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"Epidemiology of tuberculosis": a threat to global, national, and local public health

"Epidemiología de la tuberculosis": una amenaza para la salud pública mundial, nacional y local

"Epidemiologia da tuberculose": uma ameaça à saúde pública global, nacional e local

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Abstract

The aim was to analyze the epidemiological scenario of tuberculosis at the global, national, and local levels, focusing on Brazil and the state of Rio de Janeiro. The methodology used was documentary research, through the analysis of secondary data extracted from official reports of the World Health Organization, the Notifiable Diseases Information System, and national and state epidemiological bulletins, with a time frame from 2022 to 2023. Globally, tuberculosis remains a serious public health issue, with 10.6 million cases and 1.3 million deaths in 2022. In Brazil, the disease presents a heterogeneous distribution, concentrating in the Southeast region and predominantly affecting economically active adult men of Black and mixed race. It was identified that the most vulnerable groups, such as people experiencing homelessness, those with HIV, or users of illicit substances, are disproportionately impacted. The discussion highlights the existence of robust public policies, such as the National Tuberculosis Control Program and Directly Observed Therapy, but also reveals persistent challenges, such as treatment abandonment and multidrug-resistant tuberculosis. It concludes that, despite efforts, global disease control goals are still far off, making it imperative to strengthen intersectoral actions targeting the most vulnerable populations and to invest in research and innovation to interrupt the chain of transmission and reduce the burden of tuberculosis.

Descriptors: Tuberculosis; Epidemiology; Public Health; Global Health; Health Vulnerability.

Resumén

El objetivo fue analizar el panorama epidemiológico de la tuberculosis a nivel mundial, nacional y local, con especial atención a Brasil y el estado de Río de Janeiro. La metodología empleada fue la investigación documental, mediante el análisis de datos secundarios extraídos de informes oficiales de la Organización Mundial de la Salud, el Sistema de Información de Enfermedades de Notificación Obligatoria y boletines epidemiológicos nacionales y estatales, abarcando el periodo 2022-2023. A nivel mundial, la tuberculosis sigue siendo un grave problema de salud pública, con 10,6 millones de casos y 1,3 millones de muertes en 2022. En Brasil, la enfermedad presenta una distribución heterogénea, concentrándose en la región Sudeste y afectando predominantemente a hombres adultos económicamente activos de raza negra y mestiza. Se identificó que los grupos más vulnerables, como las personas sin hogar, las personas con VIH y las personas que consumen sustancias ilícitas, se ven afectados de manera desproporcionada. El análisis destaca la existencia de políticas públicas sólidas, como el Programa Nacional de Control de la Tuberculosis y el Tratamiento Directamente Observado, pero también revela desafíos persistentes, como el abandono del tratamiento y la tuberculosis multirresistente. Concluye que, a pesar de los esfuerzos, los objetivos mundiales de control de enfermedades aún están lejos de alcanzarse, lo que hace imperativo fortalecer las acciones intersectoriales dirigidas a las poblaciones más vulnerables e invertir en investigación e innovación para interrumpir la cadena de transmisión y reducir la carga de la tuberculosis.

Descriptores: Tuberculosis; Epidemiología; Salud Pública; Salud Global; Vulnerabilidad Sanitaria.

Resumo

Objetivou-se analisar o cenário epidemiológico da tuberculose nas esferas global, nacional e local, com foco no Brasil e no estado do Rio de Janeiro. Utilizou-se a metodologia de pesquisa documental, mediante a análise de dados secundários extraídos de relatórios oficiais da Organização Mundial da Saúde, do Sistema de Informação de Agravos de Notificação e de boletins epidemiológicos nacionais e estaduais, com recorte temporal de 2022 a 2023. Globalmente, a tuberculose permanece uma grave questão de saúde pública, com 10,6 milhões de casos e 1,3 milhão de óbitos em 2022. No Brasil, a doença apresenta distribuição heterogênea, concentrando-se na região Sudeste e afetando predominantemente homens adultos, economicamente ativos, pretos e pardos. Identificou-se que os grupos mais vulneráveis, como pessoas em situação de rua, com HIV ou usuárias de substâncias ilícitas, são desproporcionalmente impactados. A discussão salienta a existência de políticas públicas robustas, como o Programa Nacional de Controle da Tuberculose e a Terapia Diretamente Observada, mas evidencia desafios persistentes, como o abandono do tratamento e a tuberculose multirresistente. Conclui-se que, apesar dos esforços, as metas globais de controle da doença estão distantes, sendo imperativo fortalecer ações intersetoriais direcionadas às populações mais vulneráveis e investir em pesquisa e inovação para interromper a cadeia de transmissão e reduzir a carga da tuberculose.

Descritores: Tuberculose; Epidemiologia; Saúde Pública; Saúde Global; Vulnerabilidade em Saúde.

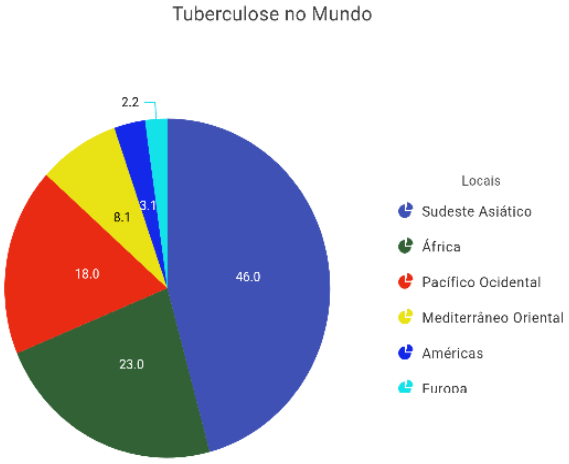
Introduction

Tuberculosis is a very old disease that affects people around the world. In November 2023, the World Health Organization released a global tuberculosis report. This report highlights the significant recovery in expanding tuberculosis diagnostic and treatment services in 2022. With data from 192 countries and regions, the report shows that 7.5 million people were diagnosed with tuberculosis in 2022, representing the highest number recorded since the WHO began global tuberculosis monitoring in 1995[1].

Worldwide, an estimated 10.6 million people contracted TB in 2022, an increase from 10.3 million in 2021. Geographically, most people who developed the disease are found in Southeast Asia (46%), Africa (23%), and the Western Pacific (18%), with smaller proportions in the Eastern Mediterranean (8.1%), the Americas (3.1%), and Europe (2.2%). The total number of tuberculosis-related deaths (including those among people with HIV) was 1.3 million in 2022, down from 1.4 million in 2021. However, during the 2020-2022 period, COVID-19 disruptions resulted in nearly half a million more tuberculosis deaths[1,2].

Tuberculosis remains the leading cause of death among people with HIV. A public health crisis that has affected the entire world. There has been some progress in the development of new diagnostics, drugs, and vaccines against TB. However, this is limited by the overall level of investment in these areas. To give an idea, while approximately 410,000 people developed multidrug-resistant or rifampicin-resistant TB (MDR/RR TB) in 2022, only about two in five people had access to treatment[1].

Figure 1. Global Tuberculosis Report. Rio de Janeiro, RJ, Brazil, 2024



Source: World Health Organization (2023).
Note: Tuberculose no mundo: Tuberculosis in the world. Sudeste Asiático: Southeast Asia. África: Africa. Pacífico Ocidental: Western Pacific. Mediterrâneo Oriental: Eastern Mediterranean. Américas: Americas. Europa: Europe.

Given the above, the objective was to analyze the epidemiological situation of tuberculosis at the global, national, and local levels, focusing on Brazil and the state of Rio de Janeiro, to elucidate the current challenges and strategies for controlling the disease.

Methodology

This is a documentary research study, which consists of analyzing materials that have not received prior analytical treatment or that can be reworked according to the research objectives. To this end, a systematic compilation and analysis of secondary data from reports, health information systems, and official documents in the public domain was carried out. The database was constructed from official national and international sources, with emphasis on the Global Tuberculosis Report 2023 from the World Health Organization (WHO), epidemiological data provided by the Notifiable Diseases Information System (SINAN) of the Brazilian Ministry of Health, and epidemiological bulletins published by the Rio de Janeiro State Health Secretariat. The time frame prioritized the years 2022 and 2023 for the analysis of the most recent indicators[1-3].

The descriptive analysis of the documents allowed us to trace the epidemiological profile of the disease, highlighting the distribution of cases by geographic regions, demographic variables (sex, age, race/color), and vulnerable population groups, such as people living with HIV, those experiencing homelessness, those deprived of liberty, and users of illicit substances. Key indicators such as incidence, mortality, TB-HIV coinfection, and the occurrence of multidrug-resistant tuberculosis were examined[1-3]. Additionally, the study included a synthesis and contextualization of the main tuberculosis control policies and programs, based on documents such as the National Plan to End Tuberculosis, manuals on Directly Observed Therapy (DOT), and guidelines for tobacco control linked to the tuberculosis program. The aim was to correlate the epidemiological findings with the framework of public health actions implemented to combat disease[4,5].

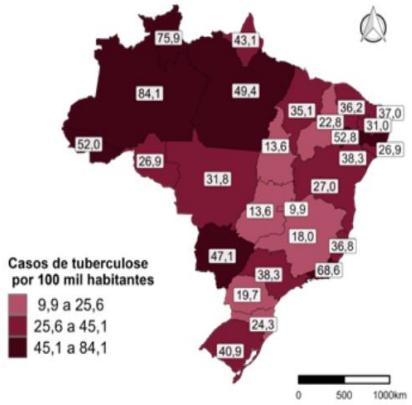
Results and Discussion

Tuberculosis in Brazil

In Brazil, the highest number of registered tuberculosis cases in 2023 was in the Southeast region, with 49,185 cases, of which Rio de Janeiro and São Paulo together

accounted for 84%. This contrasts with the West region, which had the lowest number of registered cases (5,628). Regarding national data, São Paulo stands out with a high number of cases, followed by Rio de Janeiro in second place and Pernambuco in third[2].

Figure 2. Tuberculosis cases in Brazil. Rio de Janeiro, RJ, Brazil, 2024

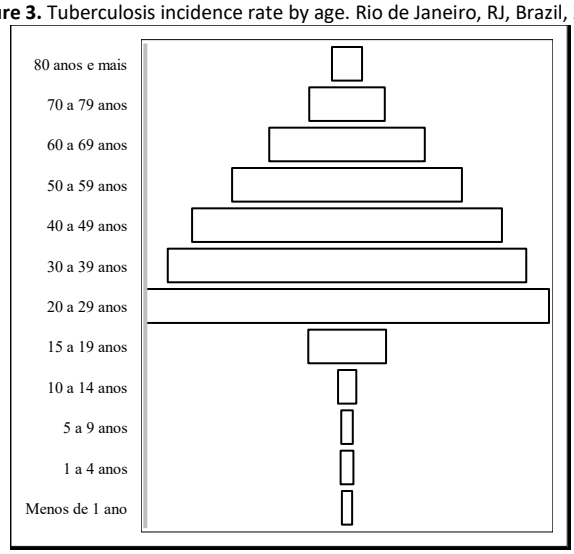


Source: Information System for Notifiable Diseases of the Ministry of Health and IBGE (2023).
Note: Casos de tuberculose por 100 mil habitantes: Tuberculosis cases per 100,000 inhabitants.

Of the states analyzed, the disease affects all age groups, with a higher prevalence among economically active individuals (15-64 years old) and males. According to the Ministry of Health, in 2023, 109,345 cases of tuberculosis were diagnosed in Brazil. Of these, 77,219 were men, mostly Black and mixed-race, totaling 67% of cases[2,6].

Over the last 10 years (2013-2023), there has been an increase of 24,132 new cases of tuberculosis. This demonstrates a concern that urgently needs to be addressed as a priority, since, when analyzing previous years, tuberculosis cases have been increasing alarmingly. Currently, according to figures from the Tuberculosis Epidemiological Bulletin, the incidence of the disease in Brazil is 37 per 100,000 inhabitants. To give an idea, in 2002 the rate was 3.07 per 100,000 inhabitants[2,6]. Regarding age, the disease is predominant among adults, with an incidence in the 29-39 age group. However, cases of childhood and adolescent tuberculosis have been increasing significantly, and in the last 10 years, 348 new cases have been diagnosed, mostly among those aged 15-19.

Figure 3. Tuberculosis incidence rate by age. Rio de Janeiro, RJ, Brazil, 2024



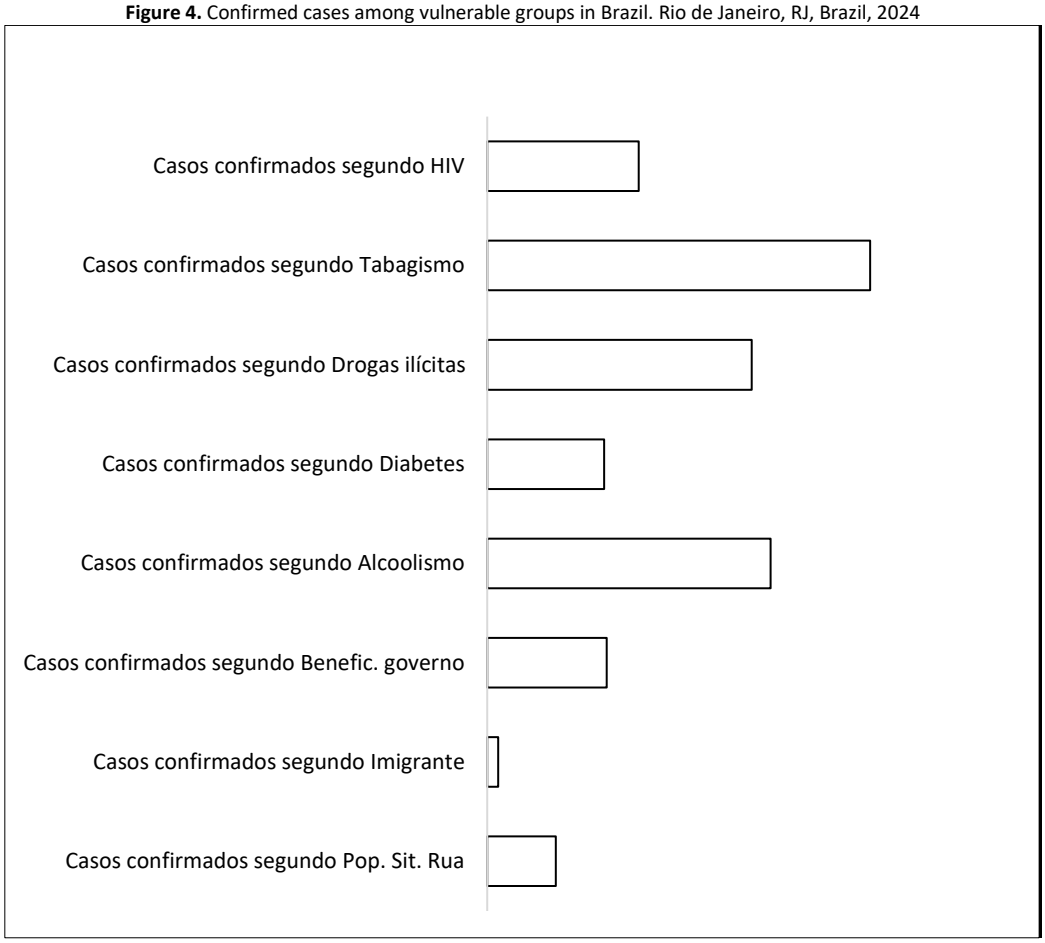
Source: Notifiable Diseases Information System - SINAN Net (2023).
Note: X anos e mais: X years or more. Menos de 1 ano: Less than 1 year.

It is necessary to understand the current situation in Brazil, correlate it with social inequality, and intervene with measures to reduce the incidence of cases. Tuberculosis is curable if the prescribed treatment is followed correctly. A key element in the global fight against tuberculosis is the development of more effective vaccines. Currently, the Brazilian vaccination schedule includes the BCG vaccine, which prevents severe forms of tuberculosis and is intended for children under 5 years old. But the potential impact of a new tuberculosis vaccine in Brazil and the world is immense.

In this context, it is important to highlight the role of Brazil and its public laboratories, such as those of the Oswaldo Cruz Foundation (Fiocruz) and the Butantan Institute, in advancing research and the development of new technologies. These institutions have a history of success and are internationally recognized for their contributions to

public health. But where does this increase come from? Who are these people, and what can we relate to this growth? The Notifiable Diseases Information System (SINAN) is an excellent tool to help answer these questions.

Figure 4. Confirmed cases among vulnerable groups in Brazil. Rio de Janeiro, RJ, Brazil, 2024



Source: Notifiable Diseases Information System – SINAN Net (2023).
Note: Casos confirmados segundo HIV: Confirmed cases according to HIV. Casos confirmados segundo Tabagismo: Confirmed cases according to smoking. Casos confirmados segundo Drogas ilícitas: Confirmed cases according to illicit drugs. Casos confirmados segundo Diabetes: Confirmed cases according to Diabetes. Casos confirmados segundo Alcoolismo: Confirmed cases according to Alcoholism. Casos confirmados segundo Benefícios do Governo: Confirmed cases according to Government Benefits. Casos confirmados segundo Imigrante: Confirmed cases according to Immigrant. Casos confirmados segundo População em Situação de Rua: Confirmed cases according to the homeless population.

According to the platform, more than 30,000 cases of tuberculosis attributed to smoking have been confirmed. This is one of the main indicators that increases the risk of disease in people. The portal also pointed to more than 21,000 confirmed cases of tuberculosis related to the use of illicit drugs, this being one of the main reasons for abandoning treatment. In addition, more than 12,000 cases of tuberculosis were registered among immunosuppressed people, which justifies investigating tuberculosis in HIV-positive patients and HIV in tuberculosis-positive patients[2,7].

National Tuberculosis Control Program in Brazil

The National Tuberculosis Control Program in Brazil advocates actions such as early diagnosis, treatment, epidemiological surveillance, health education, and disease promotion and prevention initiatives. It offers free treatment with medication and active case finding. The program is free and offered by the Unified Health System (SUS), which provides treatment with medication and case follow-up, functioning through the identification of suspected cases, appropriate diagnosis, supervised treatment, patient follow-up, and health promotion and disease prevention actions. Patients are referred to health units where they receive the necessary treatment and are regularly monitored until the disease is cured[4,8].

Globally, measures and strategies adopted to combat tuberculosis include improving access to diagnosis and treatment, promoting research and innovation in new therapies and vaccines, an integrated approach with other health programs, an emphasis on preventing disease transmission, reducing stigma and discrimination associated with tuberculosis, and strengthening health systems to ensure adequate patient care. Furthermore, there is a global effort coordinated by the World Health Organization (WHO) to achieve the goals set out in the Global Plan for Tuberculosis Elimination[1,5].

Tuberculosis situation in the State of Rio de Janeiro

The tuberculosis situation in the State of Rio de Janeiro is worrying, with an incidence of the disease that remains at higher levels compared to other states in Brazil. Tuberculosis control in Rio de Janeiro faces many challenges,

such as the occurrence of multidrug-resistant tuberculosis cases, difficulty in accessing adequate diagnosis and treatment, the need to improve epidemiological surveillance, and the implementation of more effective prevention and control strategies. However, local health authorities have been striving to improve the situation, but much remains to be done to reduce the incidence of tuberculosis in the State of Rio de Janeiro[3].

In 2022, pulmonary tuberculosis accounted for approximately 85% of reported tuberculosis cases in the state; of those reported cases, approximately 70% were classified as bacilliferous tuberculosis. People living with HIV/AIDS have a 34 times higher risk of tuberculosis. To give an idea of the scale, in 2022, approximately 15% of tuberculosis patients in the state tested positive for HIV[1-3,9].

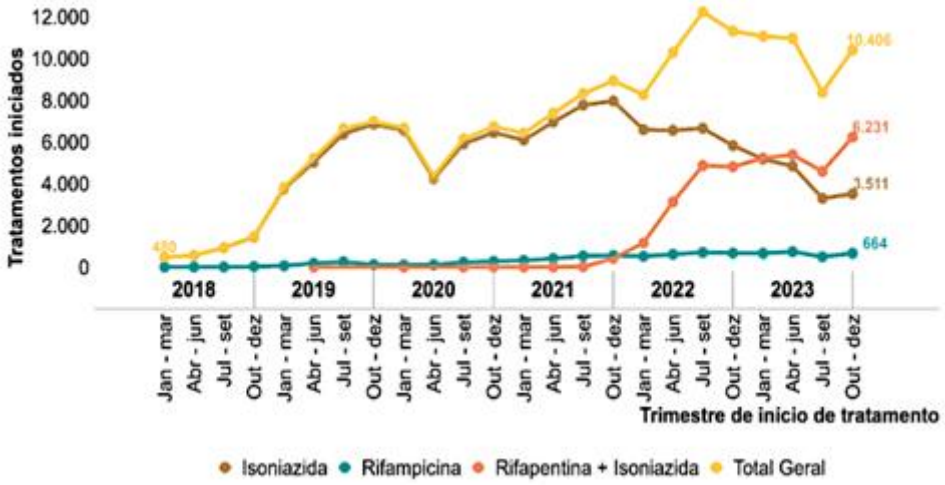
In Rio de Janeiro, the cure rate target for diagnosed tuberculosis cases is 85%. This means that the state's Health Department aims to ensure that at least 85% of patients diagnosed with tuberculosis are successfully treated and cured of the disease. Follow-up and adherence to treatment are fundamental to achieving this goal and improving patients' health outcomes.

Tuberculosis perspective: a look to the future

In Brazil, between 2018 and 2023, approximately 164,000 people began preventive treatment for tuberculosis. One of the major challenges is ensuring adherence by these patients, and one strategy that has been employed is Directly Observed Therapy (DOT), which consists of a healthcare professional observing the ingestion of medication by the person undergoing treatment, and should preferably be carried out every weekday. The location and time of the DOT are agreed upon between the patient and the provider[3,4,9].

According to the World Health Organization, Brazil has been suffering from a tuberculosis epidemic concentrated in certain vulnerable groups, such as homeless people, incarcerated individuals, indigenous populations, people living with HIV, etc. This poses significant challenges to health services, since the clinical management of these groups requires interdisciplinary and intersectoral action[10].

Figure 5. Number of people who started preventive tuberculosis treatment in Brazil from 2018 to 2023. Rio de Janeiro, RJ, Brazil, 2024



Note: Tratamentos iniciados: Treatments initiated. Trimestre de início de tratamento: Treatment initiation quarter. Isoniazida: Isoniazid. Rifampicina: Rifampicin. Rifapentina + Isoniazida: Rifapentine + Isoniazid. Total Geral: Total.

According to the World Health Organization, Brazil has been suffering from a tuberculosis epidemic concentrated in some vulnerable groups, such as homeless people, people deprived of liberty, indigenous peoples, people living with HIV, etc. This poses significant challenges to health services, since the clinical management of these groups requires interdisciplinary and intersectoral action. To achieve the goals established by the World Health Organization (WHO) and agreed upon by the Ministry of Health, it is essential to maintain the downward trend in incidence and improve cure rates. Given the lack of an effective vaccine to control the disease, TB-sensitive measures (Tuberculosis-sensitive strategies), such as social programs like the Bolsa Família Program (PBF) and the Family Plan (ESF), which strengthen political and economic efforts to reduce inequalities in health strategies, have proven fundamental in combating and controlling TB among vulnerable populations[2,10,11].

It is also important to implement strategies aimed at reducing treatment abandonment, which is one of the main indicators of strategic failure in Brazil. Programs for the direct or indirect transfer of financial resources to TB patients (TB Strategies), as well as actions taken by the health sector to complete the treatment of individuals who use or abuse alcohol and other drugs, are fundamental to achieving the defined objectives.

Conclusion

Based on the studies carried out, we can conclude that we are facing a serious global public health problem. Investments need to be made so that an effective vaccine against tuberculosis can be developed as quickly as possible.

The numbers are alarming, reaching 1.3 million deaths from tuberculosis worldwide in 2022, including 167,000 with HIV.

In Brazil, there is a National Plan to End Tuberculosis as a public health problem. In addition, in 2014, the new global strategy to combat tuberculosis was also approved during the World Health Assembly, with a vision of a TB-free world by 2035. However, according to the updated data, we are far from meeting the goal, which puts us at great risk to global health.

This review made it possible to describe, in general, the groups most affected by tuberculosis. Therefore, it is necessary for the Ministry of Health to be more proactive in addressing the issue, targeting these groups directly. Obviously, this does not mean neglecting other groups. However, we are talking about equity, offering more to those who need it most. Another important point to highlight is treatment through Directly Observed Therapy (DOT); it is an excellent strategy, but more investment and professional training are needed to serve a larger population humanely and comprehensively. This is especially important for vulnerable groups, because, as studies have shown, tuberculosis affects the Brazilian population unequally, and those who will develop the disease are homeless people, those in the prison system, indigenous people, and people below the poverty line.

It requires a joint effort from the entire population, from laboratories advancing new technologies, to the State investing in research and science, and from healthcare professionals and the Ministry of Health developing awareness campaigns and treatment for drug addicts. Tuberculosis is curable, and to achieve the goals set by the WHO, a multidisciplinary approach is necessary, focusing primarily on where it is most needed.

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