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Characterization of the homeless people affected by tuberculosis in Brazil, 2015 to 2021

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ABSTRACT. To describe the sociodemographic and clinical-epidemiological profile of homeless people affected by tuberculosis in Brazil, from 2015 to 2021. This is a descriptive, population-based epidemiological study, carried out from the tuberculosis notification records in the Brazilian homeless people, available in the Notifiable Diseases Information System. There was a predominance of male people, of mixed race/color, aged between 30 and 49 years, with (in) complete elementary education and who did not receive social benefits. Regarding the clinical-epidemiological aspects, the type of entry as a new case predominated, with the pulmonary form of the disease, directly observed treatment not performed, with loss of follow-up. The prevalence of alcohol and illicit drug use stands out, in addition to the large number of people who used tobacco. This scenario represents a great challenge, since the presence of tuberculosis prevails in this population, especially as a result of numerous risk factors and situations of vulnerability arising from being homeless. Thus, it is necessary to plan and improve actions that consider the specificities of the group, through inter- and intra-sectoral strategies, focusing on the articulation between public health services and social assistance.

Keywords: Epidemiology; public health; risk group; homeless people.

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Introduction

Tuberculosis [TB] is a chronic transmissible infectious disease caused by the *Mycobacterium tuberculosis* bacillus (World Health Organization [WHO], 2021). Despite its millennial origin, it still presents a challenge to global public health (WHO, 2021). Every day, about 30,000 people fall ill with TB and more than 4,000 people die (WHO, 2021). Its transmission occurs via the respiratory route, through the inhalation of aerosols expelled by individuals with active pulmonary/laryngeal TB (Brasil, 2019).

It is known that certain population groups are at increased risk for becoming ill with TB, whether due to biological conditions or due to social and economic vulnerabilities. Among them, people living with HIV stand out—due to the impairment of the immune system, healthcare professionals—given the greater exposure, incarcerated population, indigenous people, and the homeless people [HP]—as a result of living conditions.

As a socially determined infection, HP represent one of the most vulnerable demographic segments to the disease, bearing a 56-fold increased risk of exposure to the bacillus (Brasil, 2019). Owing to their often precarious way of life and the challenges in accessing public policies, homeless individuals exhibit some of the most dire health conditions (Hungaro et al., 2020).

HP is understood as a heterogeneous group that experiences "extreme poverty, with fragile or absent family ties, without the existence of regular conventional housing and who, in general, use public places or reception units as housing" (Brasil, 2009). Thus, it is evident that this population goes through different situations of vulnerability, both as a result of deficient socioeconomic aspects, as well as the lack of social support and housing.

Mental disorders, chronic illnesses, the use of licit and illicit substances, absence of basic sanitation and hygiene, and lack of social bonds—particularly familial ones, constitute conditions commonly linked with homelessness (Hungaro et al., 2020). Moreover, food insecurity, exposure to harsh weather conditions, prejudice, violence, and pervasive fear are among the adversities encountered by these individuals (Valle, Farah & Junior Carneiro, 2020), who, historically, have been marginalized and rendered invisible by society.

In this context, TB weakens and further aggravates the condition of survival on the streets and represents a major problem for healthcare services and systems, in addition to marking the violation of the right to health of the HP in Brazil (Silva, Vianna, Almeida, Santos & Nery, 2021). In this logic, it is apprehended that TB expands socioeconomic inequalities in different population strata, which is even more evident in the interface with homeless individuals, who, on a daily basis, are deprived of multiple rights.

Despite being one of the countries with the highest TB burden in the world, Brazil has a shortage of national research on the epidemiological characteristics that address the occurrence of TB in HP (Hino et al., 2021). This fact corroborates the negligence and invisibility experienced by this group in several aspects, including in the healthcare sector, representing, for example, the lack of a scientific approach to the disease in one of the groups with the greatest susceptibility to illness from TB in the country (Hino et al., 2021).

Thus, considering the increased risk of TB among HP and aiming to provide visibility to the singularities of the group, sensitize healthcare professionals and managers about the problem, and collaborate with the development of public health and social assistance policies and services that guarantee equitable, comprehensive, and effective attention to this public, based on the epidemiological picture of the condition in the homeless individuals, the development of this research was proposed.

Objective

To describe the sociodemographic and clinical-epidemiological profile of HP affected by TB in Brazil, from 2015 to 2021.

Method

This is a descriptive, population-based epidemiological study, carried out from the notification records of TB in the HP in the *Sistema de Informação de Agravos de Notificação* (Notifiable Diseases Information System, SINAN), accessed on July 27, 2022, at the *Departamento de Informática do Sistema Único de Saúde* (Department of Informatics of the Unified Health System, DATASUS). The recommendations of Strengthening the Reporting of Observational Studies in Epidemiology [STROBE] (Elm, Altman, Egger, Gotzsche, Vandenbroucke, 2008) were followed.

According to the *Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics, IBGE), Brazil has the fifth largest territorial extension in the world, with 8,510,345.540 km², and an estimated population of 213,317,639 inhabitants, in 2021. It is divided into five major regions: North, Northeast, South, Southeast and Midwest, with a political-administrative organization grouping 26 states and the Federal District (IBGE, 2023).

The country does not have an official count of HP at the national level. Estimates carried out by the *Instituto de Pesquisa Econômica Aplicada* (Institute of Applied Economic Research, IPEA) point to a 140% growth in HP when comparing the years 2012 and 2020, with a number of 221,869 people in Brazil, which denotes acceleration and growth of this public over the years (IPEA, 2020).

To conduct this population-based study, all confirmed cases of TB in the HP available on SINAN, notified between the years 2015 and 2021, were included. This time frame is justified considering that 2015 was the year of inclusion of the variable for identification of HP on the notification form and on the SINAN TB follow-up bulletin (Rocha et al., 2020).

Records pertaining to individuals aged 20 to 59 years were included in the study. The variables of interest accessible within the system were meticulously examined and categorized based on sociodemographic and clinical-epidemiological dimensions (Table 1). Subsequently, the data were exported to a digital spreadsheet and subjected to analysis employing descriptive statistics, which were computed using SPSS® software, version 21.0.

Table 1. Variables of homeless people investigated, according to dimension.

Dimension	Variable
Sociodemographic	Gender, race/color, age group (in years), education, and government beneficiary.
Clinical	Type of entry, form, directly observed treatment, and closure status.
Epidemiological	HIV, alcoholism, diabetes, mental disease, illegal drugs, and smoking.

Approval was obtained from the Human Research Ethics Committee of the State University of Maringá (*Universidade Estadual de Maringá*) in accordance with Resolution No. 466/2012, of the National Health

Council, with approval under CAAE No. 63981922.6.0000.0104, with approval under Opinion Report No. 5,721,740. It is mentioned that since these are aggregated and non-nominal data, waiver of the free and informed consent form was requested.

Results

Between 2015 and 2021, a total of 482,640 confirmed cases of TB were identified in the Brazilian population, of which 21,165 (4.4%) were associated with individuals experiencing homelessness. Regarding the sociodemographic characteristics of this group, 17,110 (80.9%) were male, and 9,687 (45.8%) identified as mixed race/color (Table 2).

Regarding age distribution and educational attainment, 14,093 (66.6%) individuals were aged between 30 and 49 years, and 9,341 (44.1%) had either incomplete or complete elementary education; however, data on educational background were missing or blank for 7,954 (37.6%) cases. In terms of access to social benefits, 10,350 (48.9%) were not recipients of government assistance; nonetheless, information on this aspect was lacking for 9,822 (46.4%) records (Table 2).

Table 2. Sociodemographic characteristics of the homeless population with tuberculosis in Brazil, 2015 to 2021.

Variables	n	%
Gender		
Male	17,110	80.9
Female	4,053	19.1
Ignored/blank	2	0.0
Race/color		
White	5,149	24.3
Black	4,421	20.9
Yellow	134	0.6
Mixed	9,687	45.8
Indigenous	69	0.3
Ignored/blank	1,705	8.1
Age group (in years)		
20–29	3,679	17.4
30–39	7,699	36.4
40–49	6,394	30.2
50–59	3,393	16.0
Education		
Illiterate	987	4.7
Elementary school (incomplete/complete)	9.341	44.1
High school (incomplete/complete)	2.488	11.8
Higher education (incomplete/complete)	364	1.7
Does not apply	31	0.1
Ignored/blank	7.954	37.6
Government beneficiary		
Yes	993	4.7
No	10.350	48.9
Ignored/blank	9.822	46.4

In terms of clinical characteristics, there was a predominance of new cases with 11,346 (53.5%); however, it is noteworthy that 6,957 (32.9%) were readmitted after treatment abandonment. The pulmonary form of the disease was observed in the majority with 19,613 (92.6%), while 7,814 (37%) did not perform directly observed treatment (DOT); nevertheless, 7,056 (33.3%) had missing or blank data for this variable. Regarding closure status, 7,997 (37.7%) abandoned treatment, and 6,015 (28.4%) achieved TB cure (Table 3).

Table 3. Clinical characteristics of the homeless population with tuberculosis in Brazil, 2015 to 2021.

Variables	n	%
Type of entry		
New case	11,346	53.5
Recidive	1,726	8.2
Readmission after abandonment	6,957	32.9
Unknown	150	0.7
Transference	710	3.4

Variables	n	%
Post death	276	1.3
Form		
Pulmonary	19,613	92.6
Extrapulmonar	778	3.7
Pulmonary and extrapulmonary	774	3.7
Directly observed treatment		
Yes	6,295	29.7
No	7,814	37.0
Ignored/blank	7,056	33.3
Closure status		
Cure	6,015	28.4
Abandonment	7,997	37.7
Death due to tuberculosis	1,283	6.1
Death due to other causes	1,244	5.9
Transference	2,066	9.8
Drug-resistant tuberculosis	287	1.4
Regimen change	89	0.4
Failure	19	0.1
Ignored/blank	2,165	10.2

Concerning the epidemiological characteristics of the study population, it is noted that 5,426 (25.6%) individuals were diagnosed with HIV, 713 (3.4%) had diabetes, and/or 1,341 (6.3%) had a mental illness. Notably, substance use was prevalent, with the majority comprising 11,652 (55.0%) individuals identified as alcohol users, 10,209 (48.2%) as smokers, and 12,784 (60.4%) as illicit drug users (Table 4). Additionally, it is noteworthy to mention the significant amount of missing information.

Table 4. Epidemiological characteristics of the homeless population with tuberculosis in Brazil, 2015 to 2021.

Variables	n	%
HIV		
Positive	5,426	25.6
Negative	12,404	58.6
Ongoing	289	1.4
Not performed	2,915	13.8
Ignored/blank	131	0.6
Alcoholism		
Yes	11,652	55.0
No	8,330	39.4
Ignored/blank	1,183	5.6
Diabetes		
Yes	713	3.4
No	18,871	89.1
Ignored/blank	1,581	7.5
Mental disease		
Yes	1,341	6.3
No	17,932	84.8
Ignored/blank	1,892	8.9
Smoking		
Yes	10,209	48.2
No	9,501	44.9
Ignored/blank	1,455	6.9
Illicitdrugs		
Yes	12,784	60.4
No	7,138	33.7
Ignored/blank	1,243	5.9

Discussion

The study allowed the identification of the main sociodemographic and clinical characteristics of HP with TB nationwide. With the increase in poverty and misery in the country, sustained by the scenario of the economic, social, and political crisis, which has devastated the country since 2014, the number of HP

continues to grow in Brazil, in all regions and their municipalities (IPEA, 2020). This scenario reinforces the need for social protection strategies aimed at this population, overcoming existing vulnerabilities.

The sociodemographic profile Identified in this research is in line with other investigations with HP in Brazil, represented by men, mixed/black race/color, and low education (Hungaro et al., 2020; Silva et al., 2021). This finding shows the persistence of a specific profile of individuals who need close attention from healthcare and social assistance services, with a view to continuous, comprehensive, and integrated care that promotes reintegration into society and the guarantee of rights as a citizen.

In order to understand the vulnerability of these individuals, it is necessary to take into account aspects that go beyond individual issues that expose people to an increased risk for a given condition. Thus, it is necessary to consider the social dimension, related to cultural, moral, political factors, among others; and the programmatic component, which focuses on policies, programs and services that can interfere at individual and social levels (Ayres et al., 2006).

Homeless individuals experience numerous contexts of individual, social and programmatic vulnerability, overlapping and interconnected, represented by the use of licit and illicit drugs, extreme poverty, fragile family ties, abandonment of TB treatment, exposure to environmental risks, among others (Gioseffi, Batista & Brignol, 2022). Similar situations were characterized by this study, which supports this reality.

Added to this, it is pointed out that TB as a stigmatized and stigmatizing disease produces and reinforces situations that weaken individuals. A study indicated that isolation and family and social rejection are contexts experienced by people with TB, due to the existing prejudice about the disease (Vale, Freire & Pereira, 2020). Therefore, the confluence of homelessness and the presence of TB can exacerbate the already existing vulnerability.

At the international level, significant strides in the battle against tuberculosis have been documented, largely propelled by initiatives such as the End TB Strategy. Nevertheless, persistent social disparities render individuals living on the streets less responsive and, in certain instances, overlooked by the advancements made thus far. Consequently, they bear an unjust burden of morbidity and mortality resulting from the disease (Agarwal, Nguyen, Graviss, 2019; Self, McDaniel, Morris & Silk, 2021).

In Brazil, it is recommended to actively search for people with respiratory symptoms, offer DOT for all HP, tests for infectious and contagious diseases and search for people who do not attend healthcare services for follow-up, in addition to prioritizing strategies aimed at creating bonding and harm reduction, based on dialogue between healthcare, social assistance, education, non-governmental organizations and other local partners, with the aim of expanding access to the *Sistema Único de Saúde* (Unified Health System, SUS) and the *Sistema Único de Assistência Social* (Unified Social Assistance System, SUAS) (Brasil, 2019).

Despite the existence of social assistance and health public policies specific to the HP, important gaps and weaknesses are perceived that reproduce this problem, in addition to the perpetuation of stigma in this group (Gioseffi, et al., 2022). This fragility was visualized in this study by the abandonment rate—which exceeded the cure rate, by the high number of individuals who did not perform the DOT and by the significant number of HP who were not beneficiaries of government income transfer programs.

These findings corroborate a study conducted in the North of the country, whose results question the effectiveness of existing services and programs aimed at managing TB infection in HP (Órfão, Silva, Ferreira & Brunello, 2021). These issues reinforce vulnerability, especially in its programmatic dimension, in which it is perceived the difficulty for services to provide opportunities to guarantee access and continuity of comprehensive care (Gioseffi et al., 2022; Pavinati et al., 2023).

This issue perpetuates contexts of fragility that impede self-care for health, consequently exposing individuals to precarious risk situations (Gioseffi et al., 2022). The prevalence of HIV infection among homeless individuals with TB, surpassing a quarter of cases, underscores the gravity of the situation and underscores the imperative for heightened vigilance by public agencies.

In this way, tracking, monitoring, and treatment are fundamental strategies for coping with the problem (Brasil, 2019), especially in vulnerable groups. In this context, it becomes imperative that care services and epidemiological surveillance are able to promote the linking of these people to the healthcare network and the social assistance network.

Furthermore, the use of alcohol, tobacco, and illicit drugs was predominant in the daily lives of this population. This condition further aggravates vulnerability, especially in its individual and social dimensions, in addition to the difficulty in accessing social rights (Campos et al., 2019; Gioseffi et al., 2022). The initiation

of use can be attributed to being homeless or, sometimes, as a strategy for socialization and survival on the streets (Campos et al., 2019).

The helplessness and neglect of HP drug users in Brazil is a major barrier to the implementation of policies that meet the needs of drug addicts (Rossi & Tussi, 2019). In addition to the damage caused to the proper functioning of the organism and the immune system, the abuse of alcohol and other drugs is associated with greater difficulties in adhering to TB therapy, since the concomitant use of the treatment increases the chance of intolerance to the medication (Santos, Santana & Maia, 2020).

Recognizing the great challenge that the social and economic situation has conferred on TB control around the world, the WHO has been reinforcing the approach to socioeconomic problems in care plans, which must be centered on the person and their needs (WHO, 2021). It is suggested the use of material support, such as the distribution of basic food parcel, food vouchers, transportation vouchers and government financial aid, as a strategy to overcome barriers that, otherwise, would be impossible for people to overcome without some form of support (WHO, 2021).

Given this scenario, strategies that comprehend the complexity of this issue and take into account the vulnerabilities inherent in this group are imperative for the early diagnosis and subsequent effective treatment of TB within this population (Salem et al., 2020). Consequently, the necessity for the coordination and integration of services and public policies is underscored, aiming to ensure the social rights of this notably marginalized population (Hungaro et al., 2020).

In alignment with this approach, the Ministry of Health advocates for comprehensive, person-centered care, emphasizing the organization of healthcare services targeting population groups most susceptible to this disease (Brasil, 2019). Therefore, it is suggested that additional measures, beyond the provision of free healthcare services, be considered, particularly for individuals facing social and economic vulnerability, such as those experiencing homelessness.

It is worth noting that in order to deliver comprehensive care and effectively address the needs of individuals with TB, thereby enhancing disease management, it is imperative to delineate the epidemiological, sociodemographic, and clinical profiles of those affected. However, this study encountered a significant number of notifications with fields left blank or marked as ignored, posing a challenge for the coordination between healthcare delivery and surveillance systems. This highlights the necessity for strategies aimed at accurately completing forms and promptly notifying cases, in order to inform health planning and interventions.

As such, this issue is acknowledged as one of the study's limitations, as the data may inaccurately reflect the epidemiological reality. Additionally, it is mentioned as a limitation the inclusion of the homelessness variable in the initial years of the historical series, which may contribute to inaccuracies in data collection due to the adaptation phase to the new information.

Conclusion

The profile of homeless individuals affected by TB highlighted a predominance of males, of mixed race/color, aged between 30 and 49 years, and with varying levels of elementary education completion. The epidemiological and clinical aspects underscored the vulnerabilities inherent in the daily lives of these individuals. These vulnerabilities were manifested through recurring treatment abandonment and re-entry, lack of DOT, low treatment success, elevated HIV infection, and widespread use of alcohol as well as other licit and illicit substances.

From the perspective of public health, this scenario represents a major challenge, since the presence of TB prevails in this public, especially as a result of numerous risk factors and situations of vulnerability resulting from being homeless. In the meantime, it is necessary to plan and improve actions that consider the specificities of the group, through inter- and intra-sectoral strategies, focusing on the articulation between healthcare services and social assistance.

Furthermore, there is a need for studies to delve deeper into understanding the factors associated with infection incidence and unfavorable TB outcomes in this highly vulnerable population. These studies should employ both quantitative and qualitative approaches, as well as operational and programmatic research, to inform planning and strategies aimed at addressing the current situation. Additionally, such research efforts will contribute to the scientific advancement of a field that remains nascent but is of utmost importance in the fight against TB in the country.

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