



RESEARCH ARTICLE

Acceleration of Healing of TB Patients through Dietary Supplements on Anti-Tuberculosis Drugs

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ABSTRACT

Socioeconomics has a significant influence on people's welfare in terms of health degrees. Poor hygiene, nutritional status, and sanitation status can cause Tuberculosis (TB) to occur most often in rural areas. This study aims to find an intervention area for further research in Bogor Regency. This descriptive study used secondary data from health centers related to the spread/spread of tuberculosis in the service work area. Bogor Regency Health as a preliminary research. The data was processed and analyzed descriptively. Secondary data shows that the number of clinically diagnosed pulmonary tuberculosis bacteriologically confirmed pulmonary tuberculosis, and new tuberculosis patients is high, while for extrapulmonary tuberculosis patients, some areas do not have these patients; it is that the data was not sent, but the distribution is relatively evenly distributed in several areas of advanced research TB drug complementary food interventions accelerate healing with accessibility and human resources government programs Indonesia, which is a nutritious lunch. The spread of TB, especially in rural areas, is a significant problem in defense and resilience in Indonesia because the level of welfare affects health equity, incredibly individual health by providing complementary foods for TB drugs through superior human resources of nutritious lunch programs to reduce TB disease in Indonesia. This paper is an overview of the spread of TB disease in Bogor Regency, which is intervened by the provision of complementary food for TB drugs in the treatment of TB as a new approach.

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INTRODUCTION

Socioeconomics has a significant influence on welfare. Socioeconomics is a fundamental determinant in understanding and measuring it appropriately, from psychological and life outcomes to socioeconomic conditions for achievement and acquisition (Antonoplis, 2023). Macroeconomic expectations in heterogeneity are always linked to the socioeconomic status of the economy through the measurement of the income and education of the people in the area (Das, Kuhnen and Nagel, 2020). Poor health outcomes and health-related lifestyles are affected by SES. Establish education, income, and employment as a benchmark for social inequality along with health inequality. Differences in health status and health outcomes are referred to as health disparities between social groups, which are considered systematically unfair and have an impact on the groups, as mentioned above (Stormacq, Van Den Broucke and Wosinski, 2019). Temporary considerations include the occurrence of morbidity, which has an impact on socioeconomic well-being. One of the risk factors is mental and behavioral disorders resulting in physical illness due to low SES (Kivimäki *et al.*, 2020). Health and welfare are greatly influenced by community resources and social and economic

arrangements through state policies by paying attention to social justice, health, and welfare management capabilities in the development of society as a whole (Von Heimburg and Ness, 2021).

Community welfare is related to the degree of health. It is imperative to consider how the welfare system overcomes all challenges even though economic growth is not developing. (Corlet Walker, Druckman and Jackson, 2021). Breaking the cycle of poverty (i.e., improving the quality of education, health, and community nutrition) is an investment of human resources in social development to address community capacity through social welfare programs that must be planned in the region. (Ma. Victoria H. Alarte, 2022). The cumulative effect on health is owned by countries that have increased welfare in different countries. Intervention through social determinants of health and some logical mechanisms play a significant role in a country's improved welfare. (Widding-Havneraas and Pedersen, 2020). The stigmatizing nature of the US welfare system is of particular importance not only because it has been shown to deter eligible applicants from participating in public assistance programs despite facing economic hardship but also because stigma is an essential fundamental cause of health inequities. It is crucial to the stigmatizing nature of the welfare system that is the cause of health inequalities. (Lapham and Martinson, 2022). One of the most essential factors in determining the degree of health is the low income of the community, so the government creates welfare programs for the underprivileged. (Wakata, Nishioka and Takaki, 2022).

Declining health status can lead to a decline in an individual's health status. High-risk environments constitute a significant challenge in implementing safety, health, and well-being for individuals. (Hu, Wu and Qiao, 2023). Feeding nutritious food will reduce susceptibility and complications from disease in the long run. (Butler and Barrientos, 2020). In a complex system that involves the consumption, absorption, digestion, metabolism, and utilization of nutrients functionally, the environment is closely related to nutritional status. (Raiten and Bremer, 2020). The healing process of diseases is done through a complementary nutritional approach based on biochemical and molecular effects, especially in chronic diseases that have long healed (Barchitta *et al.*, 2019). Health status varies significantly from country to country for certain diseases. (Lebano *et al.*, 2020).

Poor hygiene, nutrient status, and sanitation status can cause TB disease. Some factors related to malnutrition are caused directly by inadequate food intake and indirectly by disease, including water, sanitation, and poor individual hygiene (Chattopadhyay *et al.*, 2019). Identify priority scales and track changes in disease, injury, and risk factors. The high transmission of diseases from drinking water and sanitation and hygienic behavior must be considered in improving the health of the population/community (Prüss-Ustün *et al.*, 2019). The incidence of disease can be reduced by proper sanitation and individual hygiene (Tiwari, Tirumala and Shukla, 2022). Economic, social, and environmental interventions are carried out simultaneously to detect tuberculosis infection. India, Indonesia, China, the Philippines, and Pakistan saw incidents decline from about 10.4 million (56%) in 2016 due to improved living standards and decent housing (John, 2019). One of the infectious diseases is tuberculosis caused by *Mycobacterium tuberculosis*, which is a public health problem with 10 million people suffering from TB; although TB is a disease that can be prevented and cured, 1.5 million deaths occur (Caroux-Paz *et al.*, 2021).

Increased nutrition helps cure TB. Climate stability and ecosystem resilience threaten food security, so malnutrition occurs in the world population; 0.1% is malnourished, 0.3% is obese, and 2 billion are deficient in micronutrients from the world population. The plant-based diet should go hand in hand with the amount of nutrients needed, lacking Vitamin B12, vitamin D, iron, zinc, and calcium as micronutrients found in animal nutrition. (Neufingerl and Eilander, 2023). The increased risk of TB treatment failure is associated with malnutrition. There is no appropriate additional nutritional therapy with micronutrient intake associated with TB treatment outcomes. (Xiong *et al.*, 2020). Vitamins possess anti-oxidant, pro-oxidant, anti-inflammatory, and metabolic function effects as nutrients that help cure TB patients directly or indirectly. (Patti *et al.*, 2021). The socioeconomics and survival of TB patients who receive supplemental food will improve treatment success through weight gain, shorter phlegm convention times, cures, and reduced mortality (Mahapatra *et al.*, 2024). One of the essential metabolites in the immune system is amino acids, which contribute to providing nutrients to the host intracellular pathway in mycobacterial infection mechanisms and host mechanisms in tuberculosis disease. (Amalia *et al.*, 2022).

Economic equity has not been distributed. Inequalities measured by socioeconomic status are contributors to health disparities in the population. (Chinn, Martin and Redmond, 2021). Governments and international organizations provide an overview of how to measure, evaluate, and promote health equity. (Love-Koh *et al.*, 2020). Social determinants of health are related to factors affecting health equity. (Dover and Belon, 2019). The critical role of public health is about social issues as a fundamental principle of equality. (Stopka *et al.*, 2022). The social and economic implications, as well as policy responses, are a more significant challenge to health equity. (Shandmi *et al.*, 2020).

The degree of health and welfare of the community is decreasing. The level of regional development is related to the level of health. (Jia *et al.*, 2022). Public health indicators are a proxy for the level of health equality for vulnerable people. (Reeves, 2021). Public health levels are safer when they have access to health insurance. (Hariyani *et al.*, 2023). Ecosystems and welfare, biological, social, and economic, must continue to be developed to improve health levels. (Sadeghi *et al.*, 2022). Health inequality levels will be low when there is an educational and opinion contribution, but the inequality rate does not change significantly. (Moon, Pabayo and Hwang, 2024).

The health status of individuals in general is affected by poor hygiene and sanitation. The government's provision of access to health services affects the health status of individuals. (Alpaslan and Yildirim, 2020). Socioeconomic, health outcomes and health care are linked to social development indicators, including water and sanitation accessibility and pollution in individual health status. (Goli *et al.*, 2019). Physical, mental, and social health is called health by WHO and is multidimensional in the health status of individuals or groups, especially people with disabilities. Economic status and public services are associated with personal hygiene. (Wang, Miao and Jin, 2023). Individual health status depends on adequate nutrition. (Fras *et al.*, 2023). Improvements in individual health status, such as water, food, sanitation, and health services, are influenced by education and demographic structure. (Le Franc, 1989).

TB disease occurs most in rural areas. The diagnostic approach depends on the geographical conditions that cause variations in the prevalence of TB (Noviyani, Nopsopon and Pongpirul, 2021). Rural areas, compared to urban areas, have a prevalence of TB, which is likely to be caused by poverty, malnutrition, and low access to health services (Hanrahan *et al.*, 2019). In rural areas and underprivileged communities with low access to health services, awareness of TB is often low, and TB transmission in rural environments is often found (Datiko *et al.*, 2019). High levels of stigmatization are dominant in rural areas, resulting in low TB detection and treatment (Bashorun *et al.*, 2020). Accessibility to health services for TB diagnostics and health information is less in rural areas than in urban areas, which affects the search and follow-up of TB patients (Ereso *et al.*, 2020).

Malnutrition is still high in rural areas. The increased risk of latent to active TB infection is due to a decrease in the immune system by malnutrition. Active TB will also exacerbate malnutrition, which is a public health problem in areas with a high prevalence of TB. The increased prevalence of malnutrition can be a socioeconomic and demographic benchmark of low TB patients. (Musuenge, Poda and Chen, 2020). The main contributor to TB is malnutrition, the cause of the high prevalence of TB, which can lead to TB drug resistance, so it is essential to prevent and treat malnutrition conditions to prevent the spread of TB worldwide and improve the TB healing process. (Ockenga *et al.*, 2023). Rural areas with low-income populations are a risk factor for malnutrition that often occurs in TB patients with favorable bacteria. (Li *et al.*, 2023). The population of active TB patients in rural areas occurs in malnourished conditions and increases in HbA1c. (Yu *et al.*, 2020).

This research is essential in searching for areas that have the potential to have a level of spread of TB disease. This research aims to increase immunity with dietary supplements as a support for anti-tuberculosis drugs as a new approach to curing TB. This study seeks secondary data to trace which areas can be applied for further research.

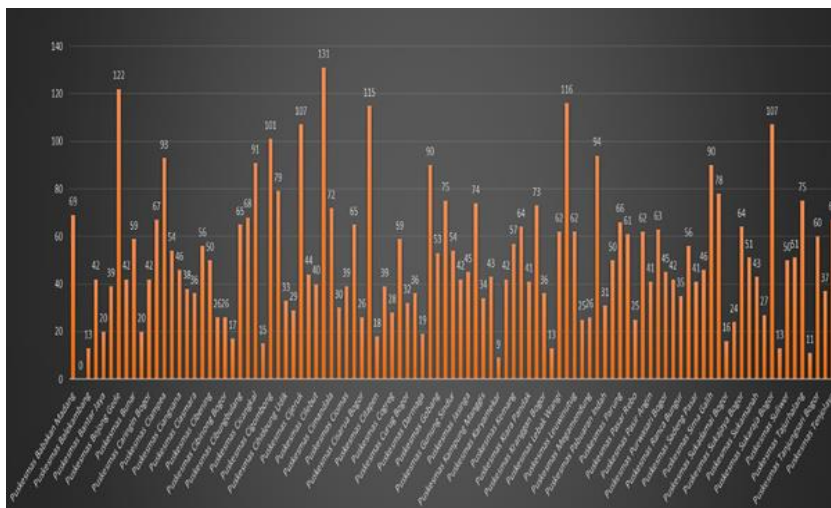
MATERIALS AND METHODS

This study is descriptive research that takes secondary data from the Community Health Centers related to the distribution/distribution of TB disease in Bogor Regency as preliminary research. The

population is located in the work area of the Community Health Centers in Bogor Regency. The data is processed, described, and then analyzed descriptively.

RESULT

Figure_1 shows that the spread of Lung TB diagnosed clinically in 2023 in Bogor Regency is still high on average, with the 5 highest TB areas in the working areas of Ciomas, Caringin Bogor, Leuwintutug, Citapen, and Sukamanah. There is only one working area of the Balekambang Health Center where there is no data on clinically diagnosed pulmonary tuberculosis.



Figure_1: Clinically diagnosed pulmonary TB in bogor

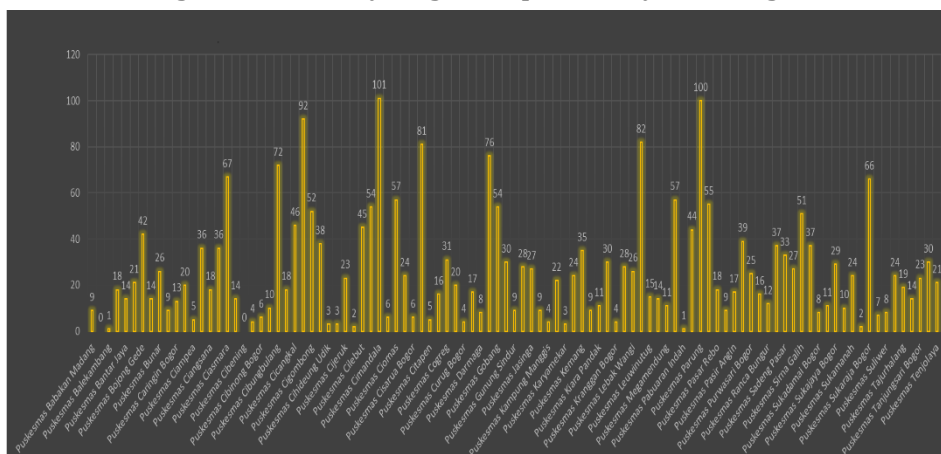


Figure 2: Bacteriologically diagnosed pulmonary TB in bogor regency in 2023

Figure_2 shows that the distribution area of pulmonary TB, which was confirmed bacterially in 2023 in Bogor Regency, is also evenly distributed in almost all working areas of health centers. However, several areas of health center work areas are still high, such as Ciomas, Parung, Cigombong, and Cisarua Bogor. However, the results show that the data on Bacteriologically Confirmed Pulmonary TB in 2023 was obtained in the absence of patients suffering from Bacteriologically Confirmed Pulmonary TB in the working area of the Balekambang and Cibening Health Centers.

Extrapulmonary TB in Bogor Regency In 2023, it shows that there are several working areas of health centers where there is no extrapulmonary tuberculosis at all. However, in some areas, it still looks pretty prominent, with a small number of patients, around 1-6 patients with extrapulmonary tuberculosis. Some of the areas that have experienced an increase in patients are the working areas of the Bojong Gede, Parung, and Mega Mendung health centers, as shown in Figure 3.

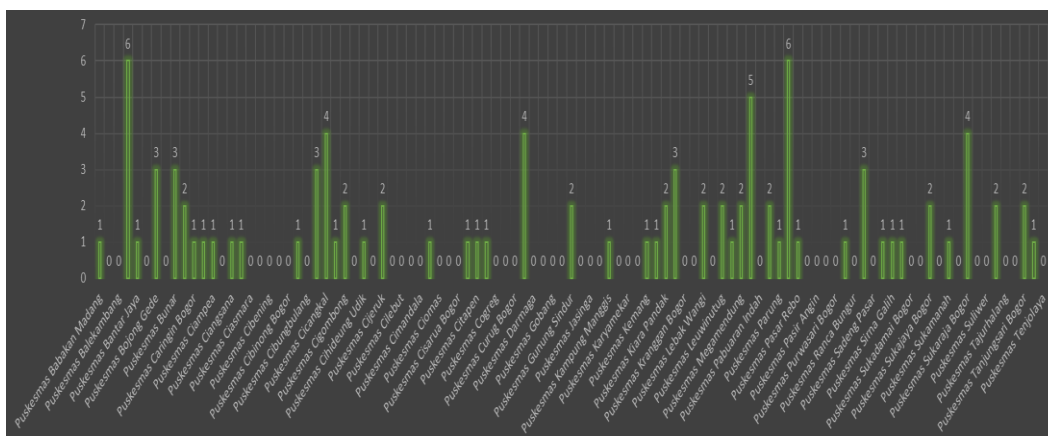


Figure 3: Extrapulmonary TB in bogor regency in 2023

The incidence of new patients with pulmonary tuberculosis in Bogor can be seen in Figure 4, which shows that clinically diagnosed pulmonary tuberculosis has a linear line. In contrast, for bacteriologically confirmed pulmonary tuberculosis, a prominent line is obtained in the increase, and for extrapulmonary tuberculosis, it is still considered low.

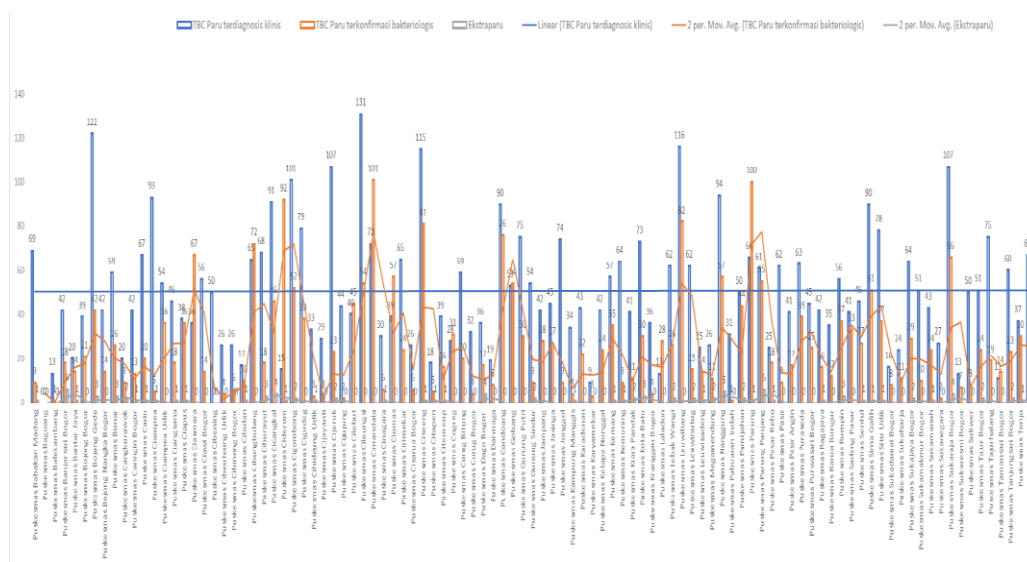


Figure 4: New patients with pulmonary tuberculosis in bogor regency in 2023

DISCUSSION

From the data obtained, there is still a high level of clinically diagnosed pulmonary tuberculosis, bacteriologically confirmed pulmonary tuberculosis, and new tuberculosis patients. In contrast, for patients with extrapulmonary tuberculosis, there are several areas where there are no such patients. It is possible that the confirmed data was not delivered, but the spread was relatively evenly distributed in several areas of the working area of the health center in the Bogor Regency area. Improving nutrition is a solution to government programs such as those that will be carried out in the nutritious lunch program to reduce the risk of active TB infection so that TB drug resistance can be prevented. This nutritional improvement is by providing additional food to accompany TB drugs that are practical, have high nutritional value, and are cheap and easy to obtain, especially in rural areas that have a high population of active TB patients, so that the reduction and prevention of the spread of TB around the world can be reduced.

Rural areas, especially in remote and outermost areas, must be able to improve their welfare so that related to malnutrition and access to health services can be affordable, which can reduce the prevalence rate of TB disease in rural areas. The level of knowledge and education about TB disease

needs to be increased with an increase in counseling in rural areas to detect and treat TB as early as possible.

The government of Indonesia has made a policy on the issue of individual health status, especially in increasing knowledge of counseling and equitable sanitation development, especially for the vulnerable (the aged and children) in the underprivileged community. The improvement of education and demographic structure must be intensively in the development of the whole human being with a nutritious food program, especially for TB patients, with the provision of additional food accompanying TB drugs to be able to accelerate TB healing and transmission of TB disease to other regions to improve the health status of individuals.

Equitable development in all regions can improve the welfare of the community, which can improve the level of health, especially in areas that have poverty levels, which must be a particular concern. The nutritious lunch program launched by the Indonesia government and the preparation of superior human resources that will be distributed to all corners of Indonesia to overcome the low level of welfare by making a positive contribution to the development and improvement of human resources in disadvantaged and remote areas in the nutritious lunch program and other programs that can improve the welfare of disadvantaged and remote communities. This poverty alleviation can reduce the risk and transmission of TB disease and accelerate the healing of TB disease with foods that overcome malnutrition problems and as additional complementary foods to provide sound nutritional intake in the process of curing TB disease.

Increasing equity in terms of economic equality must be leveled through the preparation of superior human resources that are being prepared for economic development in areas that have low levels of welfare; this preparation is aimed not only at the equitable distribution of development but also at improving the quality of human resources in disadvantaged, remote and outermost areas, especially in reducing stunting and mortality rates with adequate health improvement and reduce malnutrition and the most prominent diseases, especially tuberculosis. Increasing health equity by providing optimal health service accessibility, providing nutritious lunches to prevent malnutrition, and accelerating the cure of TB disease plays a significant role in Indonesia's resilience and defense.

CONCLUSION

The distribution of TB disease, especially in rural areas, is a significant problem in defense and resilience in Indonesia because the level of welfare affects health equality incredibly individual health. Supplemental feeding to help TB drugs in the process of curing TB disease. The preparation of human resources that excel in improving welfare in the nutritious lunch program will help reduce TB disease in Indonesia. This paper provides an overview and understanding of the distribution of TB disease in Bogor Regency to find areas that will be involved in TB drug complementary feeding interventions in TB treatment as a new approach.

Authors' contributions

Each author has contributed to the research and writing of this article as follows Arif Rachman: Conceptualization, Methodology, Software, Data curation, Writing- Original draft preparation, Visualization, and Investigation. Arfiyanti : Supervision, Software, Validation, Writing- Reviewing and Editing, and Funding acquisition.

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