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Tuberculosis surveillance in an endemic area of northeastern Brazil. What do the epidemiological indicators reveal?

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TO THE EDITOR,

Tuberculosis is a chronic infectious disease, the etiologic agent of which is *Mycobacterium tuberculosis*, and continues to be a major public health problem in several countries.[1] In 2015, approximately 10.4 million new cases were detected worldwide, resulting in more than 1 million deaths.[2]

For the 2016-2020 period, the World Health Organization has listed three groups of priority countries for tuberculosis surveillance, on the basis of the incidence of tuberculosis (magnitude), tuberculosis/HIV coinfection, and multidrug-resistant tuberculosis. In total, 48 are considered priority countries, some of which are included in more than one group. Brazil is part of two priority groups, ranking 20th in the magnitude group and 19th in the tuberculosis/HIV coinfection group.[2]

Although Brazil has experienced a significant reduction in the incidence of tuberculosis in recent years, the problem is still far from being solved. In 2015, more than 63,000 new cases of tuberculosis were diagnosed, of which 6,800 were diagnosed in people living with HIV, and there were 4,500 tuberculosis-related deaths.[3,4]

This entire context indicates the need for regular surveillance of epidemiological indicators. Systematic disease monitoring allows the assessment of both the magnitude of the problem in a given area and the outcomes of activities, plans, and health care policies that may have an impact on the reduction in incidence and mortality rates.[5,6]

Therefore, the objective of the present study was to analyze the time trends of tuberculosis monitoring indicators in the city of Juazeiro, located in the state of Bahia, Brazil. To that end, we conducted an ecological time-series study. We included all new cases of tuberculosis diagnosed between 2006 and 2015 in residents of the city. Clinical data were obtained from the National Case Registry Database. The demographic data required to calculate the indicators were obtained from the Brazilian Institute of Geography and Statistics, using the 2010 census and the intercensal projections for the other years of the time series.

The following epidemiological indicators were selected:

Group 1 - Indicators of the impact of tuberculosis control activities

- Tuberculosis incidence rate/100,000 population
- Incidence rate of active pulmonary tuberculosis/100,000 population
- Tuberculosis mortality rate/100,000 population

Group 2 - Indicators of the outcome of tuberculosis control activities

- Proportion of tuberculosis/HIV coinfection
- Proportion of cured cases of tuberculosis
- Proportion of tuberculosis cases that dropped out of treatment
- Proportion of tuberculosis cases that received directly observed treatment
- Proportion of cases of tuberculosis retreatment
- Proportion of contacts of reported cases of tuberculosis who were examined

For the trend analysis, we used a linear regression model with a trend component (Y = b0 + b1X), where Y is the time series scale; b0 corresponds to the intersection between the line and the vertical axis; b1 corresponds to the slope of the line; and X is the time frame. Type I error was set at 5%. Statistical calculations were performed using the R software, version 2.15.0 (The R Foundation for Statistical Computing, Vienna, Austria).

Analysis of the indicators of the impact of tuberculosis control activities in the city studied revealed that there was no trend for change in the time behavior of any of the three indicators (Table 1). Between 2006 and 2015, the tuberculosis incidence rate ranged from 18.10 to 34.54 new cases/100,000 population, the incidence rate of active pulmonary tuberculosis ranged from 9.68 to 14.06 cases/100,000 population, and the tuberculosis mortality rate ranged from 0.46 to 2.48 deaths/100,000 population. The persistence of the disease burden over the time series suggests that the chain of transmission is active, indicating the persistence of the problem. Similar time behaviors were observed in São Paulo[7] and in Paraná.[8]

Analysis of the indicators of the outcome of tuberculosis control activities (Table 1) showed significant upward trends in four of the six parameters studied: tuberculosis/HIV coinfection; treatment dropout; directly observed treatment; and tuberculosis retreatment.

The outcome indicators show the weaknesses of the health care facilities in the city of Juazeiro, Brazil, in following up patients. The low cure rates, which are in contrast with

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Table 1. Indicators of the impact and outcome of tuberculosis control activities in the city of Juazeiro, Brazil, between 2006 and 2015.

Year	Tuberculosis incidence rate/100,000 population	Incidence rate of active pulmonary tuberculosis/100,000 population	Tuberculosis mortality rate/100,000 population	Proportion of TB/HIV coinfection, %	Proportion of cured cases of tuberculosis, %	Proportion of tuberculosis cases that dropped out of treatment, %	Proportion of tuberculosis cases that received DOT, %	Proportion of cases of tuberculosis retreatment, %	Proportion of contacts of reported cases of tuberculosis who were examined, %
2006	21.11	10.08	0.96	6.82	75.00	5.00	0.00	0.00	57.49
2007	27.18	14.06	2.81	3.45	69.00	7.00	48.28	13.79	56.56
2008	18.10	9.68	1.68	6.98	70.00	5.00	46.51	6.98	60.61
2009	27.47	12.30	2.05	7.46	78.00	4.00	37.31	7.46	81.91
2010	29.30	12.12	1.52	6.90	67.00	9.00	25.86	13.79	63.09
2011	34.54	9.01	1.50	10.14	58.00	9.00	18.84	21.74	65.41
2012	28.78	8.44	2.48	12.07	59.00	14.00	25.86	15.52	68.46
2013	18.63	9.78	1.40	22.50	75.00	8.00	27.50	15.00	81.89
2014	28.63	12.00	0.46	12.90	68.00	8.00	17.74	11.29	72.16
2015	24.73	10.53	1.83	29.63	52.00	13.00	22.22	12.96	70.32
Slope	0.01356	−0.01267	−0.04373	0.18262	−0.02446	0.09480	0.09480	0.09480	0.02740
p	> 0.05	> 0.05	> 0.05	< 0.001	> 0.05	< 0.05	< 0.05	< 0.05	> 0.05
Trend	Stationary	Stationary	Stationary	Upward	Stationary	Upward	Upward	Upward	Stationary
Graph									

TB: tuberculosis; and DOT: directly observed treatment.

the World Health Organization recommendation that at least 85% of cases should be cured, might be due to poor treatment adherence, which results in treatment dropout and in later need for retreatment, increasing the likelihood of drug resistance.[9] It is of note that cure is one of the major strategies for reducing morbidity and mortality from tuberculosis.

Treatment dropout, as well as poor contact investigation, contributes to the persistence of the chain of transmission. This scenario is a cause for even greater concern when we consider the growth in the proportion of patients coinfected with tuberculosis and HIV. However, the increase in the proportion of coinfection might be due to the fact that more patients are being tested, which represents a major advancement.[7] Similar results have been observed throughout Brazil, especially in the north and northeastern regions.[10]

What do the indicators presented here reveal then? Much more than showing the persistence of the disease in the city, they point out the local weaknesses and the urgent need for developing systematic activities that transcend the biological dimension of the disease and reach the subjects and their contexts of vulnerability, allowing patients themselves and civil society in general to engage in the fight against the disease.

At the same time, the provision of services that are less bureaucratic and more accessible to the community, with thorough and continuous treatment, seems to be an important way to overcome the problem. In this aspect, the emphasis is on strengthening primary health care. We conclude that, in addition to revealing important issues regarding the dynamics of the disease in the city, the epidemiological indicators presented here reinforce the importance of health surveillance itself in the monitoring of health problems. Limited access to diagnostic services suggests that the true incidence of the disease is even higher than that presented here.

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