



# Revista de Epidemiologia e Controle de Infecção

Original Article

## Prevalence of tuberculosis notifications at a university hospital between 2010 and 2022

Prevalência das notificações de tuberculose em um hospital universitário, entre 2010 e 2022  
Prevalencia de notificaciones de tuberculosis en un hospital universitario entre 2010 y 2022

Site doi: <https://doi.org/10.17058/reci.v15i3.20110>

Submitted: 12/18/2024

Accepted: 07/24/2025

Available online: 10/08/2025

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### ABSTRACT

**Background and Objectives:** Tuberculosis remains a significant public health challenge. This study aimed to describe the sociodemographic and clinical-epidemiological profiles of tuberculosis cases and identify factors associated with loss to follow-up between 2010 and 2022 at a university hospital in São Paulo-SP, Brazil. **Methods:** This cross-sectional study analyzed secondary data from mandatory tuberculosis notifications in a tertiary health service in São Paulo. Descriptive statistics and measures of central tendency were applied. Poisson regression with robust variance was used to calculate prevalence ratios for loss to follow-up. **Results:** A total of 2,076 cases were reported during the study period, with 39% identified in urgent or emergency settings, and 10.6% classified as loss to follow-up. Higher prevalence of treatment discontinuation was associated with unemployment, diagnosis in urgent/emergency care or hospitalization, retreatment cases, alcohol use, and positive serology for human immunodeficiency virus. **Conclusion:** Many cases were reported in the urgent care and/or emergency sector, and treatment interruption was high. This scenario underscores the necessity for a comprehensive approach to tuberculosis, with a focus on cases diagnosed in tertiary care and those undergoing retreatment.

**Keywords:** Tuberculosis. Health Profile. Lost to Follow-Up. Tertiary Healthcare. Public Health Surveillance.

### RESUMO

**Justificativa e Objetivos:** A tuberculose persiste como um importante problema de saúde pública. Dessa forma, objetivou-se descrever o perfil sociodemográfico e clínico-epidemiológico dos casos de tuberculose e identificar as características associadas à perda de seguimento, entre 2010 e 2022 em um hospital universitário do município de São Paulo - SP, Brasil. **Métodos:** Estudo transversal, com base em dados secundários referentes às notificações compulsórias de tuberculose de um serviço de saúde terciário do município de São Paulo. Na análise foram reportadas as medidas descritivas e de tendência central e, pela regressão de Poisson com variância robusta, a razão de prevalência para a perda de seguimento do tratamento. **Resultados:** Foram notificados 2.076 casos durante o período do estudo, dos quais 39% foram descobertos no setor de urgência/emergência e 10,6% foi encerrado por perda de seguimento. A maior prevalência para interrupção do tratamento esteve associada as pessoas que se encontravam desempregadas, com descoberta em serviços de urgência/emergência ou durante a internação hospitalar, em retratamento, que relataram uso de álcool e com sorologia positiva para o vírus da imunodeficiência humana. **Conclusão:** Muitos casos foram notificados no setor de urgência e/ou emergência e a interrupção do tratamento foi elevada. Esse cenário reforça a necessidade de enfrentamento amplo da tuberculose, com atenção aos casos diagnosticados na atenção terciária e que se encontram em retratamento.

**Descritores:** Tuberculose. Perfil de saúde. Perda de Seguimento. Atenção Terciária à Saúde. Vigilância em Saúde Pública.

### RESUMEN

**Justificación y Objetivos:** La tuberculosis sigue siendo un desafío significativo para la salud pública. Este estudio tuvo como objetivo describir el perfil sociodemográfico y clínico-epidemiológico de los casos de tuberculosis e identificar los factores asociados a la pérdida de seguimiento entre 2010 y 2022 en un hospital universitario de São Paulo-SP, Brasil. **Métodos:** Se realizó un estudio transversal utilizando datos secundarios de notificaciones obligatorias de tuberculosis provenientes de un servicio de salud terciario en São Paulo. Se aplicaron estadísticas descriptivas y medidas de tendencia central. La regresión de Poisson con varianza robusta se utilizó para calcular las razones de prevalencia de la pérdida de seguimiento. **Resultados:** Durante el período de estudio, se notificaron 2.076 casos, de los cuales el 39% fueron detectados en servicios de urgencias o emergencias, y el 10,6% se clasificaron como pérdida de seguimiento. Una mayor prevalencia de interrupción del tratamiento se asoció con el desempleo, el diagnóstico en urgencias o durante la hospitalización, los casos en retratamiento, el consumo de alcohol y la serología positiva para el virus de la inmunodeficiencia humana.

**Conclusión:** Se notificaron muchos casos en el sector de urgencias y/o emergencias y la interrupción del tratamiento fue elevada. Este escenario refuerza la necesidad de abordar la tuberculosis de manera integral, prestando atención a los casos diagnosticados en la atención terciaria y que se encuentran en retratamiento.

**Palabras Clave:** Tuberculosis. Perfil de Salud. Pérdida de seguimiento. Atención Terciaria de Salud. Vigilancia en Salud Pública.

## INTRODUCTION

Tuberculosis (TB) remains a major global public health problem, despite the availability of treatment and cure; in 2023, more than 10 million people worldwide were affected, resulting in 1.2 million deaths.<sup>1</sup> As it is a socially determined disease, it is more prevalent in developing countries, such as Brazil, which is among the countries with the highest burden of disease and co-infection, TB-Human Immunodeficiency Virus (HIV), in the world.<sup>1</sup>

Given the magnitude of the damage caused by the disease, the 2030 Agenda for Sustainable Development established by the United Nations (UN) aims to eliminate TB by that year. In addition, as a global and national effort, guidelines have been developed by the World Health Organization (WHO), with the End TB Strategy, and by the Ministry of Health, with the National Plan to End Tuberculosis as a Public Health Problem, seeking to reduce the incidence and mortality of cases by 2035.<sup>1,2</sup>

Although there is a commitment to achieve the agreed targets, more than 80,000 new cases were recorded in Brazil in 2023, representing an incidence rate of 37/100,000 inhabitants.<sup>3</sup> The state of São Paulo accounts for the highest absolute number of notifications in the country, covering 24.4% of new cases, and its capital has a higher rate than the national average, with 58.3 cases per 100,000 inhabitants. In addition to this high incidence, approximately 14% of cases in the country are closed due to treatment interruption, with a proportion of 16% for the state of São Paulo, which makes the elimination process more challenging.<sup>3</sup>

Through the Unified Health System (SUS), TB care is organized around Primary Health Care (PHC), which is the priority gateway for diagnosing the disease and monitoring treatment with a basic regimen and/or with fewer adverse effects.<sup>2</sup> However, the identification of TB cases in the hospital network is still a reality in the country.<sup>4,6</sup>

A study that aimed to understand the motivation for seeking diagnosis and treatment in urgent and emergency care units rather than in PHC services close to home revealed issues related to fear of prejudice and stigma, severe clinical manifestations due to delays in seeking care, the perception of rapid resolution at this level of health care, and gaps in PHC in terms of organization and human resources.<sup>4</sup>

A previous population-based study conducted in the state of São Paulo found that TB was diagnosed in emergency departments in 45% of cases.<sup>5</sup> In the state capital, the proportion of cases detected in specialized services was 50.2% in two regions of the municipality.<sup>6</sup> Furthermore, cases diagnosed in medium- or high-complexity settings, via urgent/emergency care or

diagnostic clarification during hospitalization, had worse outcomes for TB.<sup>5</sup>

This scenario reveals weaknesses in the organization of TB control services, highlighting the importance of understanding the epidemiological situation of the disease based on cases reported in secondary and tertiary health care services. Thus, the objective of the study was to describe the sociodemographic and clinical-epidemiological profile of TB cases and identify the characteristics associated with loss to follow-up between 2010 and 2022 in a university hospital in the city of São Paulo, SP, Brazil.

## METHODS

This is a cross-sectional study with a quantitative approach, referring to TB cases reported in a university hospital in the city of São Paulo, SP, Brazil, from 2010 to 2022. The study was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) tool.

The study setting was the Epidemiology Center of a large teaching hospital. This hospital is classified as tertiary and provides outpatient, inpatient, and urgent/emergency care, in addition to working in conjunction with teaching, research, and extension activities at a public higher education institution. The study population consisted of all TB cases reported at that health institution, regardless of age, over a 12-year period (2010 to 2022), excluding duplicate cases.

The data were collected from notification forms and TB-WEB, which is a TB case monitoring system in the state of São Paulo. A semi-structured instrument containing the items that make up the TB Notification/Investigation and Follow-up Form was used for this purpose, with both sociodemographic and TB-related variables.

The variables collected were: gender (female; male), age group ( $\leq 15$ ; 15 to 29; 30 to 59;  $\geq 60$  years), color/race/ethnicity (white; brown; black; yellow or indigenous; unknown or not filled in), years of schooling (no schooling; 1-7; 8-11; 12 or more; unknown or not filled in), marital status (single; married; separated; widowed; not filled in), occupational status (employed/self-employed; unemployed; retired; homemaker; student; unknown or not filled in), year of notification (2010-2022), place of discovery (outpatient demand; urgency/emergency; diagnostic clarification during hospitalization; contact investigation; active search; unknown or not filled in), type of admission (new case; recurrence; retreatment), clinical form (pulmonary; extrapulmonary; pulmonary + extrapulmonary), if extrapulmonary (pleural; peripheral lymph node; meningeal; miliary; multiple organs; bone; other), associated diseases and conditions (Aids; diabetes; mental illness; alcoholism; smoking; drug use;

others), HIV serology (positive; negative; ongoing; not performed; no information; not filled in), antiretroviral therapy (yes; no; not applicable; unknown or not filled in), and outcome/closure (cure; loss to follow-up; death from TB; death from other causes; failure; undergoing treatment or not started; change in diagnosis; transfer or not filled in).

For descriptive analyses, absolute frequencies (n) and relative frequencies (%) of qualitative and quantitative variables were reported; and mean, standard deviation (SD), minimum, maximum, and 95% confidence interval (95% CI) for quantitative variables. In addition, a line graph was created showing notifications over time.

For the association, loss to follow-up was defined as the dependent variable and occupational status, place of discovery, type of entry, clinical form, associated diseases and conditions, HIV serology, and antiretroviral therapy were defined as predictor variables; while the covariates were gender, color/race/ethnicity, age group, and years of schooling. In addition, for this analysis, the groups “no information” and “ignored or not filled in” were removed, and the following variables were regrouped: outcome (cure; loss to follow-up); occupational status (employed/self-employed; unemployed; retired; other) and place of discovery (outpatient demand; urgency/emergency; diagnostic clarification in interaction; other).

To verify the Prevalence Ratio (PR) between the outcomes “loss to follow-up” and “cure,” a Poisson regression with robust variance was performed, reporting the PR, its respective 95% CI, and p-value,

adopting 5% ( $p \leq 0.05$ ) as the minimum level of statistical significance. In addition, the assumption of collinearity was verified by the variance inflation factor (VIF) and pseudo- $R^2$  as an indicator of model quality.

Initially, a bivariate analysis was performed, followed by the selection of variables for multivariate analysis using backward stepwise regression, i.e., variables with a p-value  $< 0.20$  in the first analysis for the likelihood ratio test were included in the second analysis. subsequently, the variables were removed one by one until those with a p-value  $< 0.05$  remained in the final model.

The data were analyzed using Jamovi version 2.3.28 (Sydney, NSW, Australia) and RStudio version 4.1.3 (Boston, MA, USA).

In accordance with the recommendations of Resolutions No. 466/12, 510/16, and 580/18 of the National Health Council of the Ministry of Health, the study was approved by the Research Ethics Committee of the Federal University of São Paulo under opinion No. 6,183,627 and Certificate of Ethical Review No. 41064920.4.0000.5505, on July 14, 2023.

## RESULTS

During the 12-year period (2010 to 2022), after excluding 29 duplicate cases, 2,076 cases of TB were reported by the Epidemiology Center of the university hospital, with an average of 159.6 cases ( $SD \pm 26.8$ ), with a minimum of 107 and a maximum of 200 notifications in 2022 and 2019, respectively (Figure 1).



**Figure 1.** Distribution of tuberculosis case notifications by year (2010–2022).

Regarding the sociodemographic characteristics of the cases, most were male (63.4%), aged between 30 and 59 years (54.7%) and with a mean age of 41.3 years ( $SD \pm 17.41$ ), ranging from a minimum of 0 to a maximum of 92 years (Table 1). The majority were black (51.5%), single (53.8%), employed or self-employed (40.3%), and had eight to 14 years of schooling (40.6%), followed by one to seven years (35.6%).

**Table 1.** Distribution of sociodemographic and clinical-epidemiological characteristics of tuberculosis cases reported at a university hospital in the city of São Paulo, Brazil, between 2010 and 2022.

Sociodemographic characteristics	N (%)
<b>Gender</b>	
Women	759 (36.6)
Men	1317 (63.4)
<b>Age group (years)</b>	
< 15	88 (4.2)
15 to 29	501 (24.1)
30 to 59	1136 (54.7)
≥ 60	351 (16.9)
<b>Race/color/ethnicity</b>	
White	911 (43.9)
Black	282 (13.6)
Brown	786 (37.9)
Yellow/Indigenous	66 (3.2)
Ignored or not filled in	31 (1.4)
<b>Years of study</b>	
No education	69 (3.3)
1 to 7	739 (35.6)
8 to 11	695 (33.5)
12 or more	229 (11.0)
Ignored or not filled in	344 (16.6)
<b>Marital status</b>	
Single	1117 (53.8)
Married	501 (24.1)
Separated	133 (6.4)
Widowed	92 (4.4)
No entry	233 (11.2)
<b>Employment status</b>	
Employed/self-employed	836 (40.3)
Unemployed	232 (11.2)
Retired	238 (11.5)
Housewife	195 (9.4)
Student	131 (6.3)
Ignored or not filled in	444 (21.4)
<b>Clinical and epidemiological characteristics</b>	N (%)
<b>Place of discovery</b>	
Outpatient demand	640 (30.8)
Urgency/Emergency	809 (39.0)
Diagnostic clarification during hospitalization	520 (25.0)
Contact tracing	7 (0.3)
Active search	11 (0.5)
Ignored or not filled out	89 (4.3)
<b>Input type</b>	
New case	1797 (86.6)
Recurrence	170 (8.2)
Retreatment	106 (5.1)
No information	3 (0.1)
<b>Clinical form</b>	
Pulmonary	1150 (55.4)
Extrapulmonary	647 (31.2)
Pulmonary + Extrapulmonary	279 (13.4)
<b>Extrapulmonary</b>	
Pleural	244 (26.2)
Peripheral lymph nodes	145 (15.6)
Meningeal	108 (11.6)
Miliary	80 (8.6)
Multiple organs	80 (8.6)
Bone	50 (5.4)
Other	224 (24.0)
<b>Associated diseases and conditions present</b>	
Aids	387 (18.6)
Diabetes	153 (7.4)
Mental illness	40 (1.9)
Alcoholism	235 (11.3)
Smoking	236 (11.4)
Drug use	160 (7.7)
Other	669 (32.2)
<b>Serology</b>	
Positive	401 (19.4)
Negative	1237 (59.6)
In progress	3 (0.1)
Not completed	389 (18.7)
No information	39 (1.9)
Not filled out	7 (0.3)

Antiretroviral therapy	
Yes	88 (4.2)
No	21 (1.0)
Not applicable	1623 (78.2)
Ignored or not filled in	344 (16.6)
Outcome/Closure	
Cure	1221 (58.8)
Loss to follow-up	221 (10.6)
Death from tuberculosis	128 (6.2)
Death from other causes	197 (9.5)
Bankruptcy	39 (1.9)
Undergoing treatment or treatment not started	35 (1.7)
Change in diagnosis	155 (7.5)
Transfer or no information provided	80 (3.9)

Regarding TB characteristics, most cases were detected in the emergency room (39%), followed by outpatient care (30.8%), with new cases (86.6%), pulmonary clinical form (55.4%), and cure outcome (58.8%). Regarding associated diseases and conditions, the prevalence of Aids between the years was 18.6%, smoking and alcoholism was about 11.3%, drug addiction and diabetes was 7.5%, mental illness was 1.9%, and others was 32.3%, which includes immunosuppression and sexually transmitted infections, as well as cardiovascular, renal, neurological, and pulmonary diseases, cancers, and others.

Most HIV serology tests were negative (59.6%), followed by positive (19.4%) and not performed (18.7%). Regarding antiretroviral therapy (ART), when separating cases that did not apply, only 19.4% of individuals were receiving ART, and for 75.9% of cases, this information was unknown or not filled in.

Among the associations with sociodemographic and clinical-epidemiological characteristics and loss to follow-up in the univariate model (Table 2), statistical significance was observed for occupational status (<0.001), place of discovery (<0.001), type of admission (<0.001), Aids (<0.001), mental illness (0.004), alcoholism (<0.001), smoking (0.042), drug use (<0.001), HIV serology (<0.001), and antiretroviral therapy (0.018).

In the adjusted multivariate model (Table 2), only the following variables remained significant: occupational status (0.024), place of discovery (0.004), type of admission (<0.001), alcoholism (0.033), and HIV serology (<0.001).

**Table 2.** Association between sociodemographic and clinical-epidemiological characteristics and loss to follow-up in tuberculosis treatment, using bivariate and multivariate models. São Paulo-SP, Brazil, 2010-2022.

Characteristics	Loss of follow-up			
	PR (IC95)	p-value	aPR (95%CI)*	p-value
<b>Employment status</b>		< 0.001		0.024
Employee/self-employed	0.38 (0.28-0.53)		0.64 (0.44-0.93)	
Unemployed	reference		reference	
Retired	0.14 (0.05-0.28)		0.49 (0.19-1.08)	
Other	0.48 (0.32-0.71)		1.08 (0.65-1.79)	
<b>Place of discovery</b>		< 0.001		0.004
Outpatient demand	reference		reference	
Urgent/Emergency care	2.16 (1.57-3.03)		1.80 (1.20-2.76)	
Diagnostic clarification during hospitalization	2.44 (1.72-3.49)		2.06 (1.35-3.2)	
Other	2.51 (0.69-6.42)		2.66 (0.72-7.17)	
<b>Admit</b>		< 0.001		< 0.001
New case	reference		reference	
Recurrence	1.8 (1.19-2.63)		1.19 (0.70-1.9)	
Retreatment	4.74 (3.40-6.46)		2.59 (1.71-3.85)	
<b>Clinical form</b>		0.074		
Pulmonary	reference		-	
Extrapulmonary	0.74 (0.55-0.99)		-	
Pulmonary + Extrapulmonary	1.09 (0.77-1.52)		-	
<b>Aids</b>		< 0.001		
Yes	3.15 (2.45-4.04)		-	
No	reference		-	
<b>Diabetes</b>		0.087		
Yes	0.6 (0.3-1.06)		-	
No	reference		-	
<b>Mental illness</b>		0.004		
Yes	2.68 (1.41-4.59)		-	
No	reference		-	
<b>Alcoholism</b>		< 0.001		0.033
Yes	2.19 (1.62-2.91)		1.54 (1.03-2.26)	
No	reference		reference	
<b>Smoking</b>		0.042		
Yes	1.44 (1.01-2)		-	
No	reference		-	
<b>Drug use</b>		< 0.001		
Yes	2.97 (2.19-3.96)		-	
No	reference		-	
<b>HIV serology</b>		< 0.001		< 0.001
Positive	reference		reference	
Negative	0.31 (0.24-0.4)		0.4 (0.29-0.56)	
Not achieved	0.22 (0.14-0.33)		0.51 (0.3-0.85)	
<b>Antiretroviral therapy</b>		0.018		
Yes	reference		-	
No	2.45 (1.17-4.93)		-	

**Abbreviations:** \*Robust Poisson regression model adjusted for gender, age group, race/color/ethnicity, and years of schooling; regarding model adjustment, it presented a VIF between 1.1 and 1.02, which corresponds to non-collinearity, and a pseudo- $R^2$  0.201, that is, it has the capacity to explain 20.1% of the variation in the dependent variable data.

Employment status was a sociodemographic characteristic associated with the outcome, with a lower prevalence of loss to follow-up among employed or self-employed individuals ( $OR = 0.64$ ; 95% CI = 0.44-0.93) compared to those who were unemployed. This aspect was also observed for HIV serology, which had a lower prevalence of the outcome in cases with negative results ( $aRP = 0.4$ ; 95% CI = 0.29-0.56) as opposed to positive tests.

The highest prevalences of loss to follow-up were associated with clinical-epidemiological aspects. For the place of discovery, both urgent/emergency care and diagnostic clarification during hospitalization were associated with discontinuation of treatment, with 1.8 times (95% CI = 1.20-2.76) higher prevalence in urgent/emergency care and 2 times (95% CI = 1.35-3.20) more prevalent in diagnostic clarification when compared to outpatient demand.

For the type of admission, retreatment after loss to follow-up showed a 2.5-fold (95% CI = 1.71-3.85) higher prevalence of a new treatment interruption when

compared to admission classified as a new case. Among the diseases and conditions present, only alcoholism showed an association, with a prevalence 1.54 times (95% CI = 1.03-2.26) higher in the loss to follow-up outcome.

## DISCUSSION

Analysis of the epidemiological situation of TB based on cases identified in a large university hospital over a 12-year period showed that detection of the disease in this service corresponds to approximately 2% of the municipality's reported cases.

TB notifications over the years showed a similar trend to that observed in the municipality of São Paulo, except for the Covid-19 pandemic period, which went from a reduction in 2020 to a gradual increase in 2022, contrasting with the decrease in cases detected in the hospital over these three years. These changes may be linked to the respiratory symptoms present in both

diseases and the reorganization of services to contain Covid-19.<sup>7-9</sup>

It should be noted that public calamities are circumstances that intensify social inequalities, as experienced in the Covid-19 pandemic and its implications for TB control in the health sector.<sup>8</sup> From this perspective, with regard to the goals agreed upon by the UN, the pandemic has led to significant setbacks, given the increase in deaths after two decades of decline, posing new challenges for containing the burden of the disease.<sup>10</sup>

The sociodemographic characteristics present in most cases are similar to those found in Brazil and in the municipality of São Paulo, with a predominance of males, black people, of working age, and with low levels of education.<sup>3,7</sup> Another aspect observed is that almost half of the individuals had an occupation, either as an employee or self-employed, and this was a protective factor against loss to follow-up. In fact, the occupational profile found corroborates the findings in a TB reference center, characterizing these individuals as having occupations that require a lower degree of specialization and remuneration.<sup>11</sup>

The sociodemographic profile found in this study, as well as that reported in the literature, reinforces that vulnerability to TB has a social character, being inherent to living and working conditions, given that social groups in less favorable socioeconomic conditions account for the highest proportion of cases of the disease.<sup>12-16</sup>

Regarding the organization of TB control services, the place of discovery is a strategic aspect to be analyzed in order to understand access to the health care network and the actions promoted for disease detection. The study found that 64% of diagnoses were made in the emergency room/emergency department and during hospitalization, with these factors being associated with higher prevalence of loss to follow-up.

In the state of São Paulo, one in four people were diagnosed with TB in emergency departments between 2010 and 2013, with these cases presenting a higher risk of death, discontinuity, and treatment failure compared to those detected in PHC/outpatient clinics.<sup>6</sup> In fact, there is less resolution when seeking initial care in PHC, with a longer time elapsed for TB diagnosis, which motivates patients to seek more complex services based on the perception of rapid resolution of the problem.<sup>5,17,18</sup>

These circumstances indicate the need to strengthen PHC in its role in the healthcare network in order to enhance its capacity for resolution in the face of diseases that require hospitalization, such as TB, considering the cultural motivators of the therapeutic pathway.<sup>5,17,18</sup> To this end, it is imperative to involve other government segments and civil society in the

process of addressing and controlling the disease, which is marked by social and health inequalities.<sup>5,15</sup>

One challenge in reducing the chain of disease transmission is cases involving re-treatment after loss to follow-up, as they present a higher chance of recurrence of this unfavorable outcome.<sup>19</sup> Corroborating the findings of the cases under study, which show that retreatment has a 150% higher prevalence of new interruption, a national study that aimed to analyze the factors associated with TB treatment interruption also identified a higher prevalence of these patients repeating the treatment outcome due to discontinuity.<sup>13</sup> Since loss to follow-up is an obstacle to be overcome, special attention is required for the group that includes individuals undergoing retreatment, both in the design and implementation of TB control actions, seeking to provide opportunities for engagement, bonding, and adherence to treatment.<sup>19</sup>

Diseases and associated conditions are established factors influencing loss to follow-up in TB treatment.<sup>12,14,16</sup> In the notifications analyzed, the most common were TB-HIV coinfection and tobacco and alcohol use. However, alcoholism was the only condition that showed a significant association, with a 54% higher prevalence for loss to follow-up. Alcohol use in individuals with TB impairs immunity and increases the possibility of liver damage and, consequently, adverse events. From this perspective, the relationship between substance use and TB infection is harmful, making treatment adherence more difficult and, consequently, increasing treatment interruption and mortality.<sup>12,14,20,21</sup>

Brazilian municipalities face operational difficulties in controlling TB, such as low HIV testing rates.<sup>22</sup> Regarding this test, almost 20% of notifications were HIV-positive, which is a factor of higher prevalence for loss to follow-up; a condition also observed for unfavorable outcomes in a tertiary service in the municipality of Rio de Janeiro.<sup>23</sup> Given the complexity involved in TB-HIV coinfection, ranging from health issues with dual therapy management, leading to adverse events, to social aspects of stigma, this group is more vulnerable to death and loss to follow-up.<sup>24,25</sup>

Therefore, it is worth highlighting the need to strengthen TB control actions, investing in PHC through human and material resources, training that promotes early diagnosis and adherence to treatment, together with social incentives and awareness about TB, considering sociocultural aspects related to stigma and motivation for choosing the service, in addition to addressing social inequalities.

The topic studied and the results found are relevant to the journey towards TB eradication in the municipality of São Paulo, although the limitations present in this investigation are related to the use of secondary data, conditioned by the quality and completeness of the

notification forms, and having a single health service as the investigation setting, exposing the local reality and, thus, restricting its generalization.

The study made it possible to determine the prevalence of TB cases reported in a university hospital between 2010 and 2022, in terms of their sociodemographic and clinical-epidemiological profile, as well as the factors associated with loss to follow-up, reaffirming a process of illness marked by social determination.

Unemployment, discovery in emergency services/emergency rooms and hospitalization, retreatment, alcohol use, and testing positive for HIV were factors identified with an increased prevalence of loss to follow-up for treatment to be prioritized in the involvement of actions.

Consequently, tackling TB requires a comprehensive approach, through political commitment from public entities and engagement from civil society, in order to transform living conditions and achieve the elimination of the disease.

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## AUTHORS' CONTRIBUTIONS

**Stephanie Ribeiro** contributed to project management, bibliographic research, writing the abstract, introduction, methodology, discussion, interpretation and description of results, preparation of tables, conclusions, review, and statistics. **Claudia Susana Pérez Guerrero** contributed to project management, bibliographic research, methodology, interpretation of results, conclusions, and review. **Suely Miyuki Yashiro** contributed to project management, bibliographic research, methodology, interpretation of results, conclusions, and revision. **Nivia Aparecida Pissaia Sanches** contributed to project management, bibliographic research, methodology, interpretation of results, conclusions, and revision. **Marina Doreto Castilho** contributed to project management, bibliographic research, methodology, interpretation of results, conclusions, and revision. **Hugo Fernandes** contributed to project management, bibliographic research, methodology, interpretation of results, conclusions, and revision. **Giselle Lima de Freitas** contributed to project management, bibliographic research, methodology, interpretation of results, conclusions, and revision. **Meiry Fernanda Pinto Okuno** contributed to project management, literature review, methodology, interpretation of results, conclusions, and revision. **Paula Hino** contributed to project management, literature review, writing of the abstract, introduction, methodology, discussion, interpretation of results, conclusions, and revision.

All authors approved the final version to be published and are responsible for all aspects of the work, including ensuring its accuracy and integrity.

**Please cite this article as:** Ribeiro S, Guerrero CSP, Yashiro SM, Sanches NAP, Castilho MD, Fernandes H, de Freitas GL, Okuno MFP, Hino P. Prevalence of tuberculosis notifications at a university hospital between 2010 and 2022. Rev Epidemiol Control Infect [Internet]. 2025 Oct. 8;15(3). Available from: <https://seer.unisc.br/index.php/epidemiologia/article/view/20110>