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TUBERCULOSIS IN THE CITY OF JUAZEIRO DO NORTE-CE, BETWEEN THE YEARS 2010 TO 2020

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Abstract

Tuberculosis is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* Zopf, 1883 and is estimated to be responsible for about 1.9 million deaths worldwide. In Brazil, every year 70,000 people are infected and 4,500 die. Thus, the objective was to investigate the epidemiological profile of those affected by tuberculosis in Juazeiro do Norte-CE, between 2009 and 2019. This was an epidemiological, retrospective, analytical, documentary, ecological and quantitative study using secondary data from the "Departamento de Informática do Sistema Único de Saúde" (DATASUS). The variables analyzed were year, sex, age group, ethnicity, education and area of residence. 1,093 cases of tuberculosis were found, with 2019 being the most prevalent. The epidemiological profile of those affected was predominantly men (67.9%), aged 20 to 59 years (69.6%), brown (75.5%), with low education (35.4%) and living in urban area (92.6%). These data can be used for the creation of public policies aimed at serving the population most susceptible to tuberculosis in the city.

Keywords: Tuberculosis. Epidemiology. *Mycobacterium tuberculosis*.

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1 Introduction

Tuberculosis (TB) is an infectious and contagious disease (DE ANDRADE et al., 2020), characterized by granulomatous lesions (tubers) in various organs, especially the lungs, and if left untreated it can lead to the individual's death (CAMPOS et al., 2014).

The causative agent of tuberculosis is the bacterium *Mycobacterium tuberculosis* Zopf, 1883, which has an alcohol-acid resistant (BAAR) cell wall and is resistant to antibiotics, due to the mycolic acids that compose it (SANTOS et al., 2019).

The patient with tuberculosis presents a different amount of symptoms such as night sweats, dry cough (or with sputum) for more than three weeks, evening fever, weight loss and excessive tiredness (PINTO et al., 2011). Thus, the diagnosis consists of observing these symptoms or using laboratory methods, which are bacteriological (bacilloscopy, rapid molecular test and mycobacterial culture) and imaging through chest X-rays, in cases of the pulmonary form (SILVA; ANDRADE JÚNIOR, 2020).

However, the disease has a treatment that is based on pharmacotherapy for six months with two phases. The intensive in the first two months with the use of the drugs isoniazid, rifampicin and pyrazinamide and the double phase carried out in the last four months with isoniazid and rifampicin (RABAHI et al., 2017).

Despite being a treatable and easily diagnosed disease, tuberculosis is still a global and national public health problem, since in 2019 in Brazil, 73,846 new cases were diagnosed and the incidence rate increased compared to other years (BRASIL, 2020).

Epidemiological analyses can contribute information to help control and prevent the resurgence of collective fear of tuberculosis, as well as providing indications on the effectiveness of control measures in combating it (COSTA et al., 2020). However, it is seen that there is an absence of epidemiological studies carried out in several Brazilian municipalities, such as the city of Juazeiro do Norte in the state of Ceará.

Thus, the objective of this study was to elucidate the epidemiological profile of individuals affected with tuberculosis in the city of Juazeiro do Norte-CE.

2 Material and Methods

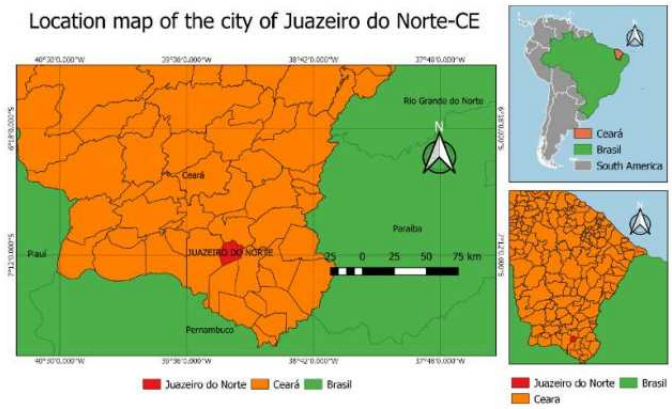
2.1 Study Design

This is an epidemiological, retrospective, analytical, documentary, ecological and quantitative study in which data were collected from the "Departamento de Informática do Sistema Único de Saúde" (DATASUS) (BRASIL, 2021).

2.2 Study Area

The city of Juazeiro do Norte is located in the metropolitan region of Cariri in the state of Ceará (Figure 1). Its population for the year 2019 was 276,264, with an average of 1.8 minimum wages for formal workers. Adding to this, in health, the year 2009 presented 94 health establishments linked to the "Sistema Único de Saúde" (SUS) (IBGE, 2021).

Figure 1. Location map of the city of Juazeiro do Norte-CE.



Source: Prepared with Qgis (2021).

2.3 Analysed Variables

The variables year, sex, age group, race, education and area of residence and evolution of the cases were studied.

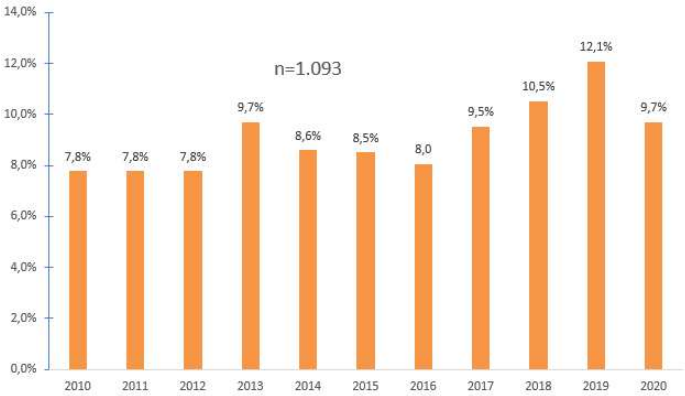
2.4 Ethical Procedures

Due to the fact that this research was carried out using secondary public data available through DATASUS and, therefore, it does not have variables that allow the identification of the individuals studied, this study waived the authorization of the Research Ethics Committee as provided for in the resolution No. 510, of April 7, 2016, of the "Conselho Nacional de Saúde" (CNS).

3 Results and Discussion

Between 2010 and 2020, there were 1,090 cases of tuberculosis in individuals in the city of Juazeiro do Norte-CE, as shown in the figure below (Figure 2).

Figure 2. Percentage of Tuberculosis cases in Juazeiro do Norte – CE, between 2010 and 2020.



Source: Survey Data (this study), 2021.

Checking Figure 1, it is noted that the year 2019 was the year in which the highest percentage of cases was found with 12.1%, followed by the years 2018 (10.5%), 2013 and 2019 (9.7%) and 2017 (9.6%). The years 2010, 2011 and 2012 were those in which the lowest percentage of cases (7.8%) was observed.

This increase in the number of cases over the years is due to the implementation of the "Programa Nacional de Combate à Tuberculose" (PNCT), which has goals such as early diagnosis, treating all those affected and increasing prevention campaigns to promote control initiatives suitable for the disease (SILVA; ANDRADE JÚNIOR, 2020).

In addition, in 2017, health professionals in the city of Juazeiro do Norte underwent a training course on practices in surveillance and control of actions aimed at the disease, contributing to greater quality and quantity of notifications in subsequent years (ESP/CE, 2017).

The association between age group and gender of those affected by TB can be seen in table 1.

Regarding the sex of those affected, there was a predominance of males, representing 67.9% of cases. This finding corroborates a study carried out in the city of Catolé do Rocha-PB, between 2009 and 2019, in which of the 91 affected with tuberculosis, 63.7% were men (SILVA; ANDRADE JÚNIOR, 2020).

The higher prevalence of males may be involved with cultural traits, in which men consume more alcoholic beverages, tobacco and less interest in self-care, which contributes to depression of the immune system and favours infection with *M. tuberculosis* (PINTO et al., 2019).

Table 1. Association between and sex and age group of those affected with TB in Juazeiro do Norte – CE, between 2010 and 2020.

Age Group	Male		Female	
	n	%	n	%
<1-4 years old	16	2.2	6	1.7
5- 9 years old	4	0.5	0	0
10 to 19 years old	33	4.4	30	8.6
20 to 59 years old	543	73.1	218	62.3
≥ 60 years old	147	19.8	96	27.4
Total	743	100	350	100

Source: Survey Data (this study), 2021.

The age group that prevailed in individuals with tuberculosis was 20 to 59 years old, with 69.6%, followed by those aged 60 years and over (22.2%) and 10 to 19 (5.8%). Similar results were observed in the city of Crato-CE, between 2002 and 2011, of which out of 261 TB cases, about 73.6% were aged between 20 and 59 years (PINTO et al., 2019).

This high prevalence of individuals aged 20 to 59 years is justified by the fact that this age group is more active in work fields and, consequently, in large agglomerations, which contributes to greater exposure to the bacillus (COSTA et al., 2020).

The table 2 shows the ethnicity of those affected by tuberculosis.

Table 2. Race of tuberculosis patients in Juazeiro do Norte-CE, from 2010 to 2020.

Race	n	%
White	120	10.9
Black	89	8.2
Yellow	8	0.7
Mulatto	825	75.5
Indigenous	4	0.4
Ignored	47	4.3
Total	1.093	100

Source: Survey Data (this study), 2021.

Regarding the affected race, mulatto individuals were the most affected with 75.5%, followed by white (10.9%).

The fact that most tuberculosis patients are of the mulatto race/colour may be due to the fact that around 60.7% of the 249,939 inhabitants of Juazeiro do Norte declare themselves as brown, as shown in the latest census by the Brazilian Institute of Geography and Statistics (IBGE, 2021).

The table 3 shows the educational level of those affected by tuberculosis.

Table 3. Percentage of education of those affected with Tuberculosis in Juazeiro do Norte – CE, between 2010 and 2020.

Education	n	%
No Schooling*	106	9.7
Low education level**	387	35.4
Average schooling***	185	16.9
High education ****	41	3.8
Ignored	351	32.1
Not applicable	23	2.1
Total	**1,093**	**100**

Illiterate*, Complete and Incomplete Elementary School**; Complete and incomplete secondary education***, Complete and incomplete higher education ****.
Source: Survey Data (this study), 2021.

Regarding education, it was found that individuals with low education had the highest percentage (35.4%), followed by those with average (16.9%), those without education (9.7%) and those with high education had the lowest percentage with 3.9% of cases. The data obtained are similar to those found in the study carried out in Iguatu-CE, in which the majority of those infected had a low level of education (CAMPOS et al., 2014).

Few years of study are related to the lack of knowledge about the disease, leading to difficulties in understanding the methods of prevention and treatment of TB (SANTOS et al., 2019).

The area of residence of the affected is also an important factor to understand the behaviour of the disease in the city, as can be seen in the table below (Table 4).

Table 4. Area of residence of those affected with tuberculosis in Juazeiro do Norte-CE, between 2010 and 2020.

Residence Area	n	%
Urban	1,012	92.6
Rural	54	4.9
Periurban	2	0.2
Ignored	25	2.3
Total	**1,093**	**100**

Source: Survey Data (this study), 2021.

In the city of Juazeiro do Norte-CE, with regard to the area of residence of the infected, there was a higher prevalence in the urban area (92.6%) compared to rural (4.9%) and peri-urban (0.2%). About 2.3% of cases were ignored. High prevalence of cases in urban residents was also verified in the city of Rondonópolis-MT, between 2001 and 2015, with a contingent of 90.4% of the 1,082 affected (SANTOS et al., 2019).

The fact that most cases come from urban areas is due to the fact that these places have vast agglomerations and, consequently, promote greater transmission of the bacillus (SILVA; ANDRADE JÚNIOR, 2020). However, despite the low percentage of cases, data from rural areas are worrying, as many residents have difficulties in accessing health services.

The table 5 shows the clinical situation of those affected by tuberculosis in the city of Juazeiro do Norte-CE.

Table 5. Clinical situation of cases of tuberculosis patients in Juazeiro do Norte, between 2010 and 2020.

Clinical Situation	n	%
Cure	722	66.1
Abandonment	44	4.2
Death from TB	42	3.8
Death from other causes	31	2.8
Transfer	31	2.8
Others*	7	0.5
Ignored	216	19,8
Total	**1,093**	**100**

*TB-Dr; Schema Change; Primary dropout.
Source: Survey Data (this study), 2021.

From the analysis of the table, it can be seen that most of those affected evolved to the state of cure and a small percentage died from the disease. However, this indicates that improvements should be made in the city's health system for better control of the disease, since even if some individuals have evolved to a cure, it is still a small percentage.

It is important to report the numbers ignored in the survey, as this fact indicates the need for improvements in filling in the notification forms, as these data are extremely relevant for the actions of health surveillance in the municipality.

4 Conclusions

A total of 1,093 cases of tuberculosis were found, and 2019 was the year in which the highest percentage of those affected was observed in Juazeiro do Norte-CE.

The profile of those affected was predominantly male individuals, aged 20 to 59 years, of mixed race, with low education and living in urban areas. Regarding the clinical evolution, most of those affected evolve to a cure.

The data obtained in this study can serve to guide the development of public policies aimed at the most susceptible population and thus contribute to the reduction of cases, in addition to allowing greater health promotion and protection against tuberculosis in the city.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

All the authors have carried out all the stages in this manuscript, such as Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Writing, Formal analysis and Validation.

DECLARATION OF INTEREST

The authors disclose that they have no known competing financial interests or personal relationships that could have appeared to influence the study reported in this manuscript.

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