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SITUATION OF TUBERCULOSIS IN PEOPLE DEPRIVED OF FREEDOM IN THE PERIOD 2007 TO 2012

SITUAÇÃO DA TUBERCULOSE EM PESSOAS PRIVADAS DE LIBERDADE NO PERÍODO DE 2007 A 2012

SITUACIÓN DE LA TUBERCULOSIS EN LAS PERSONAS PRIVADAS DE SU LIBERTAD DURANTE EL PERÍODO 2007-2012

Daniel Souza Sacramento¹, Maria Jacirema Ferreira Gonçalves²

ABSTRACT

Objective: to identify the situation of tuberculosis and its temporal variation in persons deprived of their liberty in Brazil, from 2007 to 2012. **Method:** descriptive and ecological study of tuberculosis cases reported in the Brazilian states. Was used, as a source of data for the general population, the Notification of Injury Information System; and persons deprived of their liberty (PDL), the integrated system of prison information. Data was grouped in the 2007-2009 and 2010-2012 triennia. **Results:** among the PDLs, the incidence rate was 25 to 30 times higher than in the general population. The rates of cure, abandonment and mortality among PDLs, in 2010-2012, were 69.3%, 9.0% and 1.3%, with a temporal variation of 4.1%, 15.9% and 18.7%, respectively. Respectively, compared with the period 2007-2009. **Conclusion:** the analyzed tuberculosis indicators are worse among the PDLs, however, in both populations, they are far from the goal for disease control. **Descriptors:** Tuberculosis; Information Systems; Prisons.

RESUMO

Objetivo: identificar a situação da tuberculose e sua variação temporal em pessoas privadas de liberdade no Brasil, no período de 2007 a 2012. **Método:** estudo descritivo, ecológico, dos casos de tuberculose notificados nos estados brasileiros. Utilizou-se, como fonte de dados para a população geral, o Sistema de Informação de Agravos de Notificação; e das pessoas privadas de liberdade (PPL), o sistema integrado de informações penitenciárias. Os dados foram agrupados nos triênios 2007-2009 e 2010-2012. **Resultados:** entre as PPL, a taxa de incidência foi 25 a 30 vezes maior que na população geral. As taxas de cura, abandono e mortalidade entre as PPL, no período 2010-2012, foi 69,3%, 9,0% e 1,3%, com variação temporal de 4,1%, 15,9% 18,7%, respectivamente, comparados com o período de 2007-2009. **Conclusão:** os indicadores de tuberculose analisados são piores entre as PPL, no entanto, em ambas as populações, encontram-se distante da meta para o controle da doença. **Descritores:** Tuberculose; Sistemas de Informação; Prisões.

RESUMEN

Objetivo: identificar la situación de la tuberculosis y su variación temporal en las personas privadas de libertad en Brasil, en el período comprendido entre 2007 hasta 2012. **Método:** estudio descriptivo, ecológico, de casos de tuberculosis notificados en los estados brasileños. Se utilizó, como una fuente de datos para la población en general, el Sistema de Información de Agravios de Notificación; y de las personas privadas de su libertad (PPL), el sistema integrado de informaciones penitenciarias. Los datos se agruparon en mandatos de tres años 2007-2009 y 2010-2012. **Resultados:** entre las PPL, la tasa de incidencia fue 25 a 30 veces mayor que en la población general. Las tasas curativas, abandono y mortalidad entre el PPL, en el período 2010-2012, fue de 69.3%, 9.0% y 1.3%, con variación temporal de 4.1%, 15.9% 18.7%, respectivamente, en comparación con el período 2007-2009. **Conclusión:** los indicadores de tuberculosis analizados son peores entre el PPL, sin embargo, en ambas poblaciones, están lejos de la meta para el control de la enfermedad. **Descriptores:** Tuberculosis; Sistemas de Información; Prisiones.

¹Nurse, Master in Health, Society and Endemias in the Amazon (UFAM / ILMD), Nurse of the Municipal Health Department of Manaus (SEMSA/Manaus), Manaus (AM), Brazil. E-mail: dsacramento@ig.com.br; ²Nurse, PhD in Epidemiology, Researcher at the Oswaldo Cruz Foundation (ILMD / Fiocruz) and Professor at the Federal University of Amazonas (UFAM). Manaus (AM), Brazil. E-mail: jaciremagoncalves@gmail.com

INTRODUCTION

The increase in the prison population is a phenomenon observed in several countries, including Brazil.¹ In 2012, there were 548,003 thousand inmates in Brazil, 29.7% more than in 2007, without a corresponding adjustment of physical structure and work team, which has repercussions on the daily life of prisons.²

In this context, the spread of transmissible diseases, particularly HIV/AIDS and tuberculosis (TB) infection, poses a serious health risk to detainees and is of great magnitude.³⁻⁵ The impact of TB in prisons is not limited to detainees, it also affects the community with which they are related, that is, family and prison staff, during and after detention.⁶⁻⁸ Walls are irrelevant to the triviality of the movement of individuals between the prison system and the community. In addition to frequent transfers, delays in identifying TB suspected detainees and neglect of control and therapy procedures have favored the outbreak of the disease in prisons.

Although people deprived of their liberty (PDL) were considered at-risk populations for the dissemination and control of TB since 1944⁹ - when studies conducted in several parts of the world pointed out the prevalence and incidence of TB in the prison population more than in the general population - in Brazil, only in 2003, through the National Health Plan in the Penitentiary System, were established activities and targets for TB control in this population that did not differ from those for the general population, following the general norms of the National TB Control Program (NTCP).¹⁰ In 2007, based on the need for an information system with case reports among the PDLs, making possible the national evaluation, the institutionalized variable, indicating PDL, was included in the TB notification form. However, only in 2010, the NTCP establishes, through its Manual of Recommendations, specific guidelines for the PDL.¹¹

OBJECTIVE

- To identify the situation of tuberculosis and its temporal variation in persons deprived of their liberty in Brazil, from 2007 to 2012.

METHOD

A descriptive, ecological epidemiological study, using the states of the federation of Brazil as unit analysis, whose source of information, of the new cases of tuberculosis, are the notifications in the Notifiable Diseases Information System (SINAN) referring to the years 2007 to 2012 (<http://dtr2004.saude.gov.br/sinanweb/>. Accessed on 10 Feb 2015). The initial year of 2007 was chosen because, as of that date, the information on the prison origin of the case was included in the TB notification form.

At the SINAN database were selected the cases per unit of notification federation, year of diagnosis and confirmed cases. Afterwards, the cases were filtered by year of diagnosis, age, sex, type of entry, clinical form, 1st and 2nd smear microscopy diagnosis for pulmonary cases, anti-HIV test and outcome. All tabulations were performed considering the general population (excluding cases in PDL) and PDL, selected through the institutionalized variable (prison).

For the groupings, the triennia 2007-2009 and 2010-2012, were used according to the year of diagnosis of the case, which allowed to minimize the notification data fluctuations, especially in the the PDL population, which has large variability. The population was approximately 434,890 detainees per year, distributed in prisons in the country (penitentiary, prison, public chain, shelter house, custody and treatment hospital, observation center, patronage and federal penitentiary).

The incidence rate (IR) was calculated using the following indicator:

General Population

$$IR = \frac{\text{New cases of tuberculosis (excluded the PDL)}}{\text{Resident Population (excluded the PDL)/year}} \times 100.000$$

PDL

$$IR = \frac{\text{New cases of tuberculosis in PDL}}{\text{Prisoner population/year}} \times 100.000$$

The treatment outcome follows the recommendation of the Ministry of Health registered in the SINAN: (i) death due to tuberculosis, at the time of patient death, during treatment, having TB as basic cause of death; (ii) treatment default: when the patient has stopped taking the medication for more than 30 consecutive days; (iii) cure: it is

filled when patient completes treatment, independent of confirmation by sputum smear microscopy, based on clinical criteria and radiological findings for the definition of discharge and (iv) multi-resistant tuberculosis: a situation in which the result of the culture examination and the patient's sensitivity test are likely to be resistant bacilli.¹¹

The general population was obtained through the Brazilian Institute of Geography and Statistics (IBGE) (<http://www2.datasus.gov.br/DATASUS/index.php?area=0206>. Access on 10 Dec 14). The population, for the years 2007 to 2009, is an estimate elaborated under the Support Project of the United Nations Population Fund/IBGE. For the year 2010, the population of the 2010 IBGE Demographic Census was used and for the years of 2011 and 2012, the population estimates calculated by the Ministry of Health / Datasus sent to the Court of Auditors of the Union (TCU).

The Brazilian prison population was obtained through the Integrated Penitentiary Information System (Infopen) of the Ministry of Justice of Brazil, having as reference the month of December of each analyzed year. The Infopen provides detailed records on the prison population, procedures for the administration of penal establishments and integration of the databases of prisons and their respective states and federal institutions (www.infopen.gov.br. Access on 13 Dec 14).

The Excel® program, of Microsoft Office 7, was used to organize the tables and descriptive data analysis, by observing the frequencies. In the tables were highlighted, in bold, the values above or below those determined as acceptable by the national TB control program, or that are, depending on the indicator, located in the 1st or 3rd quartile of the distribution among all the states. Such markers are duly identified in the tables.

It was also calculated the percentage of variability between the time periods analyzed, using $[(x1 - x2) / x2 * 100]$, where: x1 = percentage of the period from 2010 to 2012; and x2 = percentage of the period from 2007 to 2009. The case ratios (general population / prison population) were also

calculated using the absolute number of notifications.

Because they are public domain secondary data, accessible through the official websites of the corresponding agencies, there was no need to submit the study to the Research Ethics Committee, since it does not use any individual identification or nominal basis.

RESULTS

In the period from 2007 to 2012, 473,493 cases of TB were reported in the general population of Brazil (Table 1), with a mean of 78,915 cases/year. The incidence rate was 34.8 cases and 33.6 cases/100,000 inhabitants for the period 2007-2009 and 2010-2012, respectively, representing a decrease of -3.6% between the periods. Among the PDLs, 31,794 TB cases were reported in 1,134 Brazilian prisons during the period, an average of 5,299 cases/year. The incidence rate among PDLs increased by 14.7% in the three-year period analyzed, with an incidence rate of 25.3 to 30.1 times higher than in the general population (Table 2).

Rio de Janeiro (RJ) and Amazonas (AM) were the states with the highest incidence rates in the general population; In the PDLs, were Rio de Janeiro and Maranhão (Table 2), emphasizing, in the states of São Paulo and Minas Gerais, there were more PDLs than in other states, with 146 and 67 prisons respectively.

In relation to the type of entry, PDL are characterized by presenting percentages of new cases below those found in the general population. On the other hand, the cases of relapse and retreatment after default are higher than the general population, with 11 states, with recurrence rates higher than the average of Brazil as a whole, with Pernambuco (12.3%), Rio de Janeiro (12.2%), São Paulo (11.6%) and Rio Grande do Sul (11.5%). Regarding the retreatment after default, this number increases to 16 states, with the highlights being Goiás (11.3%), Distrito Federal (10.6%), Amazonas (10.0%) and Rondônia (10.0%).

Table 1. Tuberculosis cases in general population and persons deprived of liberty (PDL), Brazil, 2007-2012. Brazil, 2015.

UF Notification	Number of Prisons Establishments	Number of cases		
		General	PDL	Case ratios (general/PDL)
North region		46,741	1,458	32.1
Acre	13	1,914	127	15.1
Amapá	5	1,427	24	59.5
Amazonas	17	15,418	230	67.0
Pará	37	22,699	715	31.7
Rondônia	38	3,253	319	10.2
Roraima	5	808	13	62.2
Tocantins	22	1,222	30	40.7
Northeast Region		134,118	6,699	20.0
Alagoas	8	7,770	223	34.8
Bahia	22	37,122	1,047	35.5
Ceará	144	24,352	1,071	22.7
Maranhão	12	13,800	488	28.3
Paraíba	82	7,151	607	11.8
Pernambuco	86	27,336	2,709	10.1
Piauí	14	6,135	126	48.7
Rio Grande do Norte	13	6,664	254	26.2
Sergipe	6	3,788	174	21.8
Southeast Region		212,820	15,545	13.7
Espírito Santo	22	7,735	786	9.8
Minas Gerais	67	27,853	1,261	22.1
Rio de Janeiro	44	78,796	4,555	17.3
São Paulo	146	98,436	8,943	11.0
South Region		59,520	6,060	9.8
Paraná	25	15,832	1,173	13.5
Rio Grande do Sul	92	32,403	3,863	8.4
Santa Catarina	36	11,285	1,024	11.0
Midwest Region		20,294	2,032	10.0
Distrito Federal	6	2,796	160	17.5
Goiás	69	5,546	379	14.6
Mato Grosso	65	6,914	723	9.6
Mato Grosso do Sul	38	5,038	770	6.5
Brasil	1,134	473,493	31,794	14.9

^aThose who are deprived of their liberty; UF = unit of federation

Table 2. Tuberculosis notification data in the general population and persons deprived of their liberty (PDL), Brazil, 2007-2012. Brazil, 2015.

UF Notification	Incidence rate ^a				Variability % ^b	
	2007-2009		2010-2012			
	General ^c	PDL	General ^c	PDL	General ^c	PDL
North Region						
Acre	40.8	214.4	39.2	880.6	-3.8	310.6
Amapá	34.4	207.4	29.3	158.0	-14.7	-23.8
Amazonas	64.0	471.0	60.0	810.1	-6.2	72.0
Pará	43.2	866.0	43.2	1,376.9	0.1	59.0
Rondônia	28.5	657.7	29.4	669.4	3.4	1.8
Roraima	28.1	45.0	26.7	215.1	-5.1	378.0
Tocantins	13.5	307.4	12.2	201.7	-9.6	-34.4
Northeast Region						
Alagoas	35.3	1,837.5	33.0	933.9	-6.7	-49.2
Bahia	36.3	1,707.9	33.8	1,563.3	-7.0	-8.5
Ceará	40.3	941.2	38.5	920.7	-4.4	-2.2
Maranhão	31.1	2,182.5	27.9	1,770.0	-10.0	-18.9
Paraíba	24.6	912.1	25.2	996.6	2.2	9.3
Pernambuco	42.1	1,313.6	41.7	1,588.9	-0.9	21.0
Piauí	30.2	641.5	26.0	754.2	-14.1	17.6
Rio Grande do Norte	29.0	901.5	27.4	812.6	-5.4	-9.9
Sergipe	26.6	581.5	23.7	827.0	-10.9	42.2
Southeast Region						
Espírito Santo	33.1	1,267.5	31.4	950.1	-5.1	-25.0
Minas Gerais	20.7	641.4	18.0	376.1	-13.0	-41.4
Rio de Janeiro	66.7	2,518.1	64.2	1,933.4	-3.7	-23.2
São Paulo	34.7	556.0	34.3	911.0	-1.1	63.8
South Region						
Paraná	21.6	670.4	19.8	812.9	-8.6	21.3
Rio Grande do Sul	38.5	1,613.7	40.0	1,640.3	3.9	1.7
Santa Catarina	24.0	1,043.6	25.1	897.5	4.4	-14.0
Midwest Region						
Distrito Federal	17.4	211.8	14.7	235.7	-15.5	11.3
Goiás	12.8	412.1	12.8	512.3	-0.4	24.3
Mato Grosso	31.2	515.6	33.6	1,278.5	7.7	148.0
Mato Grosso do Sul	31.5	772.8	28.8	1,257.5	-8.6	62.7
Brasil	34.8	882.4	33.6	1,011.9	-3.6	14.7

^aHighlights of the 3rd quartile; ^b incidence rates comparisons between the period 2007-2009 and 2010-2012; ^c Except those deprived of their liberty; UF = unit of federation

Table 3. Characterization of new cases of tuberculosis in the general population and persons deprived of liberty (PDL), Brazil, 2007-2012. Brazil, 2015.

Variables	2007 - 2009		2010- 2012		% Var ^a	
	% General ^b	% PDL	% General ^b	% PDL	General ^b	PDL
Gender						
Male	64.8	89.9	65.1	91.5	0.4	1.7
Female	35.2	10.1	34.9	8.5	-0.7	-15.4
Age Group						
15-19 years	6.3	3.7	6.4	3.6	1.6	-3.3
20-39 years	45.0	75.8	43.6	77.8	-3.1	2.6
40-59 years	34.6	16.3	35.1	15.2	1.5	-7.1
60-64 years	4.6	1.5	5.0	1.2	8.9	-18.8
65-69 years	3.5	1.1	3.5	0.8	0.5	-23.8
70-79 years	4.3	1.3	4.5	1.0	5.3	-17.9
80 years or more	1.7	0.4	1.8	0.4	7.6	20.2
Clinical Form						
Pulmonary	82.4	90.1	82.2	91.5	-0.3	1.6
Extrapulmonary	14.3	7.4	14.4	6.5	1.1	-12.5
Pulmonary + Extrapulmonary	3.3	2.5	3.4	1.9	1.5	-22.0
Anti-HIV Test						
Positive	9.2	9.8	10.1	9.1	9.1	-7.3
Negative	42.8	39.6	53.7	53.3	25.5	34.4
In progress	9.9	12.0	7.9	8.0	-20.3	-33.1
Not carried out	38.1	38.6	28.4	29.6	-25.5	-23.2
Bacilloscopy ^c						
1 sample						
Positive	63.8	69.7	64.4	69.5	1.1	-0.2
Negative	23.1	22.1	22.9	24.2	-1.1	9.8
Not carried out	13.1	8.3	12.7	6.2	-3.2	-24.6
2 samples						
Positive	34.7	29.9	37.1	29.9	6.9	0.0
Negative	15.9	12.3	15.8	8.5	-0.6	-31.0
Not carried out	22.3	26.9	21.7	23.2	-2.8	-13.8
Ignored	27.1	30.9	25.4	38.4	-6.3	24.4

HIV = Human immunodeficiency virus
^AReferring to the comparison of the percentages for the period 2007-2009 and 2010-2012; ^B Except those deprived of liberty; ^C Only pulmonary cases

Table 3 shows the predominance of males, which is more pronounced in PDL, concentrating 90.0% of the cases, with a percentage variability of 1.7%, regarding the first group of years analyzed. This phenomenon occurs also in relation to the age group of 20-39 years, which accounts for 75% of the cases in the PDL, with a 2.6% increase.

The pulmonary clinical form was predominant in both populations, being higher in PDL. The percentage of non-performance of the anti-HIV test among new TB cases declined in both populations (general: -25.5% and PDL: -23.2%). In the PDL, the percentage with HIV positive test result decreased by -7.3%, with positive results of 9.8% in the triennium 2007-2009 and 9.1% in the triennium 2010-2012, values close to those registered in the general population .

Tables 4 and 5 refer to the new TB cases outcome. In the PDL, only 2 states reached the cure goal > 85.0%. About 40.0% of the states registered cure rates <70.0% in the 2007-2009 triennium, with the lowest rates

being in Rio de Janeiro (35.9%) and Sergipe (47.6%). In the 2010-2012 period, this percentage increased to 48.1%, with Rio de Janeiro (55.3%) and Rio Grande do Norte (47.5%) registering the lowest rates.

Regarding treatment default, approximately 88% of the states had a default rate higher than 5%, both in the general population, and in the PDL. In the three-year period 2007-2009, in the PDLs, 51.9% of the states presented default rates higher than 10%, especially Sergipe (33.3%) and Pará (21.4%), decreasing 14.3% on the triennium 2010-2012.

The percentage of TB mortality among the PDLs is lower than in the general population. In 2007-2009, the percentage of mortality from TB, registered in SINAN, for the general population, was 3.5% in Brazil, and for PDL, 1.6%, without reduction in the general population and reduction of -18.7% in the PDL in the period 2010-2012. The highest percentages of mortality among PDLs were recorded in Piauí (8.3%) and Tocantins (6.7%)

in the 2007-2009 triennium; and Rio Grande do Norte (7.6%) stands out in the 2010-2012 period.

Regarding the closed cases, without information on the treatment outcome, there was an increase of 76.0% in the general

population, from 3.3% in 2007-2009 to 5.9% in 2010-2012. In the PDL, there was a decrease of -7.8% of this percentage, however, Rio de Janeiro stood out for presenting the high values, 48.3% in 2007-2009 and 22.1% in 2010-2012.

Table 4. Outcome situation of new cases of tuberculosis in the general population and persons deprived of their liberty (PDL), Brazil, 2007-2009. Brazil, 2015.

Unit of Federation	2007 - 2009							
	Cure (%) ^a		Default (%) ^b		Death by TB (%) ^c		TB-MDR (%)	
	General ^d	PDL	General ^d	PDL	General ^d	PDL	General ^d	PDL
North Region								
Acre	89.0	94.7	5.8	5.3	2.6	0.0	0.6	0.0
Amapá	70.0	75.0	14.0	8.3	1.2	0.0	0.0	0.0
Amazonas	70.9	74.0	10.4	10.0	4.2	2.0	0.2	0.0
Pará	74.7	58.2	11.8	21.4	2.5	2.0	0.3	0.0
Rondônia	80.8	68.1	11.5	16.8	2.0	0.8	0.2	0.8
Roraima	85.4	100.0	5.1	0.0	1.7	0.0	0.6	0.0
Tocantins	70.9	73.3	4.7	13.3	4.0	6.7	0.0	0.0
Northeast Region								
Alagoas	76.7	77.9	10.2	12.6	4.2	3.2	0.1	0.0
Bahia	74.6	68.9	7.3	7.3	3.1	3.5	0.3	0.0
Ceará	79.7	80.6	9.0	6.7	3.2	1.1	0.3	0.3
Maranhão	80.3	66.2	10.1	14.3	3.0	2.9	0.1	0.0
Paraíba	74.0	71.2	11.7	12.4	2.9	2.6	0.3	0.0
Pernambuco	72.3	68.9	11.6	8.2	4.5	1.3	0.3	0.0
Piauí	59.4	75.0	3.7	2.1	2.9	8.3	0.2	0.0
Rio Grande do Norte	74.4	55.2	9.8	18.4	4.0	2.3	0.0	0.0
Sergipe	76.7	47.6	12.5	33.3	4.3	4.8	0.1	0.0
Southeast Region								
Espírito Santo	86.8	72.6	7.0	9.4	4.1	2.3	0.5	0.4
Minas Gerais	78.1	73.4	9.8	11.2	4.1	2.3	0.1	0.2
Rio de Janeiro	69.9	35.9	13.8	10.1	3.8	1.3	0.3	0.2
São Paulo	81.2	83.1	11.1	9.7	3.2	0.6	0.0	0.0
South Region								
Paraná	78.3	71.3	8.4	9.5	3.8	2.7	0.1	0.2
Rio Grande do Sul	76.4	59.6	12.0	14.0	3.4	1.4	0.4	0.5
Santa Catarina	81.7	70.0	8.5	8.4	3.5	2.6	0.6	0.8
Midwest Region								
Distrito Federal	79.6	82.0	2.9	4.0	1.2	0.0	0.1	0.0
Goiás	73.9	70.9	9.5	11.1	3.6	3.4	0.2	0.0
Mato Grosso	81.6	66.3	7.1	6.9	2.7	1.9	0.4	0.0
Mato Grosso do Sul	79.5	68.4	9.7	16.4	6.3	3.1	0.1	0.0
Brasil	76.4	66.3	10.6	10.7	3.5	1.6	0.2	0.2

^aHighlights > 85%; ^b Highlights <5%, ^c Highlights rates lower than the mortality target for 2015;
^d Except those deprived of liberty

Table 5. Outcome situation of closure of new cases of tuberculosis in the general population and persons deprived of liberty (PDL), Brazil, 2010-2012. Brazil, 2015.

Unit of Federation	2010 - 2012							
	Cure (%) ^a		Default (%) ^b		Death by TB (%) ^c		TB-MDR (%)	
	General ^d	PDL	General ^d	PDL	General ^d	PDL	General ^d	PDL
North Region								
Acre	96.4	95.9	4.8	2.0	2.3	0.0	1.1	0.0
Amapá	74.0	100.0	15.5	0.0	2.3	0.0	0.2	0.0
Amazonas	77.5	60.0	11.6	19.3	3.8	2.2	0.2	0.0
Pará	75.1	60.4	9.1	14.2	2.5	0.5	0.5	0.0
Rondônia	77.5	71.8	11.2	12.7	1.7	0.7	0.1	0.0
Roraima	82.0	72.7	5.4	18.2	3.5	0.0	0.8	0.0
Tocantins	69.3	83.3	4.7	8.3	4.5	0.0	0.0	0.0
Northeast Region								
Alagoas	71.5	73.7	11.4	11.1	3.4	1.0	0.2	0.0
Bahia	69.5	62.6	7.4	7.4	2.6	3.1	0.2	0.4
Ceará	76.1	68.7	10.6	7.3	3.0	0.7	0.4	0.7
Maranhão	77.6	71.1	10.7	10.9	3.5	1.4	0.4	0.9
Paraíba	71.3	64.7	13.5	17.3	4.0	0.4	0.2	0.0
Pernambuco	72.1	66.7	13.8	8.0	4.0	1.3	0.4	0.2
Piauí	68.5	79.7	4.4	1.6	3.3	1.6	0.2	0.0
Rio Grande do Norte	67.1	47.5	7.1	8.5	4.7	7.6	0.2	0.0
Sergipe	81.8	76.1	10.6	14.1	4.4	2.2	0.5	0.0
Southeast Region								
Espírito Santo	86.4	73.2	8.7	5.8	3.4	2.6	0.3	0.0
Minas Gerais	73.4	64.7	8.4	9.8	4.2	3.0	0.2	0.0
Rio de Janeiro	71.0	55.3	12.4	11.0	3.6	1.5	0.6	0.2
São Paulo	81.2	78.6	9.1	5.9	3.5	0.4	0.0	0.0
South Region								
Paraná	81.5	69.0	7.7	9.3	4.1	4.5	0.3	0.8
Rio Grande do Sul	73.5	60.9	15.4	14.6	3.9	1.4	0.5	0.1
Santa Catarina	83.0	80.6	8.9	8.1	3.0	1.5	0.9	1.0
Midwest Region								
Distrito Federal	75.7	73.6	3.2	0.0	2.2	0.0	0.0	0.0
Goiás	73.8	70.2	9.9	15.8	4.3	1.2	0.2	0.0
Mato Grosso	76.9	64.9	10.7	7.5	2.5	0.5	0.2	0.2
Mato Grosso do Sul	78.8	61.2	10.2	11.2	5.6	2.5	0.1	0.0
Brasil	75.7	69.3	10.3	9.0	3.5	1.3	0.3	0.2

^aHighlights > 85%; ^b Highlights <5%, ^c Highlights rates lower than the mortality target for 2015; ^d Except those deprived of liberty

DISCUSSION

The TB indicators analyzed in this study are, for the most part, differences between PDL and the general population. The incidence of TB in PDLs in Brazil ranged from 882.4/100,000 inmates (triennium 2007-2009) to 1,011.9/100,000 inmates (triennium 2010-2012); although, in the comparison, the general population presents a much lower incidence rate than in the PDL, the situation in Brazil is of high morbidity burden¹², although there is a decrease.

In a systematic review study³, it was found that the incidence rate of prison TB in developed countries is 237.6/100,000 inmates, and for developing countries, it is 1,942.8/100,000 inmates. Although Brazil has lower PDL incidence rates than the average for developed countries, there was a 14.7% increase in TB in detainees between 2007-2009 and 2010-2012. This fact can be a reflection of the increasing rate of Brazilian prison occupation, which in the period 2007-2009 was 148.0%, and in 2010-2012, it was 160.4% in the prisons analyzed - without the

concomitant adequacy of physical structure and of professional teams, coupled with the precarious conditions of hygiene, ventilation and solar lighting in cells¹³⁻¹⁵; How much may be a reflection of the investments of the national TB control program in improving the control of the disease in the prison system, improving the diagnosis and follow-up of the cases.

This improvement was based on Resolution No. 11 of December 7, 2006 of the National Council of Criminal and Penitentiary Policy, which reaffirms the right to health of detainees, already assured by Article 196 of the Federal Constitution of 1988, and establishes the basic guideline for the detection of TB cases among admissions to the penitentiary system: specific transportation service for the health service, for the displacement of patients and biological materials; centralization of admissions, in order to allow admission health examinations; and acquisition of equipment that allow these tests to be performed. The clinical and radiological evaluation of the sentenced person entering the system, regardless of the

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existence of the symptoms, is guaranteed in the resolution.¹⁶

The interpretation of the high incidence rate of TB in PDL may be even more severe if the possibility of underestimation of such rates is considered. This is because both diagnosis, and treatment depend on access to the health service, which, in the prison situation, is differentiated, usually limited by security issues and internal organization of establishments, supply and quality of service, motivation of professionals and perception that patients have of their own symptoms.^{4, 17, 18} Health professionals avoid circulating in the establishment and it is often the prison agents who judge the need for care, at the request of the detainee, and their performance may facilitate or difficult to access.⁴ These factors make it difficult to diagnose early, causing clinical harm to the patient, the community; and affect the budget of the State. Added to the above, the possibilities of failures in the notifications and feeding of the information system, as well as the fluctuation of the prison population, leading to the calculation of the incidence rate, as a snapshot in time. In addition, the prison system is organized according to the place of the subjects trial, which leads to have a larger population where there are also more places in prisons and greater capacity of the judicial system, in the case of Mato Grosso do Sul where, in 2013, 36, 0% of detainees were from other States.¹⁸

The low percentage of notification of new cases (78.3%), and high cases of relapse (9.8%) and retreatment after default (7%) serve as an alert for the severity of TB in PDLs in Brazil because they are hiding a load of patients who remain as a source of infection, and consequent potential for transmission of the disease. In addition to the difficulties mentioned above, it is difficult to follow-up diagnosed cases, whether due to administrative issues, transfer of prison or disciplinary isolation; either because of the lifestyle of this population, which, often involves scapes, as well as problems already identified in other studies that hinder adherence, such as low level of schooling, alcohol use, drugs and the presence of comorbidities.^{5, 18} Males, irregular medication use, HIV infection, lower socioeconomic status and presence of co-morbidities, such as diabetes mellitus, are associated factors for TB relapse¹⁹⁻²¹. Besides this, the deficient self-care of this population can be listed, within prisons, where the subject refrains from taking care of health to pass on an image of strength, that is essential to "survival" in the group, reducing the risk of stigmatization and

segregation⁷, becoming vulnerable in an environment where the opportunities for disease transmission are multiple, restarting the cycle.

The cases that remain with the transfer situation in SINAN also merit attention, since transfers of detainees between prisons are common in all systems. The Ministry of Health recommends that the prison establish the transfer to the epidemiological surveillance of the municipality of destination, which may reduce the risk of discontinuation of the treatment.¹¹ The prison manager must guarantee and communicate the detainee's situation in order to continue treatment. Considering the operational difficulties of this measure and the lack of integration and coordination of actions between Justice and Health^{6, 17} the question of the discontinuation of treatment, after release and between prisons, still needs to be resolved. And, even after the patient is released, follow-up by the health surveillance of the municipality is necessary, so that this patient is not admitted to SINAN again due to relapse or retreatment after default.

In this study, young adults with low schooling and pulmonary clinical forms predominated. This profile portrays the Brazilian prison population, which is mostly composed of men (93.9%) in the age group 18-29 (55.0%) (Data from 2012²), low schooling and low socioeconomic level, already characterized as TB associated factors.

The TB treatment default and irregular therapy have repercussions on the persistence of morbidity and mortality due to the disease, favor drug resistance, low cure rates and negatively impact on disease control. In the analyzed periods, only two states (Roraima and Federal District), in 2007-2009, and three States (Acre, Amapá and Federal District) in 2010-2012 maintained the default rate lower than 5%, adopted as a limit acceptable to the Ministry of Health. This situation is not exclusive to the PDLs, since the default rate in the general population is approximated to the PDL, evidencing the difficulties of the program managers to put into practice the recommendations and guidelines of the NTCP in relation to the 22 control actions and organization of the health services to ensure the proper care process for patients with TB. In addition, there are individual factors that favor default, which, in PDL, may be inherent to the subject or to his/her institutionalized living condition.

Among the limitations of this analysis, the systematic registration/notification of PDL cases is highlighted, since the institutionalized

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variable was inserted in SINAN 2007, the first year analyzed in the study. This may have led to underreporting in this population until the services were attentive to fill in such information. However, with the grouping of the data in triennial, it is ~~not~~ considered that there is guarantee to decrease the fluctuation, allowing the identifying of the TB scenario in PDL. Another limitation is related to the quality of filling the data, because, when working with secondary data, it is not possible to have control. It is assumed that the professionals have been properly trained to fill in and enter the data, but it is known that, even then, there may be failures, as the PDL data, since it was detected cases in age groups that are not commonly inserted in the Brazilian penitentiary system as children younger than one year (66 cases), one to four years (48 cases) and five to nine years (43 cases). However, these notifications, added to ignored cases represent only 1.1% of the total number of new cases in the period and do not have a negative impact on the validity of this analysis.

The TB indicators in the Brazilian states, both in the population, and in the PDL, are below that recommended by the Ministry of Health for the control of the disease. In PDLs, this may be a reflection of the absence of specific programs for epidemiological surveillance and TB control.¹⁷ In this sense, actions to control TB in prisons should be implemented, such as: reinforcement of passive detection; implantation of the active detection, especially between the admitted, mainly, with the creation of intramural laboratories; better treatment supervision; and awareness of PDLs, their relatives and prison staff, in order to improve access to diagnosis and follow-up of treatment and control of the disease.

CONCLUSION

TB persists as an important public health problem, and the achievement of the goals of cure and default, recommended by the Ministry of Health in both populations, are major issues related to its control. The possibility of default of treatment implies social and epidemiological consequences, among which: increased relapse rate; multidrug resistance; persistent source of infection; increased mortality; increased treatment time and cost, and increased suffering of the human person. Thus, the transmissibility of TB in the prisons has been presented as a threat, because, without control of the disease in this system, it is

understood that control outside of it would not be possible.

The health team's work in prison systems, together with the NTCP, becomes important to ensure proper treatment and follow-up of patients as they move between prisons and the community. It is imperative to overcome the organizational, logistical and political difficulties in order to make feasible the application of the most effective control strategies inside and outside this system. It is necessary to invest in human and financial resources to ensure access to health for the population deprived of liberty, not as a privilege or a compassion, but as a constitutional right.

In addition, the instruction and training of the professionals directly involved in the implementation of the program in the prisons becomes extremely important, addressing the importance of performing the fundamental procedures for the early diagnosis and control of the disease, as well as the commitment to follow up of cases outside the prison system.

REFERENCES

1. International Center for Prisons Studies. King's College London. World prison brief; 2015 [cited 2015 July 13]. Available from: http://www.prisonstudies.org/research-publications?shs_term_node_tid_depth=27
2. Instituto Avante Brasil. O sistema penitenciário brasileiro em 2012. Rio de Janeiro; 2014 [cited 2016 Jan 02]. Available from: <http://institutoavantebrasil.com.br/sistema-penitenciario-brasileiro/>
3. Baussano I, Williams BG, Nunn P, Beggiato M, Fedeli U, Scano F. Tuberculosis Incidence in Prisons: A Systematic Review. PLoS Med [Internet]. 2010 [cited 2016 Jan 01]; 7(12):e1000381. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3006353/pdf/pmed.1000381.pdf>
4. Diuana V, Lhuillier D, Sánchez AR, Amado G, Araújo L, Duarte AM et al. Saúde em prisões: representações e práticas dos agentes de segurança penitenciária no Rio de Janeiro, Brasil. Cad Saude Publica [Internet]. 2008 [cited 2016 Jan 02];24(8):1887-96. Available from: <http://www.scielo.br/pdf/csp/v24n8/17.pdf>
5. Ribeiro Macedo L, Reis-Santos B, Riley LW, Maciel EL. Treatment outcomes of tuberculosis patients in Brazilian prisons: a polytomous regression analysis. Int J Tuberc Lung Dis [Internet]. 2013 [cited 2016 Jan 02];17(11):1427-34. Available from: <http://dx.doi.org/10.5588/ijtld.12.0918>

6. Oliveira HBd, Cardoso JC. Tuberculose no sistema prisional de Campinas, São Paulo, Brasil. *Rev Panam Salud Publica* [Internet]. 2004 [cited 2016 Jan 02];15(3):185-93. Available from: <http://www.scielo.org/pdf/rpsp/v15n3/a08v15n3.pdf>
7. Sánchez AR, Camacho LAB, Diuana V, Larouzé B. A tuberculose nas prisões: uma fatalidade? *Cad Saude Publica* [Internet]. 2006 [cited 2016 Jan 02];22(12):2510. Available from: <http://www.scielo.br/pdf/csp/v22n12/00.pdf>
8. Santana ACM, Franco MSP, Nascimento MMP, Castro AP, Cartaxo ACA. Tuberculose no cárcere: percepção dos detentos sobre essa enfermidade. *J Nurs UFPE on line* [Internet]. 2015 [cited 2016 Jan 02];9(6):8222-7. Available from: <http://www.revista.ufpe.br/revistaenfermage/index.php/revista/article/download/7599/12419>
9. Abrahao RM, Nogueira PA, Malucelli MI. Tuberculosis in county jail prisoners in the western sector of the city of Sao Paulo, Brazil. *Int J Tuberc Lung Dis* [Internet]. 2006 [cited 2016 Jan 01]; 10(2):203-8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/16499262>
10. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas. Plano Nacional de Saúde no Sistema Penitenciário [Internet]. Brasília: Ministério da Saúde; 2004 [cited 2015 Jan 21]. Available from: http://crpsp.org.br/interjustica/pdfs/outros/Revisao_PNSSP.pdf
11. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica. Manual de recomendações para o controle da tuberculose no Brasil [Internet]. Brasília: Ministério da Saúde; 2011 [cited 2015 Jan 23]. Available from: https://www.nescon.medicina.ufmg.br/biblioteca/imagem/manual_recomenda%C3%A7oes_controle_tuberculose.pdf
12. Oliveira GP, Torrens AW, Bartholomay P, Barreira D. Tuberculosis in Brazil: last ten years analysis - 2001-2010. *Braz J Infect Dis* [Internet]. 2013 [cited 2016 Jan 01]; 17(2):218-33. Available from: <http://www.scielo.br/pdf/bjid/v17n2/v17n2a16.pdf>
13. Alcantara LM, Alves RS, Oliveira RCC, Andrade SLE, Costa LS, Sá LD. Ações para controle da tuberculose no sistema penitenciário masculino. *Rev enferm UFPE on line* [Internet]. 2014 [cited 2016 Jan 02];8(11):3823-32. Available from: <http://www.revista.ufpe.br/revistaenfermage/index.php/revista/article/download/6679/10745>
14. Alves ERP, Silva ACO, Costa AMd. Tuberculosis in the prison: control actions in terms of the detainees. *Rev enferm UFPE on line* [Internet]. 2011 [cited 2016 Jan 02];5(4):1039-45. Available from: <http://www.revista.ufpe.br/revistaenfermage/index.php/revista/article/view/1629>
15. Souza KMJ, Villa TCS, Assolini FEP, Beraldo AA, França UM, Protti ST et al. Atraso no diagnóstico da tuberculose em sistema prisional: a experiência do doente apenado. *Texto & contexto enferm* [Internet]. 2012 [cited 2016 Jan 02]; 21(1):17-25. Available from: http://www.scielo.br/pdf/tce/v21n1/en_a02v21n1.pdf
16. Ministério da Justiça e Cidadania (BR), Conselho Nacional de Política Criminal e Penitenciária. Resolução nº 11 de 07 de Dezembro de 2006. Diretriz básica para a detecção de casos de tuberculose entre ingressos no sistema penitenciário na Unidades de Federação [Internet]. Brasília: Ministério da Justiça e Cidadania; 2006 [cited 2015 Jan 22]. Available from: http://www.mpsp.mp.br/portal/page/portal/cao_civel/cadeias/pe_legislacao/2006resolu11.pdf
17. Sánchez AR, Massari V, Gerhardt G, Barreto AW, Cesconi V, Pires J et al. A tuberculose nas prisões do Rio de Janeiro, Brasil: uma urgência de saúde pública. *Cad Saude Publica* [Internet]. 2007 [cited 2016 Jan 02]; 23(3):545-52. Available from: <http://www.scielo.br/pdf/csp/v23n3/13.pdf>
18. Carbone A, Paiao D, Sgarbi R, Lemos E, Cazanti R, Ota M et al. Active and latent tuberculosis in Brazilian correctional facilities: a cross-sectional study. *BMC Infect Dis*. 2015 [cited 2016 Jan 01]; 15(1):24. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4307675/pdf/12879_2015_Article_764.pdf
19. Picon PD, Bassanesi SL, Caramori MLA, Ferreira RLT, Jarczewski CA, Vieira PRB. Fatores de risco para a recidiva da tuberculose. *J Bras Pneumol* [Internet]. 2007 [cited 2016 Jan 01]; 33(5):572-8. Available from: <http://www.scielo.br/pdf/jbpneu/v33n5/v33n5a13.pdf>
20. Millet JP, Shaw E, Orcau À, Casals M, Miró JM, Caylà JA et al. Tuberculosis Recurrence after Completion Treatment in a European City: Reinfection or Relapse? *PLoS ONE* [Internet]. 2013 [cited 2016 Jan 02];

Sacramento DS, Gonçalves MJF.

Situation of tuberculosis in people deprived...

8(6):e64898. Available from:
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3679149/pdf/pone.0064898.pdf>

21. Hung CL, Chien JY, Ou CY. Associated Factors for Tuberculosis Recurrence in Taiwan: A Nationwide Nested Case-Control Study from 1998 to 2010. PLoS ONE [Internet]. 2015 [cited 2016 Jan 02]; 10(5):e0124822. Available from:
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4416773/pdf/pone.0124822.pdf>

22. Wendling APB, Modena CM, Schall VT. O abandono do tratamento da tuberculose sob a perspectiva dos gerentes de diferentes centros de saúde de Belo Horizonte-MG, Brasil. Texto & contexto enferm [Internet]. 2012 [cited 2016 Jan 03];21(1):77-85. Available from:
<http://www.scielo.br/pdf/tce/v21n1/a09v21n1.pdf>

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Corresponding Address

Daniel Souza Sacramento
Av. Barcelos, 2228
Bairro Praça 14 de Janeiro
CEP: 69020-200 – Manaus (AM), Brazil