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# INCREASING TREND OF TB CASES 2021-2023 IN URBAN AREAS: CORRELATION STUDY OF POPULATION DENSITY WITH NUMBER OF TB CASES

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## ABSTRACT

Tuberculosis or TB is a type of infectious disease that is the center of world attention because it spreads very quickly and causes death. According to data from the Pekalongan Health Service, TB cases increase every year, in 2021 there were 347 cases, in 2022 there were 459 cases and in 2023 there were 505 cases. The research aims to determine the profile of TB cases, their characteristics based on age and gender and analyze the relationship between population density and the number of TB cases in Pekalongan Urban Area. The research design is an observational study on secondary data on the number of TB cases in 2021-2023 in Pekalongan Urban Areas. Using purposive sampling, the total research sample focused on four areas, namely North Pekalongan District, South Pekalongan District, East Pekalongan District and West Pekalongan District. Data collection techniques are observation and literature study. Descriptive data analysis and inferential analysis uses the Pearson Correlation Test. The research results explain that almost every sub-district in Pekalongan Urban Areas during 2021-2023 experienced an increasing trend in the number of TB cases. Based on age, the highest trend of TB cases occurs in productive age (15-65 years) compared to children. Based on gender, the highest number of TB cases occurs in men. On the other hand, no relationship was found between population density and the number of TB cases in Pekalongan Urban Areas (p value = 0.380 > 0.05). So, integrated preventive and promotive efforts are needed from the community.

*Keywords: Population density, Trend,Tuberculosis, Urban*

## INTRODUCTION

Pneumonia is a disease caused by acid-fast bacteria, Mycobacteria tuberculosis. This disease is more familiarly called Tuberculosis (TB). TB is a type of infectious disease that still receives special attention at the world level because it spreads very quickly and causes death (World Health Organization, 2022). Tuberculosis mycobacteria are aerobic, live in groups, are resistant to acid, and can survive for a very long time in dry, cold or humid air. This organism is not resistant to ultraviolet light and is most often transmitted at night. Tuberculosis

transmission occurs from germ droplets through coughing and sneezing (Nisak et al, 2024; Mar'iyah & Zulkarnain, 2021).

The results of a cohort study in India concluded that the prevalence of Tuberculosis Infection (TBI) was estimated at 41 percent regardless of the risk of infection. Another 36 percent prevalence was observed in the general population, excluding high risk groups. Cities with a high active TB burden have a high prevalence of TBI such as Delhi and Tamil Nadu. An increasing trend of TBI is observed with increasing age in India (Chauhan et al, 2023).

Indonesia is included in the top three developing countries after India and China, where the majority of the population dies from pneumonia. So tuberculosis is still a global health problem in developing countries, including Indonesia. This is certainly a health problem, where early detection of tuberculosis is very necessary to reduce the spread of the disease and even death (Fitria & Rahayu, 2024; Panda, 2023).

Based on WHO (2022), it shows that 10.6 million people worldwide have been diagnosed with tuberculosis, Indonesia accounts for 11% of cases and the second largest number of tuberculosis cases in the world after India, namely 18% of all cases. The order of countries with the most TB in the world in 2022 is India (27.9%), Indonesia (9.2%), China (7.4%), Philippines (7.0%), Pakistan (5.8%) , Nigeria (4.4%), Bangladesh (3.6%), Democratic Republic of the Chongo (2.9%), South Africa (2.9%) and Myanmar (1.8%) (Global Tuberculosis Report, 2022).

The Ministry of Health of the Republic of Indonesia (2023), stated that Indonesia reached the highest level since TB was declared a national priority program and continues to experience an increasing trend with the number of cases reaching 724,309 cases, namely 613,428 TB cases in adults and 613,428 TB cases in children. as many as 110,881 cases. Of the total number of TB cases in Indonesia, Central Java Province is one of the provinces with relatively high cases. In 2021, 83,076 TB cases were found and there was a decrease in 2022, TB cases were 46,966 with a total number of cases of 82,978. The number of TB cases will increase in 2023. There were 85,071 TB cases found, which is higher than the estimated 73,856 cases (Central Java Provincial Health Service, 2021).

Research by Rahmawati et al (2023), states that the variables of the number of poor people and population density have a significant effect on TB cases in East Java Province. Meanwhile, research by Nadya & Hendrati (2023) shows that there is a relationship between population density, the cure rate for TB AFB +, the death rate for TB AFB + treatment, and the incidence of TB AFB + TB in the city of Surabaya. The analysis uses secondary data on the health profile of the City of Surabaya for 2018-2020.

On the other hand, Pekalongan Urban Areas is one of the regions in Central Java Province, with the number of TB cases experiencing a significant increase per year. According to data from the Pekalongan Urban Areas Health Service (2021), there were 347 TB cases found, then increased in 2022 to 459 cases and in 2023 there was another increase, namely with the number of cases reaching 505 cases.

Based on the description of the TB case trend problem above, the author conducted research to analyze the relationship between population density and the number of TB cases in Pekalongan Urban Areas. Another aim of this research is to determine the profile of TB cases in Pekalongan Urban Areas as well as the characteristics of TB cases based on age and gender in Pekalongan Urban Areas.

**METHODOLOGY**

This research design is in the form of observational research on secondary data about TB cases from 2021 to 2023 in Pekalongan Urban Areas. Secondary data comes from two agencies, namely the Pekalongan Urban Areas Health Service and the Pekalongan Urban Areas Central Statistics Agency (BPS) in 2024 (population density for each sub-district in Pekalongan Urban Areas). The data analyzed is aggregate data. Using purposive sampling, the total sample for this study focused on the entire number of TB cases at each sub-district-based Community Health Center (Puskesmas) in Pekalongan Urban Areas, namely North Pekalongan District, South Pekalongan District, East Pekalongan District and West Pekalongan District. This research was conducted from February-June 2024. The independent variable is population density. The dependent variable is the number of TB cases. The data collection techniques are observation and literature study.

Descriptive data analysis was used to present the frequency distribution of age and gender in several health centers per sub-district in Pekalongan Urban Areas from 2021 to 2023. Inferential analysis was used to test the relationship between population density and the number of TB in Pekalongan Urban Areas in 2023. Analysis The data uses the Pearson Correlation Test with SPSS version 25.

**RESULTS AND DISCUSSION**
**Trend Profile of Number of TB Cases**

Descriptive analysis regarding the trend in the number of TB cases in Pekalongan Urban Areas from 2021 to 2023 is as follows:

**Figure 1**
**Trends in the Number of TB Cases Based on District Areas in Pekalongan Urban Areas in 2021-2023**
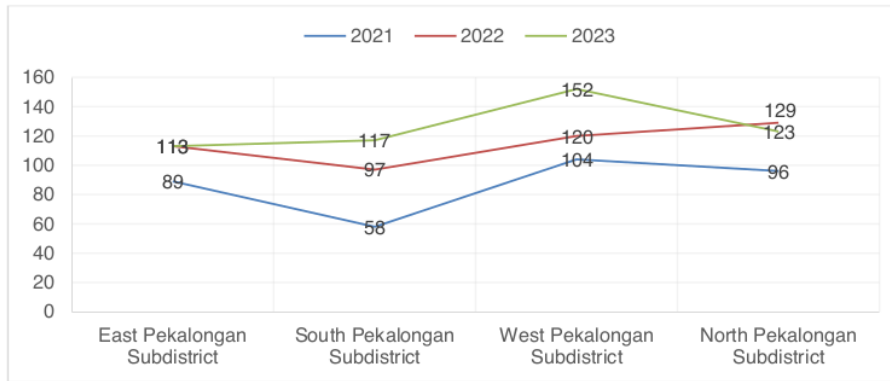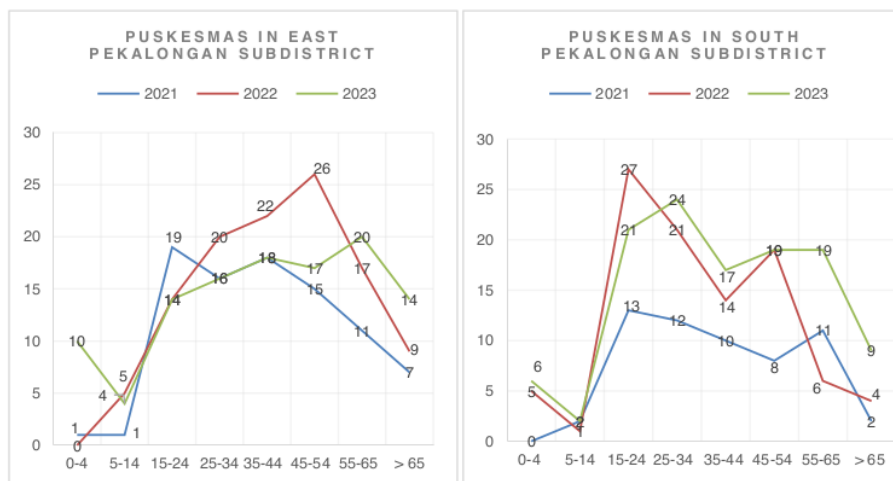
Figure 1 explains that of the total number of cases based on the 4 Pekalongan District Regions, the West Pekalongan District Region has the highest TB cases. Meanwhile, the number of TB cases in Pekalongan Urban Areas each year was recorded at 347 cases in 2021, 459 cases in 2022, and 505 cases in 2023. Of the total number of cases in the last 3 years, the highest cases occurred in 2023 with a total of 505 TB cases. So, almost every sub-district experiences an increasing trend in TB cases every year.

**Characteristics of TB Cases Based on Age and Gender in Pekalongan Urban Areas**

Below we will present the trend in the number of TB cases based on age and gender in Pekalongan Urban Areas from 2021 to 2023.

**Figure 2**
**Trends in the Number of TB Cases Based on Age (Years)**
**at Community Health Centers throughout Pekalongan Urban Areas in 2021-**
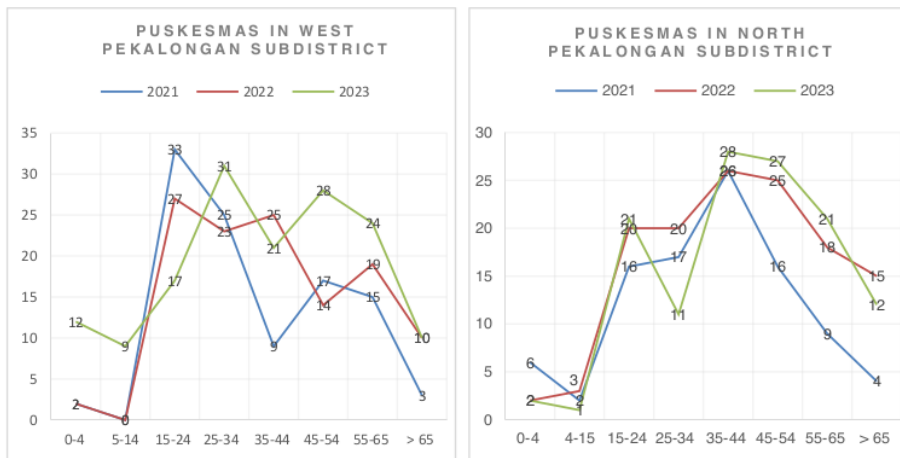


**2022**

Figure 2 explains that the total number of TB cases based on age at the East Pekalongan District Health Center from 2021 to 2023 shows a total of 315 cases with details of the total cases in 2021 being 89 cases, in 2022 being 111 and in 2023 being 113 cases. The total number of TB cases at the Pekalongan Selatan District Health Center showed a total of 272 cases, with details of the total cases in 2021 being 58 cases, in 2022 being 97 and in 2023 being 117 cases. The total number of TB cases at the West Pekalongan District Health Center showed a total of 376 cases with details of the total cases in 2021 being 104 cases, in 2022 being 120 and in 2023 being 152 cases. The total number of TB cases in the North Pekalongan District Health Center showed a total of 348 cases with details of the total cases in 2021 being 96 cases, in 2022 being 129 cases and in 2023 being 123 cases.

Based on Figure 2, the age of TB sufferers in Pekalongan Urban Areas is categorized into two, namely the child category from 0-14 years of age and the adult category from 15 to over 65 years of age. In these two age categories, the results showed that the largest number of TB sufferers in Pekalongan Urban Areas in the 2021-2023 period were in the adult or productive age category.

This is in line with research conducted by Faye et al (2023), research on TB conducted in Africa shows that the adult age group is the largest group (78%) of all cases. In research conducted in Taiwan, the highest incidence of TB occurred in the 17-60 year age group, namely 69.74% (Wijayanti et al, 2023). The results of other research state that the adult group has multiple risk factors, high activity outside the home and exposure to many communities so that this age group is much more vulnerable to transmission of TB disease (Cheng et al., 2020).

In line with quantitative research with a sample of 33 respondents, the results showed that tuberculosis occurred more frequently in late adulthood (46-55 years), namely 14 respondents. Researchers say that the level of TB infection often occurs in productive age, this happens because those in productive age often interact with other people which can indirectly increase the risk of TB transmission (Larasati et al, 2023).

It can be said that at the age of more than 40 years, a person's immune system is very vulnerable to various diseases including tuberculosis.

**Figure 3**
**Trends in the Number of TB Based on Gender in Community Health Centers in Pekalongan Urban Areas in 2021-2023**
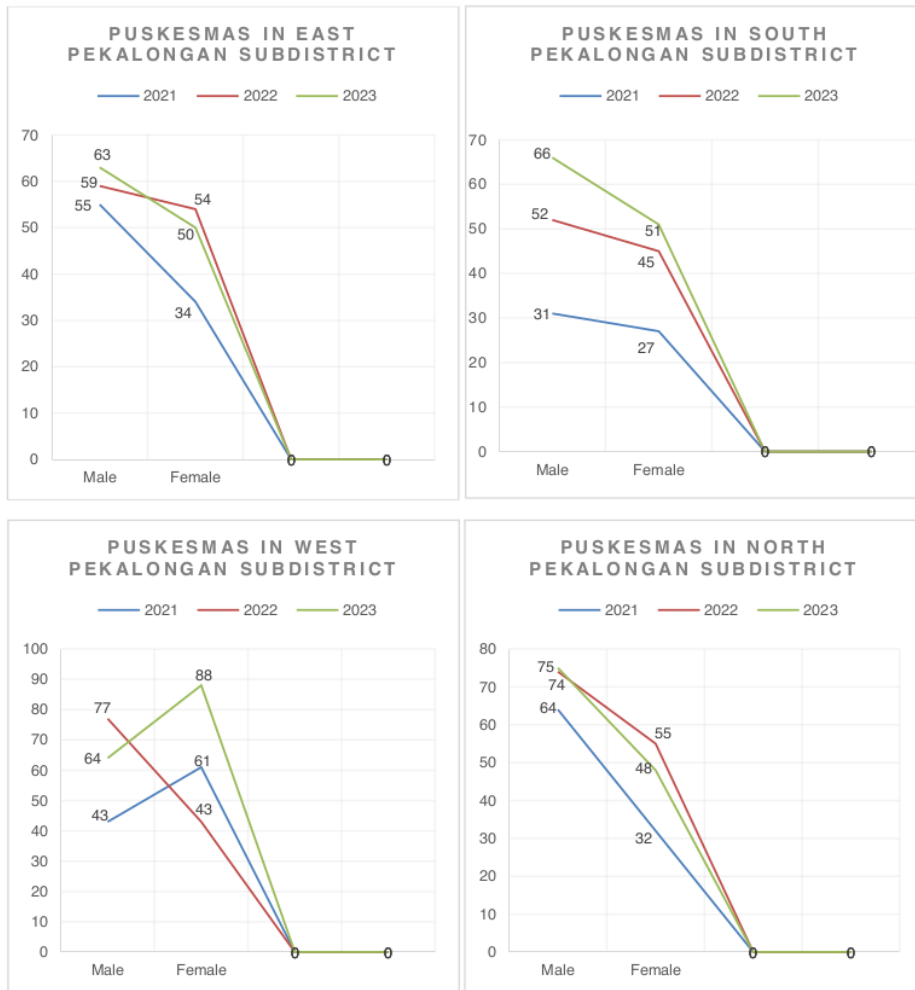


Figure 3 explains that the total number of TB cases based on gender in the East Pekalongan District Health Center from 2021 to 2023 shows a total of 315 cases with details of the total cases in 2021 being 89 cases, in 2022 being 113 cases and in 2023 being 113 cases. The total number of TB cases at the South Pekalongan District Health Center showed a total of 272 cases, with details of the total cases in 2021 being 58 cases, in 2022 being 97 cases and in 2023 being 117 cases. The

total number of TB cases at the West Pekalongan District Health Center showed a total of 376 cases, with details of the total cases in 2021 being 104 cases, in 2022 being 120 cases and in 2023 being 152 cases. The total number of TB cases at the North Pekalongan District Health Center showed a total of 348 cases, with details of the total cases in 2021 being 96 cases, in 2022 being 129 cases and in 2023 being 123 cases.

Based on the data above, the largest TB cases in Pekalongan Urban Areas within three years were in the male category. These results are in line with research conducted at the Tegal Sari Medan Denai Community Health Center. Men have a higher risk of contracting tuberculosis because they move and work longer than women. Apart from that, smoking habits and alcohol consumption which can reduce the body's antibodies also increase the risk of contracting TB. Because of these factors, men are more susceptible to TB bacteria than women (Sikumbang et al., 2022).

Humayun et al (2022), in their research in the city of Harare, Zimbabwe, revealed that men have a 53% higher risk of contracting TB compared to women. He added that men can have a higher risk of tuberculosis as they get older. This is due to smoking habits and alcohol consumption which can reduce the body's immune system and are often referred to as agents of TB disease.

In agreement with the results of research conducted by Refialdinata et al (2023), in their research on the smoking habits of TB sufferers before being diagnosed in the Lubuk Buaya Health Center Working Area, Padang City, it was stated that the majority of tuberculosis sufferers were men (58.5%).

**Analysis Between Population Density and Number of TB Cases**

Based on Pearson correlation analysis, a P value or significance value of 0.380 was obtained, where 0.380 > 0.05 with a confidence interval (95%). This means that there is no relationship between population density and the number of TB cases. This means that population density in the Pekalongan Urban Areas area is not closely related to the spread of tuberculosis cases, even though in the last 3 year period tuberculosis cases have increased followed by population density which has also increased. This is in line with research in East Java Province, after passing the Spearman correlation test, there was no significant correlation between the percentage of population density in an area and the number of TB cases (Setyawan et al, 2023).

Although this research does not prove that there is a relationship between population density and the number of TB cases. However, promotive and preventive strategies to eradicate TB in Pekalongan Urban Areas must be optimized as per the pillars in the End TB Strategy by WHO. Integrated, patient-centered health services and TB prevention efforts in high-risk communities through early TB detection, providing therapy for resistant patients with TB drugs and vaccination (BCG). Apart from that, forming a system through collaboration between government, society and the private sector. Including through innovative research to optimize implementation while promoting

innovation strategies to overcome the burden of TB health problems, especially in Pekalongan Urban Areas.

## CONCLUSION

Almost every sub-district in Pekalongan Urban Areas during 2021-2023 experienced an increasing trend in TB cases. Based on age, the highest trend of TB cases occurs in productive age (15-65 years) compared to children. Based on gender, the highest number of TB cases occurs in men. On the other hand, no relationship was found between population density and the number of TB cases in Pekalongan Urban Areas. So, integrated preventive and promotive efforts are needed from both the community, health workers and government by prioritizing cross-sector collaboration systems or advanced innovative research.

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