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Sociodemographic and Clinical Characteristics, Actions Provided, and Outcomes of Tuberculosis Cases in a Reference Center in Southern Brazil

Características sociodemográficas, clínicas, ações ofertadas e o desfecho dos casos de tuberculose em um centro de referência da região Sul do Brasil

Características sociodemográficas, clínicas, acciones ofertadas y de evolución de los casos de tuberculosis en un centro de referencia de la región sur del Brasil

ABSTRACT

Objective: To evaluate the outcomes of tuberculosis cases and the health actions implemented by the regional reference center in Pelotas, Rio Grande do Sul, during the COVID-19 pandemic. **Method:** A descriptive and exploratory study was conducted using medical records of individuals whose tuberculosis treatment concluded between June 2020 and March 2021. Case outcomes were categorized as favorable (cure) or unfavorable (treatment interruption or death) Frequency distributions were analyzed, and associations were tested using Chi-square and Fisher's exact tests. **Results:** The study included 134 individuals. of whom Among them, 74.6% achieved a cure, 19.4% interrupted treatment, and 6% died. A statistically significant association was found between performing chest X-rays in the second month of treatment and the treatment outcome groups ($p < 0.023$). **Final remarks:** A notably high proportion of unfavorable outcomes was identified. Ensuring access to health care and the quality of follow-up care for individuals with tuberculosis is essential for successful treatment.
Keywords: Tuberculosis; Treatment outcome; Social determinants of health; Treatment adherence and compliance; COVID-19.

RESUMO

Objetivo: Analisar o desfecho dos casos de tuberculose e as ações ofertadas pelo serviço de referência regional do município de Pelotas-RS, durante a pandemia de covid-19. **Método:** Estudo descritivo e exploratório, com prontuários de pessoas cujo tratamento para tuberculose se encerrou entre junho de 2020 e março de 2021. A situação de encerramento dos casos foi categorizada em desfecho favorável (cura) e desfavorável (interrupção do tratamento e óbito). Analisou-se a distribuição de frequências e aplicaram-se os testes Qui-quadrado e exato de Fisher. **Resultados:** Foram incluídas 134 pessoas, das quais 74,6% tiveram alta por cura; 19,4%, interrupção do tratamento e 6%, óbito. Observou-se associação estatisticamente significante entre a ação de realização de radiografia de tórax no segundo mês entre os grupos de desfecho do tratamento ($p<0,023$). **Considerações finais:** Identificou-se alta proporção de desfechos desfavoráveis. Acesso e qualidade no acompanhamento da pessoa com tuberculose são cruciais para favorecer o sucesso do tratamento.
Descritores: Tuberculose; Resultado do tratamento; Determinantes sociais da saúde; Cooperação e adesão ao tratamento; Covid-19.

RESUMEN

Objetivo: Analizar el desenlace de los casos de tuberculosis y las acciones ofrecidas por el servicio de referencia regional en el municipio de Pelotas-RS durante la pandemia de Covid-19. **Método:** Estudio descriptivo y exploratorio utilizando historias clínicas de personas cuyo tratamiento para la tuberculosis finalizó entre junio de 2020 y marzo de 2021. La situación de cierre de los casos se categorizó en desenlace favorable (cura) y desfavorable (interrupción del tratamiento y fallecimiento). Se analizó la distribución de frecuencias y se aplicaron las pruebas de Chi-cuadrado y exacta de Fisher. **Resultados:** Se incluyeron 134 personas. De ellas, el 74,6% logró la cura, el 19,4% experimentó la interrupción del tratamiento y el 6% falleció. Se observó una asociación estadísticamente significativa entre la realización de radiografías de tórax en el segundo mes y los grupos de desenlace del tratamiento ($p<0,023$). **Consideraciones finales:** Se identificó una alta proporción de desenlaces desfavorables. El acceso y la calidad en el seguimiento de las personas con tuberculosis son cruciales para favorecer el éxito del tratamiento.
Descriptores: Tuberculosis; Resultado del tratamiento; Determinantes sociales de la salud; Cumplimiento y adherencia al tratamiento; Covid-19.

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INTRODUCTION

The World Health Organization (WHO) estimates that, in 2019, 10 million people worldwide fell ill with tuberculosis (TB), and 1.2 million died from the disease [1]. In Brazil, an average of 69,000 new TB cases and 4,500 TB-related deaths are recorded annually[2]. To eliminate this disease, recognized as a public health issue, Brazil launched the strategy "Todos pelo Fim da Tuberculose" (All for the End of Tuberculosis) in 2017. This initiative aims to strengthen prevention, diagnosis, and treatment measures to reduce the number of cases and deaths caused by the disease[3].

Despite progress in controlling TB, the challenges posed to health care systems during the COVID-19 pandemic have worsened the TB epidemiological situation, particularly in developing countries [1,2,4,5]. Evidence highlights the influence of social determinants on TB morbidity and mortality, as well as on outcomes related to COVID-19.

In Brazil, studies conducted before the pandemic revealed that treatment interruptions and TB-related mortality were influenced by social determinants and various types of vulnerability (individual, social, and programmatic). The most affected groups include non-White individuals, those with multimorbidities, lower income levels (especially informal workers), and residents of regions with lower socioeconomic development, such as favelas. These areas reported higher mortality rates for both COVID-19 and TB[6-11]. However, no studies have been identified that examine whether the profile of TB-related deaths changed during the COVID-19 pandemic.

Studies have shown that populations experiencing different types of vulnerabilities are more severely affected by COVID-19[7,8], which also holds true for TB. Understanding the role of sociodemographic and clinical characteristics in TB treatment is essential to ensuring access to health care services. This requires considering the socioeconomic realities of the population and the challenges imposed by the pandemic to reduce the risks of unfavorable treatment outcomes.

Monitoring TB cases through clinical evaluation during the pandemic is particularly relevant from an epidemiological perspective. This is due to restrictions on movement imposed by health authorities to combat COVID-19 and the housing and sanitation conditions typically found in TB-endemic areas[4,6-8].

Given the potential worsening caused by the emergency scenario, the reduction in actions aimed at pharmacological follow-up and monitoring of individuals undergoing TB treatment during the pandemic, and the increased social vulnerability of the Brazilian population, it is essential to implement policies that ensure systematic and continuous follow-up of treatment for diagnosed individuals, with the goal of achieving a cure for the disease. Thus, investments in strategies to maintain and resume health actions are essential, considering that treatment efforts for this disease were neglected during the COVID-19 pandemic.

In this context, this study aimed to analyze the outcomes of tuberculosis cases and the actions provided by the regional reference service in the city of Pe-

lotas, RS, during the COVID-19 pandemic, based on the sociodemographic, economic, and clinical characteristics of the individuals affected by the disease.

METHOD

This was a descriptive and exploratory study with a quantitative approach, conducted at the TB reference center in Pelotas, RS, a city with an estimated population of 343,132 inhabitants[12]. The studied setting is a significant regional health hub, providing care to over half a million people through its public health care network.

The reference center is the primary service responsible for treating individuals with TB in the city and serves as a referral point for 20 neighboring municipalities. The center's actions also include evaluating household contacts and diagnosing individuals presenting with TB symptoms. The health care team at the reference center consists of two pulmonology specialists, two nurses, and two nursing technicians.

The study data were obtained from physical medical records of all people with TB who were treated at the regional reference center and whose treatment was recorded as completed between June 2020 and March 2021, when data collection was concluded. This timeframe was chosen to ensure the inclusion of participants who had been under care for at least three months since the onset of the COVID-19 pandemic in Brazil (March 2020).

The variable case closure status was categorized into favorable outcomes (cure) and unfavorable outcomes (treatment interruption and death) for TB treatment. Variables related to the characteristics of individuals under treatment were grouped as follows below.

- Sociodemographic: Gender, age group, occupation, education level, race, special populations (e.g., health care professionals and individuals experiencing homelessness), and beneficiaries of government income transfer programs.
- Clinical: Type of admission, clinical form of TB, presence of multimorbidities (e.g., HIV, alcoholism, diabetes, mental illness, illicit drug use, and smoking), and treatment specifics, including the treatment regimen and directly observed therapy.

Variables regarding health actions received during TB treatment included: Testing for HIV, syphilis, and hepatitis B and C in the first month of treatment; Sputum culture, blood glucose testing, and liver and kidney function assessments in the first month of treatment; Chest X-rays in the second and sixth months of treatment; Number of sputum smears for monitoring; Number of medical consultations; Number of nursing consultations; Number of times anti-TB medications were dispensed. The study variables were nominal or ordinal categorical variables, except for the last four, which were discrete quantitative variables.

Data analysis was performed using Statistica software version 10. Initially, relative and absolute frequency distributions were calculated for qualitative variables, and measures of central tenden-

cy (mean and median) were obtained. To identify potential associations between treatment outcomes and qualitative variables of interest, the Chi-square test or Fisher's exact test (when the Chi-square test was not applicable) was used. For quantitative variables, the Mann-Whitney test was applied. A significance level of 5% was adopted for all analyses.

This study was approved by the Ethics Committee of the School of Nursing at the Federal University of Pelotas on March 4, 2021 (approval no. 4.573.360). It complied with the ethical principles for research involving human subjects established in Resolution No. 466/2012 of the National Health Council[13].

RESULTADOS

The study included 134 individuals whose TB treatment was concluded at the regional reference center in Pelotas. Of these, 74.6% were discharged due to cure, 19.4% interrupted treatment, and 6% had death as the case closure status, resulting in a total of 25.4% unfavorable outcomes. No variable related to the sociodemographic characteristics of participants showed a statistically significant association with favorable or unfavorable case outcomes (Table 1).

Table 1 – Outcomes of tuberculosis cases treated at the regional reference service in the municipality of Pelotas, according to sociodemographic characteristics (2021).

Variable	Favorable Outcome	Unfavorable Outcome	p-value
	n(%)	n(%)	
Gender* (n= 134)			
Female	30 (30%)	13 (38.2%)	0.374
Male	70 (70%)	21 (61.8%)	
Age group* (n=134)			
9 - 24 years old	20 (20%)	11 (32.4%)	0.271
30-39 years old	24 (24%)	10 (29.4%)	
40-59 years old	40 (40%)	8 (23.5%)	
60+ years old	16 (16%)	5 (14.7%)	
Occupation ** (n=115) #			
Retired	14 (16.1%)	6 (21.4%)	0.065
Freelancer	21 (24.1%)	4 (14.3%)	
House chores	2 (2.3%)	2 (7.1%)	
Employee	26 (29.9%)	13 (46.4%)	
Student	1 (1.1%)	1 (3.6%)	
Unemployed	23 (26.4%)	2 (7.1%)	

Schooling ** (n=131)#			
Illiterate	3 (3.1%)	1 (3%)	
Incomplete Elementary School	69 (70.4%)	21 (63.6%)	
Complete Elementary School	1 (1%)	2 (6.1%)	
Incomplete High School	4 (4.1%)	1 (3%)	0.613
Complete High School	14 (14.3%)	4 (12.1%)	
Incomplete Higher Education	3 (3.1%)	2 (6.1%)	
Complete Higher Education	4 (4.1%)	2 (6.1%)	
Race **(n=134)			
White	61 (61%)	23 (67.6%)	
Brown	3 (3%)	-	0.667
Black	36 (36%)	11 (32.4%)	
Belonging to special TB population* (n = 134)			
Yes	8 (8%)	2 (5.9%)	0.997
No	92 (92%)	32 (94.1%)	
Beneficiary of government income transfer program (n = 134)**			
Yes	7 (7%)	0 (0%)	0.191
No	93 (93%)	34 (100%)	

*Chi-square test
** Fisher's exact test.
# Due to losses caused by the absence of this information in the medical records.
Source: Prepared by the researchers based on research data (2023).

It was observed that none of the clinical or TB treatment variables were associated with treatment outcomes (Table 2).

Table 2 – Outcomes of tuberculosis cases treated at the regional reference service in the municipality of Pelotas, according to clinical characteristics (2021)

Variable	Favorable Outcome	Unfavorable Outcome	Total	p-value
	n(%)	n(%)	n(%)	
Clinical form of TB**				
Pulmonary	74 (74%)	26 (76.5%)	100 (74.6%)	
Extrapulmonary	24 (24%)	8 (23.5%)	32 (23.9%)	0.998
Pulmonary + extrapulmonary	2 (2%)	-	2 (1.5%)	
Type of admission into outpatient care**				
New case	51 (51%)	18 (52.9%)	69 (51.5%)	
Recurrence	15 (15%)	5 (14.7%)	20 (14.9%)	0.635
Re-admission after treatment interruption	2 (2%)	2 (5.9%)	4 (3%)	
Transfer	32 (32%)	9 (26.5%)	41 (30.6%)	
Multimorbidity*				
Yes	74 (74%)	20 (58.8%)	94 (70.1%)	0.095
No	26 (26%)	14 (41.2%)	40 (29.9%)	

HIV**				
Yes	18 (18%)	2 (5.9%)	20 (14.9%)	0.101
No	82 (82%)	32 (94.1%)	114 (85.1%)	
Alcoholism*				
Yes	26 (26%)	5 (14.7%)	31 (23.1%)	0.177
No	74 (74%)	29 (85.3%)	103 (76.9%)	
Diabetes**				
Yes	12 (12%)	4 (11.8%)	16 (11.9%)	1.000
No	88 (88%)	30 (88.2%)	118 (88.1%)	
Mental illness**				
Yes	6 (6%)	1 (2.9%)	7 (5.2%)	0.678
No	94 (94%)	33 (97.1%)	127 (94.8%)	
Use of illicit drugs*				
Yes	20 (20%)	7 (20.6%)	27 (20.1%)	0.941
No	80 (80%)	27 (79.4%)	107 (79.9%)	
Smoking*				
Yes	49 (49%)	13 (38.2%)	62 (46.3%)	0.277
No	51 (51%)	21 (61.8%)	72 (53.7%)	
Pharmacological treatment regimen**				
Basic	88 (88%)	33 (97.1%)	121 (90.3%)	0.183
Date	12 (12%)	1 (2.9%)	13 (9.7%)	
Directly observed treatment**				
Yes	3 (3%)	2 (5.9%)	5 (3.7%)	0.601
No	97 (97%)	32 (94.1%)	129 (96.3%)	

*Chi-square test.
** Fisher's exact test.
Source: Prepared by the researchers based on research data (2023).

Laboratory tests for blood glucose and liver function in the first month of TB treatment were performed by only one study participant, and no individuals underwent renal function tests. For this reason, proportions of outcomes for these variables were not calculated.

A statistically significant association was observed between the action of performing chest X-rays in the second month and treatment outcome groups ($p<0.023$). People with unfavorable treatment outcomes had a higher proportion of chest X-rays performed in the second month compared to those with favorable treatment outcomes (Table 3).

Table 3 – Outcomes of tuberculosis cases treated at the regional reference service in the municipality of Pelotas, according to actions provided during treatment (2021).

	Favorable Outcome	Unfavorable Outcome	Total	p-value
Variable	n(%)	n(%)	n(%)	
HIV testing*				
Yes	89 (89%)	28 (82.4%)	117 (87.3%)	0.314
No	11 (11%)	6 (17.6%)	17 (12.7%)	
Syphilis testing*				
Yes	77 (77%)	24 (70.6%)	101 (75.4%)	0.453
No	23 (23%)	10 (29.4%)	33 (24.6%)	
Hepatitis B testing*				
Yes	80 (80%)	26 (76.5%)	106 (79.1%)	0.662
No	20 (20%)	8 (23.5%)	28 (20.9%)	
Hepatitis C testing*				
Yes	79 (79%)	26 (76.5%)	105 (78.4%)	0.757
No	21 (21%)	8 (23.5%)	29 (21.6%)	
Chest X-ray in the 2nd month**				
Yes	76 (76%)	32 (94.1%)	108 (80.6%)	0.023
No	24 (24%)	2 (5.9%)	26 (19.4%)	
Chest X-ray in the 6th month*				
Yes	46 (46%)	19 (55.9%)	65 (48.5%)	0.319
No	54 (54%)	15 (44.1%)	69 (51.5%)	
Sputum culture*#				
Yes	38 (49.4%)	12 (48%)	50 (49%)	0.907
No	39 (50.6%)	13 (52%)	52 (51%)	

*Chi-square test.
** Fisher's exact test.
n = 102, as this action was not applicable to cases of extrapulmonary TB.
Source: Prepared by the researchers based on research data (2023).

No differences were observed in the average frequencies of sputum smears for monitoring, anti-TB medication dispensing, medical consultations, or nursing consultations conducted during TB treatment between the groups with favorable and unfavorable treatment outcomes (Table 4).

Table 4 – Comparison of the averages of sputum smears for monitoring, dispensing of anti-tuberculosis medications, and medical and nursing consultations performed in Pelotas during tuberculosis treatment, by type of outcome (2021).

Variable	Favorable				Unfavorable				
	Mean	Median	Min.	Max.	Mean	Median	Min.	Max.	p-value
Sputum smears for monitoring*#	0.9	-	-	7	0.7	-	-	3	0.675
Dispensing of anti-TB medications*	5.9	6	1	12	5.6	6	2	11	0.797
Medical consultations*	5.4	5	2	13	5.2	5	1	10	0.803
Nursing consultations*	2.3	1	0	9	2.7	2.5	0	6	0.239

*Mann-Whitney's Test.
n = 102, as this action was not applicable to cases of extrapulmonary tuberculosis EPTB.
Source: Prepared by the researchers based on research data (2023).

DISCUSSION

The study revealed a *high proportion of unfavorable treatment outcomes at the regional reference center*, with 74.6% of individuals discharged as cured, 19.4% interrupting treatment, and 6% having death recorded as their case closure status. However, the sociodemographic and clinical characteristics, as well as the health actions received by individuals undergoing TB treatment during the study period, were not associated with treatment outcomes. This contrasts with findings from studies conducted before the pandemic, which indicated an association with male gender[14-16].

Thus, is hypothesized that the pandemic may have contributed to changes in the epidemiological landscape and TB case outcomes, likely due to the overlap of COVID-19 infections and the necessity to reorganize health care services. In this context, understanding the role of sociodemographic and clinical characteristics in TB treatment is critical for identifying vulnerabilities and ensuring equitable access to health care services, tailored to the social realities of each individual. Populations with social vulnerabilities were disproportionately affected, as poverty and limited access to health care were significantly exacerbated by the pandemic[8].

Although multimorbidity was not associated with TB treatment outcomes in this study, it was found to have a high prevalence in Pelotas. A study based on data from the Rio Grande do Sul Disease Notification System reported multimorbidity in 37% of new TB cases recorded between 2013 and 2017. Among these individuals, the risk of treatment interruption and death increased proportionally with the number of reported comorbidities [10], as multimorbidity directly impacts the lives of people with TB[17].

Interestingly, among the comorbidities analyzed, HIV infection, the use of legal and illegal drugs, and the treatment regimen were not associated with unfavorable treatment outcomes. This finding is unexpected, as previous studies have

identified these factors as risks for more severe forms of TB and drug resistance. Such complications challenge disease control efforts, leading to higher rates of treatment interruption and death among these groups[18-21]. Moreover, regarding HIV, all studied cases should have been tested to verify the presence of the infection. This finding underscores the need for ongoing professional education on the importance of HIV testing, along with ensuring the availability of adequate material and human resources to perform the test and provide high-quality follow-up within the health care network. HIV is a critical health condition that significantly increases an individual's susceptibility to infections and complications related to TB[21].

Another critical aspect of the clinical evaluation for individuals affected by tuberculosis is the performance of follow--up exams, including sputum smears for monitoring, sputum cultures, and chest X-rays conducted during the second month and at the conclusion of pharmacological treatment. This study found that the average number of sputum smears conducted was lower among individuals with both favorable and unfavorable treatment outcomes compared to the averages for other follow-up actions. It is presumed that many participants did not undergo sputum smear testing during their treatment, or that this action was not adequately documented by the health care team.

Bacteriological monitoring of smear-positive cases is a crucial indicator of clinical progress, and the results serve as a tool for decision-making regarding treatment extension, investigation of drug resistance, and discharge during the final phase of the pharmacological regimen[19,21]. Similarly, the evaluation of radiological results in individuals who do not produce sufficient sputum for bacteriological testing, as well as for extrapulmonary clinical forms of TB, serves as a crucial guide for therapeutic decisions regarding pharmacological treatment and the clinical monitoring of patients' progress[18,20].

In this study, less than half of the participants underwent chest X-rays. This may be due to the difficulty of accessing the test for free within the public health care network in the municipality, often requiring individuals with TB to pay for the procedure. Cases of treatment interruption may also have influenced the performance of this action

Regarding complementary laboratory tests, the lack of blood glucose, liver function, and kidney function tests among study participants represents a significant finding, especially since the facility is a TB reference center in the city and region, attending to individuals using special pharmacological treatment regimens.

Given the well-established relationship between diabetes and TB—which increases the susceptibility of diabetic individuals to illness and mortality caused by *Mycobacterium tuberculosis*, —combined with the hepatotoxicity and nephrotoxicity of anti-TB medications, early blood glucose monitoring, as well as liver and kidney function tests, are strongly recommended. These tests are essential markers for clinical evaluation and therapeutic decision-making by the health care team[17,22].

Complementary tests are especially important in cases of multimorbidity due to the complexity of combining drugs and non-pharmacological therapies necessary for maintaining treatment and the well-being of these individuals. Furthermore, such patients are particularly vulnerable to TB worsening and unfavorable treatment outcomes[10,20].

The low number of nursing consultations observed in this study raises concerns about the quality of the relationship between patients and the health care team, which can directly impact treatment adherence. This is particularly true in services where pharmacological treatment is self-administered, and visits are scheduled monthly, as in the studied setting. It is hypothesized that this result may be related to a lack of documentation of nursing activities by these professionals.

The monthly visit to the service to collect medications is a critical moment for clinical evaluation and identifying the needs of patients in treatment. These visits offer opportunities to develop interventions aimed at treatment success and achieving a cure. Nursing could utilize these moments to implement health education activities, disseminate information, and address questions about the disease, its transmission, and treatment. These actions can positively influence treatment adherence and outcomes[14,16]. Studies recognize that nursing consultations are an opportune time to monitor drug side effects, assess the body's response to medication, and identify risk factors for discontinuing pharmacological treatment[9,21].

During the pandemic, the need for social distancing may have impacted the frequency of visits to the service and the maintenance of the relationship between TB patients and treatment services. This highlighted the need for alternatives to in-person consultations, such as telemonitoring and remote care. These strategies were implemented and prioritized in TB control efforts in several countries [23-25]. However, in the studied municipality, these tools, which could have helped reduce treatment interruption rates, were not used.

In this context, investing in policies to intensify TB treatment actions, tailored to the sociodemographic and clinical characteristics of individuals with TB, is urgently needed. This approach aims to ensure the success of pharmacological treatment and prevent catastrophic costs for families affected by the disease.

FINAL CONSIDERATIONS

The study did not identify an association between the outcomes of pharmacological TB treatment and the sociodemographic and clinical characteristics of the cases. However, performing chest X-rays in the second month of treatment was associated with treatment outcomes. A high prevalence of unfavorable treatment outcomes (treatment interruption and death) was observed.

In light of these findings, it is necessary to strengthen strategies for monitoring individuals undergoing treatment, particularly given the challenges imposed on health care systems by the COVID-19 pandemic. Such efforts are essential to ensure this population has access to the necessary health actions for successful TB treatment.

A limitation of this study is the incompleteness of some variables, as the

temporal identification of the studied outcomes was not performed. Future studies using primary data sources are recommended to accurately capture the current situation of this population, addressing other determinants of the disease.

REFERENCES

1. World Health Organization. Global tuberculosis report 2020. Geneva: WHO; 2020.

2. Ministério da Saúde, Secretaria de Vigilância em Saúde. Boletim Epidemiológico da Tuberculose. Brasília: Ministério da Saúde, 2021 Mar [cited 2021 Mar 16]. Disponível em: https://www.gov.br/saude/pt-br/media/pdf/2021/marco/24/boletim=-tuberculose2021-24_03.#:~:text=Em%202020%2C%20o%20Brasil%20registrou,%C3%B3bitos%20por%20100%20mil%20habitantes.

3. Ministério da Saúde. Brasil livre da tuberculose: Plano Nacional pelo Fim da Tuberculose como Problema de Saúde Pública. Brasília: Ministério da Saúde; 2017.

4. Husain AA, Monaghan TM, Kashyap RS. Impact of COVID-19 pandemic on tuberculosis care in India. Clin Microbiol Infect. 2021 Feb [cited 2021 Mar 16];27(2):293-294. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7434422/#:~:text=In%20the%20case%20of%20India,-transmission%20rates%20among%20household%20contacts.

5. Khan MS, et al. Mitigating the impact of COVID-19 on tuberculosis and HIV services: a cross-sectional survey of 669 health professionals in 64 low and middle-income countries. PLoS One. 2021 Feb 2 [cited 2021 Mar 16];16(2):e0244936. Disponível em: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0244936.

6. Corrêa AN, Feltrin AF, Rodrigues IC, Ponce MA, Santos ML, Vendramini SH. Aspectos associados ao desfecho do tratamento da coinfecção tuberculose/vírus da imunodeficiência humana. Enferm Bras. 2019 [cited 2021 Mar 16];18(3):389-397. Disponível em: https://portalatlanticaeditora.com.br/index.php/enfermagembrasil/article/view/1187.

7. Demenech LM, Dumith SC, Vieira ME, Neiva-Silva L. Desigualdade econômica e risco de infecção e morte por covid-19 no Brasil. Rev Bras Epidemiol. 2020 [cited 2021 Mar 16];23:e200095, 2020. Disponível em: https://doi.org/10.1590/1980-549720200095.

8. Lana CN, Santana JM, Souza GB, Souza LM. Determinantes sociais da saúde e óbitos por covid-19 nos estados da região Nordeste do Brasil. Rev Bras Saúde Funcional. 2020 Set [cited 2021 Mar 16];8(2):18-29. Disponível em: https://adventista.emnuvens.com.br/RBSF/article/view/1305.

9. Santos JN, Sales CM, Prado TN do, Maciel EL. Fatores associados à cura no tratamento da tuberculose no estado do Rio de Janeiro, 2011-2014. Epidemiol Serv Saúde. 2018 Oct [cited from 2021 Mar 16];27(3):e2017464. Disponível em: https://www.scielo.br/j/ress/a/rcjqSR53W6JFMJcpzwJpQGH/?lang=pt.

10. Soares LN, Spagnolo LM, Tomberg JO, Zanatti CL, Cardozo-Gonzales RI. Relationship between multimorbidity and the outcome of the treatment for pulmonary tuberculosis. Rev Gaúcha Enferm. 2020;41:e20190373. Disponível em: https://www.scielo.br/j/rgenf/a/MpSV5Ph9zSqtsbyvgQg4Vgz/abstract/?lang=pt.

11. Sousa GJ, Garces TS, Pereira ML,

Moreira TM, Silveira GM. Padrão temporal da cura, mortalidade e abandono do tratamento da tuberculose em capitais brasileiras. Rev Latinoam Enferm. 2019 Dec 5 [cited 2021 Mar 16];27(e3181):e3218. Disponível em: https://www.scielo.br/j/rlae/a/ZC6nwryM55DKnSRd5ktNwgB/?lang=en.

12. Instituto Brasileiro de Geografia e Estatística (BR). População estimada: IBGE, Diretoria de Pesquisas, Coordenação de População e Indicadores Sociais. Brasília, DF: IBGE; 2021 [cited 2021 Mar 16]. Estimativas da população residente com data de referência 18 de agosto de 2021. Disponível em: https://www.ibge.gov.br/cidades-e-estados/rs/pelotas.html.

13. Ministério da Saúde (BR), Conselho Nacional de Saúde. Resolução nº. 466, de 12 de dezembro de 2012. Aprova diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Diário Oficial da União. 2012 Dez 12 [cited 2021 Mar 16]. Disponível em: https://conselho.saude.gov.br/resolucoes/2012/Reso466.pdf.

14. ALVES JD, et al. Magnitud de los determinantes sociales en el riesgo de mortalidad por tuberculosis en el Centro-Oeste de Brasil. Gac Sanit. 2020 Mar-/Abr [cited 2021 Mar 16];34(2):171-8. Disponível em: https://www.sciencedirect.com/science/article/pii/S0213911119300408.

15. Berra TZ, et al. Social determinants of deaths from pneumonia and tuberculosis in children in Brazil: an ecological study. BMJ Open. 2020 Aug [cited 2021 Mar 16];10(8):e034074. Disponível em: https://bmjopen.bmj.com/content/10/8/e034074.

16. Kilabuk E, et al. Social determinants of health among residential areas with a high tuberculosis incidence in a remote Inuit community. J Epidemiol Community Health. 2019 May [cited 2021 Mar 16];73(5):401-6. Disponível em: https://pubmed.ncbi.nlm.nih.gov/30728201/.

17. Souza AS, Faerstein E, Werneck GL. Multimorbidade e uso de serviços de saúde em indivíduos com restrição de atividades habituais: Estudo Pró-Saúde. Cad Saude Publica. 2019 [cited 2021 Mar 16];35(11):e00155118. Disponível em: https://www.scielo.br/j/csp/a/n6HzdpLWwPk6pRBkb7nkxgh/?lang=pt.

18. Sultana ZZ, et al. HIV infection and multidrug resistant tuberculosis: a systematic review and meta-analysis. BMC Infect Dis. 2021 Jan 11 [cited 2021 Mar 16];21(1):51. Disponível em: https://bmcinfectdis.biomedcentral.com/articles/10.1186/s12879-020-05749-2. Erratum in: BMC Infect Dis. 2021 Jan 20;21(1):86.

19. Venske Bierhals D, et al. Tuberculosis cases in a prison in the extreme south of Brazil. J Med Microbiol. 2021 Mar [cited 2021 Mar 16];70(3). Disponível em: https://pubmed.ncbi.nlm.nih.gov/33555247/.

20. Massavirov S, et al. Risk factors for unfavorable treatment outcomes among the human immunodeficiency virus-associated tuberculosis population in Tashkent City, Uzbekistan: 2013-2017. Int J Environ Res Public Health. 2021 Apr 27 [cited 2021 Mar 16];18(9):4623. Disponível em: https://www.mdpi.com/1660-4601/18/9/4623.

21. Chaves Torres NM, Quijano Rodríguez JJ, Porras Andrade PS, Arriaga MB, Netto EM. Factors predictive of the success of tuberculosis treatment: a systematic review with meta-analysis. PLoS One. 2019 Dec 27 [cited 2021 Mar 16];14(12):e0226507. Disponível em: https://journals.plos.org/plosone/arti-

cle?id=10.1371/journal.pone.0226507.

22. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica. Manual de Recomendações para o Controle da Tuberculose no Brasil. Brasília: Ministério da Saúde; 2019.

23. Anglemyer A, et al. Digital contact tracing technologies in epidemics: a rapid review. Cochrane Database Syst Rev. 2020 Aug 18 [cited 2021 Mar 16];8(8):CD013699. Disponível em: https://pubmed.ncbi.nlm.nih.gov/33502000/.

24. Shen X, et al. Continuity of TB services during the COVID-19 pandemic in China. Int J Tuberc Lung Dis. 2021 Jan 1 [cited 2021 Mar 16];25(1):81-83. : https://pubmed.ncbi.nlm.nih.gov/33384053/.

25. Warnat-Herresthal S, et al. Swarm Learning for decentralized and confidential clinical machine learning. Nature. 2021 Jun [cited 2021 Mar 16];594(7862):265-270. Disponível em: https://www.nature.com/articles/s41586-021-03583-3.

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