respondents (65.0%) did not meet the requirements. 17 people met the requirements (35.0%).

Table 3. Frequency distribution of ventilation area of respondents in the working area of the air tiris health center Kampar distric

Ventilation Area	Frequency (n)	Percentage (%)
Does Not Meet	27	67,5
Requirements	13	32,5
Meets Requirements		
Total	**40**	**100**

(Source: Primary Data, 2025)

Based on Table 3, the distribution is as follows frequency of ventilation area respondents did not meet the criteria. A total of 27 people (67.5%) 13 people met the criteria (32.5%).

Table 4. Frequency Distribution of Floor Types of Respondents in the the working area of the air tiris health center Kampar distric

Floor Type	Frequency (n)	Percentage (%)
Meets Requirements	40	100

(Source: Primary Data, 2025)

Based on Table 4, the distribution is as follows frequency of floor types respondents who meet the criteria are 40 (100%).

Table 5. Frequency distribution of humidity levels in the working area of the air tiris health center Kampar distric

Humidity	Frequency (n)	Percentage (%)

Does Not Meet	26,1	65,0 3
Requirements	4	5,0
Meets Requirements		
Total	**40**	**100**

(Source: Primary Data, 2025)

Based on Table 4.5, the distribution is as follows frequency of humidity respondents did not meet the criteria. A total of 26 people (65.0%) 14 people met the criteria (35.0%).

Table 6. Frequency distribution of lighting used by respondents in the the working area of the air tiris health center Kampar distric

Lighting	Frequency (n)	Percentage (%)
Does Not Meet	24	60,0
Requirements	16	40,0
Meets Requirements		
Total	**40**	**100**

(Source: Primary Data, 2025)

Based on Table 4.6, the distribution is as follows frequency of lighting respondents did not meet the criteria. A total of 24 people (60%) 16 people met the criteria (40.0%).

DISCUSSION
1. Respondent Characteristics

The results of the gender study show that of the 40 respondents in this study, 21 were male.The majority of respondents were male. Twenty-one of them were male (52.5%), while 19 were female (47.5%). (52.5%), while 19 (47.5%) were female. Nineteen (47.5%) were female. The results of this study are in line with those conducted by Nur et al. (2022), where there were 72 male patients (61.5%) and 45 female patients (38.5%). This study is also in line with that conducted by Manulu (2023), where the predominant gender was male ,namely 23 people (63.9%).

Gender is not a risk factor for tuberculosis because women currently engage in many activities outside the home such as work, social activities, worship activities, and social gatherings, which increases their contact with people with tuberculosis In addition, men who suffer from tuberculosis and the women around them (family) are also likely to become infected because tuberculosis is transmitted through the respiratory tract when the patient coughs, sneezes, or speaks, releasing germs in the form of droplets (spittle). The more germs that enter into the lung tissue, the higher the likelihood of pulmonary tuberculosis.

The results of research by Nur et al., (2022) based on observations made by the community, show that men who come to the health center have a smoking behavior which can put them at risk of tuberculosis, as smoking can increase the risk of tuberculosis because it can interfere with the clarity of mucosal secretions, which are used as the main defense mechanism against infection. The results of the study showed that almost half of the respondents were in the early adult age range (26-35 years). This study is not in line with the research conducted by Esse Puji Pawenrusi et al., (2020), which showed that 13 respondents (35.1%) were in the early elderly age group (46-55 years). Another study conducted by Konde et al. (2020) showed that the group with the highest number of pulmonary TB patients was aged 15-55 years

(productive age), while the group without pulmonary TB had the highest number of people aged >55 years.

group with the highest number of pulmonary TB patients is aged 15-55 years (productive age) because at this age people spend their time and energy working, which is very exhausting, reducing their rest time and thus decreasing their immune system. Meanwhile, the group with the highest number of non-pulmonary TB patients is aged >55 years (Sunarmi & Kurniawaty, 2022).

Final education level Almost half of the respondents had a final education level of elementary school, totaling 19 people (47.5%). Meanwhile, in a study conducted by Dinda et al. (2024), the final education level of most respondents was elementary school, totaling 30 respondents (54.5%).

Education is a process in which a person follows a series of lessons that have been prepared in advance. This process shapes an individual's way of thinking, helping them to distinguish between right and wrong. Indirectly, people with higher education will have broader insights and easier access to information. In addition, low education can have an impact on health knowledge, which in turn can affect the physical, biological, and social environment, as well as be detrimental to health and increase the risk of developing pulmonary tuberculosis. mproving education levels is not easy, as there are various factors that influence a person to continue their education, such as age, economic conditions, geographic location, distance, availability of educational facilities, and culture.

The results of the employment survey showed that almost half of the respondents, namely 18 people (45.0%), were housewives. These results are in line with research conducted by Toraja (2021), which found that the majority of respondents in the Bittuang Community Health Center working area, namely 13 respondents (41.9%), were housewives.

Work is something that is done to earn a living in order to meet socio-economic needs. Work is generally viewed more in terms of the possibility of exposure to specific hazards, the level or degree of such exposure, and the magnitude of risk according to the nature of the work, the work environment, and the socio-economic characteristics of employees in a particular job. Work environment factors also influence a person's exposure to a disease where a poor work environment supports infection with pulmonary TB, including fishermen, laborers, rickshaw drivers, and others compared to people who work in office areas. Occupations such as fishermen have a daily routine of going out to sea every night and returning in the morning. This can cause a person's physical condition to become susceptible to disease. Things that must be done include consuming nutritious food and maintaining health (Novita Sary et al., 2022). The results of the study on whether there are families with tuberculosis patients showed that most respondents did not have family members with tuberculosis, totaling 25 people (62.5 %). This study is not in line with that conducted by Toraja (2021), which showed that of the 25 families who had good knowledge, 18 people (72%), while of the 11 families who had poor knowledge, only 2 people (18.2%) made good efforts to prevent transmission.

Poor knowledge of pulmonary TB among families and communities has a greater risk impact of increasing pulmonary TB cases, while families and communities that have good knowledge about pulmonary TB can reduce the incidence of pulmonary TB cases. Health education about pulmonary TB can take the form of patient knowledge and behaviour, families and communities regarding the prevention of pulmonary TB transmission. Lack of knowledge and awareness about pulmonary TB will make patients a potential source of dangerous transmission to their environment. Therefore, it is very important for families with pulmonary

TB to have knowledge about preventive behaviors so that they do not transmit it to others (Toraja, 2021).

Based on the results of the study that has been conducted, it shows that the duration of tuberculosis diagnosis was almost half of the respondents experienced it for 6 months, totaling 16 people (40.0%). This study is in line with (Suriyana et al., 2020) The results of this study show that the average time of TB diagnosis was 6.94 months (±3.1; range: 3–13 months) and the average duration of TB medication consumption was 1.95 months (±1.2; range: 1–4 months), where patientsdiscontinued treatment during the intensive treatment phase. This study is also in line with that conducted by Dinda et al. (2024), where most respondents had suffered from tuberculosis for 6 months, namely 14 respondents (25.5%).

2. Physical Condition of the House

The results of the study on the density of tuberculosis patients showed that most of the respondents did not meet the requirements, totaling 23 people (65.0%). These results are in line with the study conducted by Khairani et al. (2020), which showed that 35 people (51.5%) had housing density that did not meet the requirements. Additionally, the results of this study are also in line with the research conducted by Septidwina et al. (2022), which showed that 23 people (74.2%) had inadequate housing density.

Housing density is one of the indicators that triggers high rates of TB transmission. The density of occupants in a single dwelling will affect its occupants. A house size that is not proportional to the number of occupants will cause overcrowding. This is unhealthy because it not only causes a lack of oxygen consumption, but also if one family member contracts an infectious disease, especially tuberculosis, it will easily spread to other family members

The results of the study on home ventilation in tuberculosis patients showed that most of the respondents did not meet the requirements, totaling 27 people (67.5%). These results are in line with the study conducted by Wijayanti et al. (2024), which showed that 87 people (53.3%) had ventilation areas that did not meet the requirements. Additionally, the results of this study are also in line with those conducted by Safitri et al., (2024), which showed that 56 people (47.5%) had ventilation that did not meet the requirements.

Ventilation areas that do not meet requirements must be watched out for as they pose a risk of tuberculosis transmission, where transmission occurs in a room when droplets from infected people remain in the air for a long time. Proper ventilation facilitates air exchange, reducing the number of droplets, while sunlight entering through room ventilation can kill Mycobacterium tuberculosis. A home environment that meets the criteria, such as sunlight entering the house and having adequate ventilation, will reduce the risk of tuberculosis developing and spreading.

The results of the study showed that all 40 respondents (100%) met the criteria. These results are in line with those of Wijayanti et al. (2024), which showed that 126 people (77.3%) had floors that met the criteria. Additionally, research conducted by Romadhan S et al. (2019) showed that 27 people (87.1%) had a floor type thatmet the requirements.

Based on the Decree of the Minister of Health No. 829/Menkes/SK/VII/1999 concerning the requirements for house components for floors, namely waterproof and easy to clean. Floors can act as a medium for TB transmission. Microorganisms such as bacteria that previously originated from a disease source (patient) then live and multiply on the floor of a house, where the growth of these bacteria follows the wet and dry conditions of the floor.For bacteria or other microorganisms to grow, certain humidity conditions are required. If the

patient's sputum is spat onto the floor, TB germs will fly through the air and infect people nearby. If the floor is made of dirt, it will cause humidity, which supports the growth of germs. The results of the study on humidity in the homes of tuberculosis patients showed that most of the respondents did not meet the requirements, with 26 people (65.0%). These results are in line with research conducted by Dewi et al., (2024) showing that 25 people (43.9%) had humidity levels that did not meet the requirements.

According to Minister of Health Regulation No. 2 of 2023, the required room humidity is 40% - 60%. Homes with humidity that does not meet the requirements are 2.596 times more at risk than homes with humidity that meets the requirements.

Humidity can be a risk factor for tuberculosis transmission if conditions are not right, because mycobacterium tuberculosis bacteria can live and grow in humid places. The optimum humidity for the growth of microorganisms is above 60%. Control measures that can be taken by residents if humidity does not meet the requirements include improving ventilation, opening windows and doors, or by using a humidifier (Rahmania et al., 2024).

Based on the results of the study, it was found that home lighting for tuberculosis patients was mostly inadequate for the majority of respondents, 24 people (60.0%) .These results are in line with research conducted by Nurjannah & Yuantari (2024), which showed that 38 people (73.1%) had inadequate lighting

CONCLUSION

1. The density of residences of tuberculosis patients was found to be 26 (65%) not meeting the requirements.
2. The ventilation conditions in the homes of tuberculosis patients were found to be 27 (67.5%) not meeting the requirements.
3. The floor conditions in the homes of tuberculosis patients were found to be 40 (100%) meeting the criteria.
4. Room humidity in the homes of tuberculosis patients was found to be 26 (65%) not meeting the criteria.
5. Lighting in the homes of tuberculosis patients was found to be 24 (60%) not meeting the criteria.

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