

Relationship between the Behaviour and Physical Condition of the House and the Occurrence of Pulmonary Tuberculosis (TB) in the Village of Maluro, Administrative Post of Viqueque Villa, Municipality of Viqueque, 2024

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Abstract:

➤ *Introduction*

Pulmonary tuberculosis (TB) continues to pose a considerable public health challenge, particularly in resource-limited regions where healthcare access is often restricted. The transmission of this infectious disease is heavily influenced by a combination of environmental and behavioural factors, which are particularly pronounced among families residing in substandard housing conditions. Crowded living spaces, poor ventilation, and a lack of sanitation create a breeding ground for the spread of TB, exacerbating the vulnerability of these communities.

➤ *Objective*

This study investigates the relationship between household behaviours, physical housing conditions, and the incidence of pulmonary tuberculosis in the Village of Maluro, Viqueque Municipality, Timor-Leste.

➤ *Methods*

A quantitative cross-sectional study was conducted on 53 households in the Village of Maluro. Data were collected through structured questionnaires and direct interviews, focusing on demographic characteristics, housing conditions, and health behaviours. Statistical analyses, including univariate and bivariate approaches, were performed to evaluate the relationships between variables.

➤ *Results & Discussion*

The findings revealed that 54.7% of respondents reported having pulmonary tuberculosis. Poor housing conditions, characterised by inadequate ventilation, overcrowding, and elevated humidity levels, were significantly associated with higher TB incidence ($p = 0.003$). Behavioral factors such as indiscriminate spitting and high rates of smoking and alcohol consumption exacerbated health risks. The chi-square analysis indicated that individuals with poor housing conditions were at a 0.60 times increased risk of contracting TB compared to those in better conditions. These results emphasise the critical need to address environmental determinants of TB control strategies. The results also support Gordon's theory, emphasising the role of environmental factors in TB transmission. Addressing inadequate housing infrastructure appears crucial for reducing TB incidence. Moreover, the reported low healthcare access highlights a pressing need for targeted interventions and improved healthcare strategies in the Village of Maluro, Viqueque Municipality.

➤ *Conclusion*

The study underscores the urgent need for integrated public health interventions that improve housing conditions and promote healthier behaviours to combat the high incidence of pulmonary tuberculosis in the Village of Maluro, Viqueque Municipality. Strengthening healthcare access and implementing educational campaigns focused on hygiene and lifestyle modification are essential to reducing TB prevalence and enhancing community health outcomes. Integrated public health

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strategies are essential for addressing both the medical and social factors contributing to TB's prevalence, particularly in vulnerable populations. Enhanced collaboration between health sectors and community initiatives is recommended to implement effective and sustainable solutions

Keywords: *Pulmonary Tuberculosis, Housing Conditions, Health Behaviours, Environmental Factors, Public Health.*

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I. INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* (World Health Organization, 2021). This condition has a lengthy historical context, likely since approximately 400 BC or earlier (Roth et al., 2020). The bacterium was first identified by the German physician Robert Koch on March 24, 1882, during his innovative research in Berlin, which significantly enhanced our understanding of the disease (Koch, 1882; Masriadi, 2017)

According to the World Health Organization (WHO) Global Report on Tuberculosis in 2022, the disease remains a major global health challenge (World Health Organization, 2022). In 2021, approximately 10.6 million people were reported to be suffering from TB worldwide, with an alarming 1.5 million fatalities attributed to the disease during the same year (World Health Organization, 2022). Notably, children were significantly affected, as they accounted for 21% of total cases, resulting in 1.2 million infections and around 200,000 deaths (World Health Organization, 2022). In contrast, adults represented the majority, with approximately 8.4 million cases and an estimated 1.3 million deaths (World Health Organization, 2022).

Moreover, there is a growing concern regarding multidrug-resistant tuberculosis (MDR-TB), with around 5.4 million new cases reported in 2021 (Gupta A. et al., 2021). This type of TB is particularly challenging to treat as it resists the standard first-line treatment regimens. The eight countries most severely impacted by TB are India, Indonesia, China, South Africa, the Philippines, Pakistan, Nigeria, and Bangladesh. Among these, Indonesia stands out, ranked second globally, accounting for about 9% of all TB cases (World Health Organization, 2022).

Several challenges hinder effective TB control. The World Health Organization (WHO) reported that, in 2021, only 71% of new TB cases and 82% of MDR-TB cases were recorded and began treatment, highlighting significant gaps in diagnosis and healthcare access (World Health Organization, 2022). Alarming, less than 20% of children diagnosed with TB receive the appropriate diagnostic evaluations and treatment, indicating an urgent need for improved healthcare strategies and support systems to manage this infectious disease effectively (World Health Organization, 2022).

According to the World Health Organization (WHO), in 2022, approximately 10.6 million tuberculosis (TB) cases were reported globally, with a rise of 2.9% compared to the previous year. This alarming trend resulted in about 1.87 million deaths due to TB, with a significant subset of 187,000 individuals being co-infected with HIV, highlighting the intersection of these two public health challenges (World Health Organization, 2022).

For 2023, global estimates suggest that the incidence of new TB cases will remain at around 10.6 million, with a gender breakdown revealing that 5.9 million cases will occur among men and 4.7 million among women. TB is primarily an infectious disease, and its transmission poses serious health risks to the community (World Health Organization, 2023).

Indonesia has escalated its TB burden, ranking second in the world, trailing only India, with projected new cases reaching 809,000 in 2023 alone. The death toll from TB in Indonesia is estimated at 1.6 million, with an estimated 93,000 of these individuals also living with HIV, underlining the critical need for integrated healthcare approaches for these vulnerable populations (Stop TB Partnership, 2023; World Health Organization, 2023).

Drawing on Gordon's theory presented in Siti Fátima's study (2008), the occurrence of disease, including TB, is influenced by three key factors: the agent (the pathogen itself), the host (the individual), and the environment. Environmental risk factors are pivotal in tuberculosis transmission, encompassing inadequate housing infrastructure, lack of proper ventilation, insufficient sunlight exposure, overcrowded living conditions, and elevated humidity levels. These factors create an environment conducive to spreading TB, emphasizing the importance of addressing health and social determinants in combating this disease (Gordon, 1990; Siti Fatima, 2008).

According to the recent global report on tuberculosis (TB) published by the World Health Organization (WHO), Timor-Leste has shown a notable reduction in the incidence of TB for the year 2021. While the country's TB incidence had stabilized at 498 cases per 100,000 population in recent years, a slight decrease of 2.4% was observed in 2021, bringing the rate down to 486 per 100,000 population (World Health Organization, 2021). Despite this improvement, it is important

to note that Timor-Leste still holds the unfortunate distinction of having the highest TB incidence rate in the WHO Southeast Asia Region, trailing only behind North Korea (World Health Organization, 2022).

Analyzing WHO data for Timor-Leste, the number of reported TB cases reflects a concerning upward trend: in 2020, there were 1,142 confirmed cases; this number escalated to 2,281 in 2021, then sharply increased to 3,420 in 2022 and reached 4,559 cases in 2023. This trajectory raises significant public health concerns, indicating a complex TB situation that requires urgent attention and strategic intervention (Ministry of Health, 2023).

Furthermore, specific data gathered from the Viqueque Community Health Center in 2021 highlighted the total number of TB cases: 55 cases reported in 2021, an increase to 106 in 2022, and a continued rise to 162 cases in 2023 (Viqueque Municipal Health Services, 2024). This localized data emphasizes the growing challenge of managing TB within the region.

Understanding the housing situation is vital for addressing the TB incidence, as living conditions can significantly impact health outcomes (Wanti et al., 2015). The combination of demographic and health data paints a clearer picture of the challenges facing Timor-Leste in combating TB. It underscores the need for continued efforts in public health initiatives and resource allocation (IOM Timor-Leste Marks Four Years of Progress in Tuberculosis Management, 2024).

Environmental conditions play a pivotal role in the health of families living in inadequate housing (Basu et al., 2017). Key factors contributing to the risk of tuberculosis transmission include poor ventilation systems, insufficient natural light penetrating the home, overcrowding, elevated humidity levels, and unhygienic practices such as the indiscriminate spitting of sputum inside living spaces (Garcia & Polanco, 2019; Odone et al. (2014); World Health Organization, 2015). Additionally, lifestyle choices such as alcohol consumption and smoking exacerbate health risks. The close proximity of densely populated homes significantly limits sunlight exposure, which is essential for reducing indoor humidity and inhibiting the growth of pathogens. Furthermore, the lack of space between these structures disrupts adequate air circulation, leading to stagnant air conditions (Basu et al., 2017). This creates an environment conducive to transmitting airborne diseases, particularly *Mycobacterium tuberculosis* (Khan et al., 2020; Marmot & Allen, 2014). The confined living spaces often exacerbate issues related to ventilation, allowing respiratory droplets to linger in the air for extended periods and increasing the risk of infection among residents (Wanti et al., 2015; IOM Timor-Leste Marks Four Years of Progress in Tuberculosis Management, 2024).

The primary objective of this research is to thoroughly examine and understand how the interplay between household

behaviors and the physical environment contributes to the incidence of pulmonary tuberculosis in the Village of Maluro within the Administrative Post of Viqueque Villa, Municipality of Viqueque, in the year 2024. This study aims to shed light on potential interventions that could mitigate the risk of TB and improve health outcomes for the affected community.

II. RESEARCH METHODS

This study will employ a quantitative methodological framework, utilizing a cross-sectional approach that allows data collection at a single point to analyze the relationships between variables (Sugiyono, 2009).

The investigation was conducted in 2024 within the Village of Maluro, specifically in the Suco de Maluro, part of the Administrative Post of Viqueque Villa, within the broader Municipality of Viqueque. This setting provides a rich context for examining the relevant issues at hand.

The population encompasses 115 households residing in the Village of Maluro, Administrative Post of Viqueque Villa, Municipality of Viqueque in 2024. Sugiyono (2012) further notes that the sample size typically represents a fraction of the population, ideally capturing the population's diverse characteristics. This study employs a carefully selected sample of 53 households from a single village, determined through applying the Slovin formula. This approach ensures that the sample accurately represents the diverse characteristics of the community, allowing for a nuanced analysis of the data collected.

The data collection will involve direct interviews with the 53 selected households, which will provide firsthand insights and quantitative data pertinent to the research objectives.

A. Data Collection Techniques

According to Suyanto (2014), data collection techniques are essential for conducting research and can be categorized into several key methods:

- **Questionnaire:** One of the most commonly utilized methods for data collection is the questionnaire, which serves as a structured format for gathering information through written questions (Dillman, Smyth, & Christian, 2014). Questionnaires are advantageous for several reasons: they allow for uniformity in responses, can reach many respondents simultaneously, and facilitate quantitative analysis (Fowler, 2014). Typically, a questionnaire comprises a series of questions designed to elicit specific information, and respondents must complete the list independently (Bryman, 2016). This method is particularly useful in surveys where standardization ensures that all participants interpret questions similarly (Sauro & Lewis, 2016).

➤ Interviews represent another vital technique for data collection, characterized by a direct dialogue between the researcher and the interviewee. This approach enables researchers to delve deeply into individual perspectives, nuances, and insights that might not be captured through more structured methods like questionnaires. According to Sugiyono (2001) and Sulyanto (2006), interviews are particularly effective during preliminary studies, where the researcher aims to identify core issues that warrant further investigation. Interviews also benefit from flexibility, allowing researchers to adjust their questions based on interviewees' responses and explore topics of interest in more detail. This technique is often employed when the sample size is smaller, facilitating a more personal and in-depth exploration of the subject matter (Creswell, 2014; Kvale & Brinkmann, 2015).

➤ Observation: Observation is a hands-on data collection technique utilizing the five senses to gather information about a specific environment or subject. Sulyanto (2006) notes that this method is crucial for collecting empirical data as it enables researchers to witness and record behaviors, events, or phenomena in their natural settings. According to Sugianto (2010), observations can yield factual insights into real-world conditions that may not be accessible through questionnaires or interviews. This technique is particularly beneficial for qualitative research, where understanding context and interactions is important (Sulyanto, 2006; Sugianto, 2010).

➤ Documentation: Documentation encompasses systematically collecting existing materials relevant to the research subject (Bowen, 2009). This method involves gathering data from the research site, such as notes, diaries, official reports, photographs, and historical records (Yin, 2011). By accessing pre-existing documents, researchers can enrich their analysis with contextual information, corroborate findings from other data collection methods, and provide a comprehensive overview of the topic under investigation (Creswell & Creswell, 2017). This technique is invaluable for triangulating data and ensuring the robustness of research conclusions (Denzin, 1978).

B. Data Analysis Techniques

According to Sugiyono (2013), it is essential to establish correlations among the data before conducting any data analysis, beginning with evaluating test results obtained from questionnaires. This process systematically tabulates the relationships between dependent and independent variables, employing univariate and bivariate analytical techniques.

➤ Univariate Analysis

In the initial phase, the researcher conducted a univariate analysis of the interviewees to describe each variable comprehensively. This included calculating the frequency counts and percentage distributions for each variable. The univariate analysis allows for a clearer understanding of

individual characteristics within the dataset and identifies trends and patterns that may be present in the responses (Field, 2013).

➤ Bivariate Analysis

Following the univariate analysis, the researcher proceeded with bivariate analysis to address the overarching objectives of the study. This analytical approach examines the potential relationships between two variables simultaneously, mainly focusing on the influence of behavior, the physical condition of the house, and pulmonary tuberculosis. By investigating these relationships, the study aims to uncover insights into how behaviors and living conditions may correlate with tuberculosis's prevalence (Mann, 2010). Thus, this is a critical means of data analysis in this research endeavor.

III. RESULTS

The findings of this comprehensive research were meticulously gathered in the village of Maluro during the year 2024. This study aimed to conduct an in-depth analysis of the demographic characteristics of the 53 participating respondents, who were selected to represent a diverse cross-section of the community. Key demographic factors such as age, gender, education level, occupation, and socio-economic status were carefully examined to provide a nuanced understanding of the population. By utilizing surveys and interviews, the research sought to uncover not only the statistical data but also the personal experiences and perspectives of the respondents, enriching the overall narrative of the village's demographic landscape.

Table 1. Frequency Distribution according to the Type of House in the Village of Maluro in 2024.

Type of House	Frequency	Percentage (%)
Permanent House	20	17.4
Semi-Permanent House	86	74.8
Traditional House	9	7.8
Total	115	100.0

Sources: Primary Data from households in the Village of Maluro, year 2024

Most residences in the area are classified as semi-permanent, comprising 74.8% of the total housing structures. This category includes dwellings made from corrugated metal, timber, or other locally sourced resources that provide basic shelter but may lack durability and long-term sustainability. Permanent homes, which account for only 17.4% of the housing stock, typically feature more robust construction materials like concrete and bricks, suggesting that they are built to last and offer more excellent protection against environmental elements. The remaining 7.8% of traditional dwellings often reflect cultural heritage and utilize local architectural styles and materials but may lack modern amenities.

This distribution highlights a significant reliance on semi-permanent structures, likely influenced by economic constraints and environmental factors, such as the availability of building materials or the community's vulnerability to climate change. The relatively low percentage of permanent houses raises critical questions about housing infrastructure and suggests a pressing need for investment in more durable housing solutions. It may also underscore the community's residents' economic challenges, who may struggle with limited financial resources that inhibit their ability to invest in more stable living conditions.

In this part, the data will be described based on the characteristics of the interviewees, such as age, gender, level of education, and type of work.

Table 2. Frequency Distribution of the Age Group of Respondents in the Village of Maluro in 2024.

Age Group	Frequency	Percentage (%)
10-19	2	3.8
20-29	16	30.2
30-39	12	22.6
40-49	9	17.0
50-59	11	20.8
60-69	3	5.7
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

The frequency distribution of respondents based on age reveals that the 20-29 age group has the highest representation at 30.2%, followed by the 50-59 age group at 20.8%. In contrast, the age groups 10-19 and 60-69 are the least represented. This pattern indicates a predominantly young population, with a significant portion within the working-age bracket. The limited representation of the youngest and oldest age groups may suggest demographic challenges or trends in migration. The age distribution highlights a youthful demographic, predominantly aged 20-29. While this suggests the potential for a dynamic workforce, it also underscores the necessity for job opportunities and educational resources for young adults. The slight presence of the younger (10-19) and older (60-69) age groups may point to demographic shifts, possibly reflecting the migration of younger individuals seeking employment or health-related issues affecting older residents in the community.

Table 3. Frequency Distribution of Respondents based on Gender in the Village of Maluro in 2024.

Sex	Frequency	Percentage (%)
Woman	20	37.7
Man	33	62.3
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

The frequency distribution of respondents based on sex in the village of Maluro showed that there were 20 females, with a percentage of 37.7%, and 33 males, with a percentage of 62.3%. From the above results, the investigator concluded that males are more significant than females.

Table 4. Frequency Distribution of Respondents' Attendance based on Education Level in Maluro Village in 2024.

Level of Education	Frequency	Percentage (%)
Did not complete primary school	3	5.7
Primary	4	7.5
Pre-secondary	21	39.6
Secondary	20	37.7
Tertiary Education	5	9.5
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

Most respondents have pre-secondary education (39.6%), followed closely by secondary education (37.7%). Only a small percentage completed primary education (7.5%) or did not complete primary school (5.7%). The educational attainment is relatively low, with 77.3% of respondents having pre-secondary and secondary education. This indicates a significant gap in educational opportunities, which can impede economic development and health literacy. The need for educational programs that promote higher education and vocational training is critical for community advancement.

Table 5. Frequency Distribution of Respondents based on Occupation in Maluro Village in 2024

Type of Occupation	Frequency	Percentage (%)
Farmer	22	41.5
Housewife	3	5.7
Vendor	7	13.2
Fisherman	8	15.1
Civil Servant	11	20.8
Student	2	3.8
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

The distribution of respondents according to their respective occupation type in the Maluro village reveals that the farmer comprises 22 individuals, accounting for 41.5% of the sample. In comparison, there are 3 housewives, representing 5.7%. Additionally, there are 7 salespeople, constituting 13.2% of the respondents. The fishing profession includes 8 individuals, corresponding to 15.1%. Furthermore, the number of employees is 11, equating to 20.8%. Finally, there are 2 students, comprising 3.8%. It can be concluded that the agricultural profession has a higher representation than all other professions surveyed.

Table 6. Frequency Distribution of Respondents according to the Type of Housing in the Village of Maluro in 2024

Type of house	Frequency	Percentage (%)
Permanent house	10	18.8
Semi-permanent house	38	71.7
Traditional house	5	9.5
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

Similar to Table 1, semi-permanent houses dominate (71.7%), with permanent (18.8%) and traditional houses (9.5%) accounting for the rest. This table mirrors the findings in Table 1, emphasizing the reliance on semi-permanent housing. The consistency across these tables suggests systemic issues related to housing quality and stability, which could be linked to socio-economic factors that need policy interventions to address.

➤ Univariate Analysis

In this analysis, the researcher will describe the results of the research variables, such as behavior, the house's physical condition, and the occurrence of pulmonary tuberculosis. For more details, see the following distribution table:

Table 7. Frequency Distribution of Respondents based on Behavior in Aldeia Maluro in 2024.

Alternative Answer	Frequency	Percentage (%)
Yes	25	47.2
No	28	52.8
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

The survey results reveal that respondents are nearly evenly divided in their behaviour, with 47.2% expressing a positive response ("Yes") and 52.8% indicating a negative response ("No"). This close division highlights the varied perspectives among participants.

Table 8. Frequency distribution of respondents based on housing conditions in the village of Maluro in 2024.

Physical state of the House	Frequency	Percentage (%)
Good	10	18.9
Poor	43	81.1
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

Most respondents (81.1%) report that their housing conditions are unsatisfactory. This notable consensus suggests potential deficiencies in infrastructure and living conditions. Furthermore, inadequate housing conditions are likely associated with health-related issues, particularly respiratory diseases such as tuberculosis, which necessitate prompt intervention.

Table 9. Distribution of Pulmonary Tuberculosis frequencies in the village of Maluro in 2024

Alternative Answer	Frequency	Percentage (%)
Yes	29	54.7
No	24	45.3
Total	53	100.0

Sources: Primary Data from sample in the Village of Maluro, year 2024

A majority of respondents (54.7%) reported having pulmonary tuberculosis. The prevalence of pulmonary tuberculosis is concerning, with over half of the respondents affected. This highlights a critical public health issue in Maluro, necessitating immediate health interventions, increased awareness, and better access to medical care and preventive measures.

➤ Bivariate Analysis

Table 10. Frequency Distribution of Respondents Regarding the Relationship of the Behavior with the Occurrence of Pulmonary Tuberculosis in the village of Maluro in 2024.

Behavior	Occurrence of Pulmonary Tuberculosis				Cumulative		Odds ratio	p-value	CI= 95%
	There is no occurrence		Occurrence						
	n	%	n	%	n	%			
Good	6	11.3	19	35.8	25	52.8	5.700	0.05	1.717-18.925
Bad	18	34	10	18.8	28	47.2			
Total	24	54.7	29	45.3	53	100			

Sources: Primary Data from sample in the Village of Maluro, year 2024

This table investigates the correlation between specific behaviours and the prevalence of pulmonary tuberculosis (TB). Understanding this relationship is essential for developing effective health interventions, as it allows public health officials to identify and target risky behaviors through focused educational campaigns.

Table 10 presents the frequency of responses from the 53 interviewees regarding their experiences with pulmonary tuberculosis. Among them, 19 respondents confirmed having experienced pulmonary tuberculosis, accounting for a prevalence rate of 35.8%. Of those who reported experiencing bad behaviours to the actual occurrence of the disease, 10 individuals, or 18.8%, fell into this category.

The statistical analysis employed a chi-square test with a bivariate approach to evaluate the significance of these findings. With a confidence interval (CI) set at 95%, the lower limit was calculated at 1.717 and the upper limit at 18.925. The analysis yielded a p-value of 0.05, indicating that the observed relationship is statistically significant, suggesting that the behaviours under investigation play a meaningful role in the incidence of pulmonary tuberculosis. Furthermore, the odds ratio was calculated to be 5.700, which suggests that individuals engaging in the identified behaviours are 5.700 times more likely to develop pulmonary tuberculosis compared to those who do not engage in such behaviours. This emphasizes the need for targeted interventions aimed at changing these risky behaviours to reduce the incidence of TB in the population.

Table 11. Frequency Distribution of Respondents Regarding the Relationship between the Physical Condition of the House and the Occurrence of Pulmonary TB in the Village of Maluro in 2024.

The Physical Condition of the House	Occurrence of Pulmonary Tuberculosis				Cumulative		Odds ratio	p-value	CI= 95%
	There is no Occurrence		Occurrence						
	n	%	n	%	n	%			
Good	9	17	1	1.9	10	18.9	0.60	0.003	0.07-516
Poor	15	28.3	28	52.8	43	81.1			
Total	24	54.7	29	45.7	53	100			

Sources: Primary Data from sample in the Village of Maluro, year 2024

Based on table 11 above shows that the frequency of the interviewees on the occurrence of pulmonary tuberculosis shows that of the 53 interviewees who answered that their housing condition is good so that pulmonary tuberculosis does not occur with a frequency of 9, their percentage is 17% and of the interviewees who answered that their housing condition is good and occur with tuberculosis frequency 1, it is percentage 1.9%, respondents whose housing conditions are poor. No occurrence of pulmonary tuberculosis frequently occurs 28.3%. The percentage was 52.8% for respondents whose housing conditions are poor and occurrence of pulmonary tuberculosis

Poor housing conditions could exacerbate the spread of TB. Addressing these conditions could significantly improve health outcomes and reduce TB incidence in the community

The statistical test results using the chi-square with a bivariate approach showed that CI = 95%, lower = 0.07, and upper = 516. P value = 0.003, and odds ratio = 0.60 shows that the upper and lower limits between 0.07 and 516, p-value 0.3 mean significant odds ratio = 0.60 means that the contribution of the house's physical condition to the occurrence of Pulmonary Tuberculosis is 0.60 times.

IV. DISCUSSION

Based on the results of the respondents' frequency of pulmonary tuberculosis, it was shown that out of the 53 respondents, 19 reported experiencing pulmonary tuberculosis, representing 35.8% of the total. Additionally, 6.13% of the respondents indicated they had tuberculosis without prior confirmation (those who answered "No" about their experience with the disease). Among those who answered "No" but still had a history of pulmonary tuberculosis, the occurrence was recorded at a frequency of 10, with an associated percentage of 18.8%. Furthermore, 18 respondents reported neither having pulmonary tuberculosis nor any related history, accounting for 34.0% of the sample.

In line with these findings, research by the World Health Organization (WHO, 2020) highlights that a significant percentage of individuals may underreport their history or symptoms related to pulmonary tuberculosis, further complicating prevalence estimates. A study by Fontanet et al. (2021) corroborates these observations, noting that misdiagnosis is prevalent in regions with limited access to healthcare services, leading to inaccuracies in data. Furthermore, the interplay between socioeconomic factors and tuberculosis incidence has been well-documented (Gonzalez et al., 2019), suggesting that broader health interventions are necessary to address the underlying issues contributing to tuberculosis prevalence and reporting discrepancies.

These references help underscore the importance of accurate data collection in understanding and addressing the public health challenge of pulmonary tuberculosis.

Based on the statistical test results using the chi-square with a bivariate approach, it was demonstrated that the confidence interval (CI) was 95%, with a lower limit of 1.717 and an upper limit of 18.925. The p-value was 0.05, indicating statistical significance, while the calculated odds ratio was 5.700. This suggests that the odds of pulmonary tuberculosis occurrence are 5.7 times higher due to certain behavioral factors (Mishra et al., 2020; Devi & Singh, 2021). Such findings highlight a substantial risk associated with these behaviors, underscoring the need for targeted interventions in communities.

The survey further revealed a concerning trend in the village of Maluro, where respondents exhibited behaviors such as sneezing and spitting indiscriminately. This aligns with previous research indicating that poor hygiene practices can facilitate the transmission of infectious diseases (Kumar et al., 2019). Additionally, high rates of smoking and alcohol consumption were observed, which are known risk factors for the development and progression of TB (World Health Organization, 2021; Lönnroth et al., 2010).

In light of these findings, the researcher underscores the critical importance of community education regarding respiratory etiquette and the dangers of tobacco and alcohol use. This awareness could promote preventive measures and lead to a reduction in TB incidence within the community. Consequently, it is essential for public health initiatives to address these behaviors, as effective community engagement is vital for minimizing the burden of tuberculosis (Zhao et al., 2022).

According to Notoatmodjo (2010), a house's physical condition refers to the state of the dwelling as people utilize it for their needs. Poor environmental conditions can significantly affect the respiratory system, leading to various health issues. Research by Basha and Kaliyaperumal (2015) supports this by highlighting the association between inadequate housing conditions and respiratory illnesses. These unfavorable conditions often arise from a house's physical characteristics, which may lack essential features such as adequate ventilation, windows, appropriate occupant density, suitable flooring, and proper temperature and humidity levels (Kumar et al., 2018). Furthermore, the overall environment of a home greatly influences the incidence of diseases like tuberculosis (TB), as noted by Sahu and Choudhury (2020), who argue that a healthier living environment can decrease the prevalence of respiratory infections.

Based on the results of the survey on the respondents' home condition concerning the occurrence of pulmonary tuberculosis, it was found that out of the 53 respondents who reported their physical condition as good, pulmonary

tuberculosis occurred with a frequency of 1, resulting in a percentage of 1.9%. In contrast, respondents who indicated that their physical condition was poor showed a significant correlation with the incidence of pulmonary tuberculosis, with 28 respondents (52.8%) reporting the disease. Additionally, those living in precarious housing conditions without tuberculosis presented a frequency of 15, translating to 28.3%. This aligns with previous studies, such as those by Ranjan et al. (2019) and the World Health Organization (WHO, 2021), which emphasize the role that adequate housing plays in influencing community health outcomes, including the prevalence of respiratory diseases like TB.

The statistical test results using the chi-square with a bivariate approach indicated that CI = 95%, with a lower limit of 0.07 and an upper limit of 516. A p-value of 0.003 and an odds ratio of 0.60 suggest that the contribution of the household's physical condition to the occurrence of pulmonary tuberculosis (TB) is significant, indicating an increased risk with the odds ratio of 0.60. This implies that when households do not maintain adequate control of conditions such as windows, ventilation, and the state of the soil, the risk of tuberculosis increases, making it more challenging to eradicate the disease. Specifically, in Maluro Village, instances of poorly maintained windows and soil conditions have been observed, which likely contribute to higher TB rates. Effective preventive measures, including improving physical housing conditions, can significantly reduce TB cases within these communities.

The findings of this research align with earlier studies, such as those conducted by Ratnawati et al. (2020), which demonstrated a significant relationship between home physical conditions and the incidence of pulmonary tuberculosis. Their research utilized a chi-square bivariate approach and reported a p-value of 0.001, reinforcing the significance of the connection between environmental factors and TB prevalence (Ratnawati et al., 2020). Further studies, such as those by Smith et al. (2021), have echoed these results, underscoring that inadequate housing conditions play a critical role in the transmission dynamics of tuberculosis within communities.

Moreover, the World Health Organization (WHO) emphasises the importance of improving living conditions as a public health intervention to combat TB, highlighting how social determinants such as housing quality directly impact the risk of TB infection (WHO, 2022). This broadens the understanding that public health strategies addressing housing and environmental factors are essential for TB control efforts in various communities.

V. CONCLUSION

The findings from the study conducted in the Village of Maluro highlight the pressing public health challenges related to the prevalence of pulmonary tuberculosis (TB) and the socio-economic factors influencing its spread. With over half

of the respondents reporting a history of TB, the data underscores the critical need for immediate and effective health interventions. The high incidence of TB in the community raises alarms about inadequate healthcare access, insufficient public health education, and the dire living conditions that many residents face.

Furthermore, the research reveals a significant correlation between the physical condition of housing and the occurrence of TB. Poor housing conditions, characterized by inadequate ventilation, overcrowding, and lack of sanitation, create an environment conducive to transmitting the disease. This finding emphasizes the importance of addressing housing infrastructure as a vital component of public health strategy. Improving living conditions can reduce TB incidence and enhance overall community health.

The study also identifies behavioral factors that contribute to the spread of TB, including lifestyle choices such as smoking and alcohol consumption, as well as practices like indiscriminate spitting. These behaviors increase individual risk and pose broader health risks to the community. Therefore, targeted educational campaigns focusing on behavior modification and strict public health measures are essential to mitigate these risks and promote healthier practices among residents.

In conclusion, addressing the multifaceted issues of tuberculosis in the village of Maluro requires a comprehensive approach that integrates public health initiatives with social determinants of health. To combat TB effectively, the Ministry of Health must prioritize educational outreach, improve healthcare access, and invest in housing improvements. By fostering community engagement and promoting awareness, it is possible to create a healthier environment that reduces the burden of tuberculosis and improves the quality of life for residents in the village of Maluro.

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