

## EPIDEMIOLOGICAL PROFILE OF POPULATION WITH TUBERCULOSIS IN THE STATES OF RIO DE JANEIRO

Perfil epidemiológico da população com tuberculose no estado do Rio de Janeiro

Perfil epidemiológico de la población con tuberculosis en el estado de Río de Janeiro

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### ABSTRACT

**Objective:** To identify the epidemiological profile of the population with tuberculosis in the state of Rio de Janeiro in 2014 and to make a survey of deaths due to this pathology. **Method:** An ecological study that analyzed tuberculosis deaths and the profile of this population. Used data from the IBGE, Information Systems on Mortality and Aggravation Notification. **Results:** in the state of Rio de Janeiro in 2014, there were 12,968 confirmed cases of tuberculosis. The highest proportion in the age group of 20 to 39 years, brown, male, schooling between the fifth and eighth year of elementary education and another portion among the illiterate. There were 848 deaths due to tuberculosis, with the highest proportion of unmarried individuals, 35 and 54 years old, male and brown. **Conclusion:** tuberculosis presents itself as a serious public health problem and at the same time a major social problem because it is directly associated with poverty.

**Descriptors:** Tuberculosis; Health Profile; Health Information Systems; Public Health.

### RESUMO

**Objetivo:** identificar o perfil epidemiológico da população portadora de tuberculose no Estado do Rio de Janeiro em 2014 e fazer um levantamento dos óbitos por essa patologia. **Método:** estudo ecológico que analisou os óbitos por tuberculose e o perfil dessa população. Utilizados dados do IBGE, Sistemas de Informação sobre Mortalidade e de Agravos Notificação. **Resultados:** no estado do Rio de Janeiro em 2014 foram observados 12.968 casos confirmados de tuberculose. A maior proporção na faixa etária de 20 a 39 anos, parda, sexo masculino, escolaridade entre o quinto e o oitavo ano do ensino fundamental e outra parcela entre os analfabetos. Foram registrados

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848 óbitos por tuberculose, com maior proporção entre os solteiros, 35 e 54 anos, sexo masculino e pardo. **Conclusão:** a tuberculose se apresenta como um grave problema de saúde pública e ao mesmo tempo um grande problema social por estar diretamente associada à pobreza.

**Descritores:** Tuberculose; Perfil de Saúde; Sistemas de Informação em Saúde; Saúde Pública.

## RESUMEN

**Objetivo:** identificar el perfil epidemiológico de la población portadora de tuberculosis en el Estado de Río de Janeiro en 2014 y hacer un levantamiento de los óbitos por esa patología. **Método:** estudio ecológico que analizó los muertos por tuberculosis y el perfil de esa población. Utilizados datos del IBGE, Sistemas de Información sobre Mortalidad y de Agravos Notificación. Resultados: en el estado de Río de Janeiro en 2014 se observaron 12.968 casos confirmados de tuberculosis. La mayor proporción en el grupo de edad de 20 a 39 años, parda, sexo masculino, escolaridad entre el quinto y el octavo año de la enseñanza fundamental y otra parcela entre los analfabetos. Se registraron 848 muertes por tuberculosis, con mayor proporción entre los solteros, 35 y 54 años, sexo masculino y pardo. **Conclusión:** la tuberculosis se presenta como un grave problema de salud pública y al mismo tiempo un gran problema social por estar directamente asociada a la pobreza.

**Descriptor:** Tuberculosis; Perfil de salud; Sistemas de información en salud; Salud pública.

## INTRODUCTION

Tuberculosis is an infectious disease caused by Koch's bacillus (*Mycobacterium Tuberculosis*) and its pulmonary form is transmissible. Despite being treatable and curable, it still is a problem of great relevance in public health worldwide. This condition manifests itself in two forms: pulmonary and extrapulmonary tuberculosis. In pulmonary tuberculosis, the contagion occurs through the air by means of aerosols, droplets of saliva expelled from the lung, or the larynx of individuals with active pulmonary tuberculosis.<sup>1</sup> In extrapulmonary tuberculosis, the risk of contamination is lower and its symptoms manifest themselves according to the organ or system involved.<sup>2</sup>

According to BARROS et al,<sup>3</sup> the *Sistema de Informação de Agravos de Notificação* (SINAN) [Information System for Notifiable Diseases] recorded 88,450 cases of tuberculosis in Brazil in 2013, of which 73,835 were pulmonary, 11,844 were extrapulmonary, and 2,720 were pulmonary and extrapulmonary simultaneously. The mortality rate in 2013 was around 2.3 deaths per 100,000 inhabitants, lower than the 2.9 deaths per 100,000 inhabitants reported in 2003.<sup>4</sup> Still in this context, according to the *Oswaldo Cruz Foundation*,<sup>5</sup> tuberculosis was the fourth cause of death due to infectious diseases and the first cause when related to Human Immunodeficiency Virus (HIV) infection in Brazil in 2013.

According to the Brazilian Ministry of Health,<sup>6</sup> the disease is associated with poverty, social exclusion, and HIV. The risk factors for its spread are a crowd of people, especially

in closed environments; people living in confinement; low purchasing power; and neediest population and the homeless living and feeding in precarious conditions. In this sense, its control and eradication present itself as one of the greatest challenges in Brazil.

Risk factors such as the disorderly growth of the population in certain localities, low per capita income, population living in streets, a crowd of people, individuals deprived of their liberty, drug addicts, and HIV-positive people, directly influence the increase in the incidence of tuberculosis.<sup>7</sup> Therefore, the purpose of this study was to identify the epidemiological profile of the population with tuberculosis in the *Rio de Janeiro* State, Brazil, in 2014 and determine the number of deaths from this disease in the same year. To this end, it was used the information provided by the Brazilian Ministry of Health.

## METHODS

This ecological study analyzed the deaths from tuberculosis and the profile of the population diagnosed with this disease in the *Rio de Janeiro* State in 2014. Data from the *Departamento de Informática do Sistema Único de Saúde* (DATASUS) [Information Technology Department of the Brazilian Unified Health System] and the *Instituto Brasileiro de Geografia e Estatística* (IBGE) [Brazilian Institute of Geography and Statistics] were used. The information system is of great importance in epidemiology, as it makes it possible to make a local diagnosis and undertake activities more effectively.

Death-related data and the number of cases reported in the *Rio de Janeiro* State were selected using the *Sistema de Informação sobre Mortalidade* (SIM) [Mortality Information System] and SINAN, which are information systems of the Brazilian Ministry of Health. The selected variables were as follows: age, gender, color/race, level of education, institutionalized cases, homeless people, Acquired Immunodeficiency Syndrome (AIDS), Directly Observed Treatment (DOT), marital status, the primary cause of death, and place of residence.

The scenario of the study was the *Rio de Janeiro* State, which is divided into 92 municipalities and nine regional health agencies. A population of 15,989,920 inhabitants lived in this State (2010 census) according to the IBGE.<sup>8</sup>

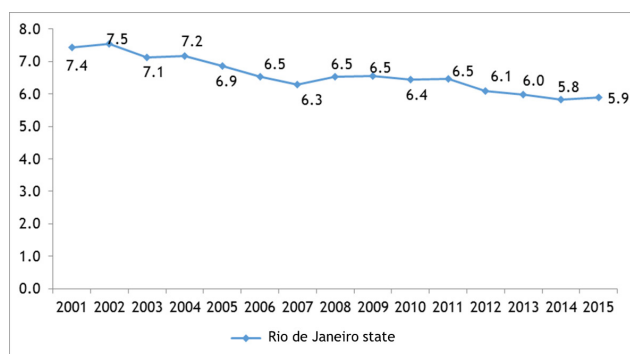
A descriptive analysis of the data was performed with the calculation of central tendency measures and mortality rates. The data were tabulated using Tabwin, which is a free program developed by the DATASUS. The results are presented in charts, tables, and maps.

This study was not submitted to the Research Ethics Committee because it used secondary, anonymous data. Secondary data are those that were previously collected and made available through information systems.

## RESULTS

In the *Rio de Janeiro* State, 222,501 confirmed cases of tuberculosis were recorded in the SINAN according to the place of residence from 2001 to 2015. As can be seen in **Figure 1**, the year with the highest proportion of cases was 2002 (7.5%) and the year with the lowest was 2014 (5.8%). In 2014, 12,968 cases of tuberculosis were observed. There was a slight decline in the number of cases during this period. Among the regional health agencies, the highest proportion was observed in *Metropolitana I* [Metropolitan I] (76.5%) and the lowest in the *Noroeste* [Northwest Region] (0.9%) in 2014.

**Figure 1** - Temporal distribution of confirmed cases of tuberculosis in the *Rio de Janeiro* State from 2001 to 2015.



Source: SINAN (2017).

Concerning the epidemiological profile of the population with tuberculosis in 2014, the 20-39 age group had the highest proportion (44.9%) followed by the 40-59 age group (32.8%). Children aged up to one year (0.6%) and children aged between one and nine years old (1.3%) had the smallest proportions. Regarding the regional health agencies, *Metropolitana I* [Metropolitan I] had the highest proportion. Observing

the gender, males (66.5%) had the highest proportion. A similar pattern was observed with the predominance of males in regional health agencies. Considering the color/race, brown (41.3%) and white (35.1%) populations had the highest proportion of tuberculosis, while indigenous (0.2%) and yellow (0.8%) populations had the lowest (**Table 1**).

In relation to education level, it was found that “ignored/not answered” had the highest proportion (20.1%), followed by “incomplete elementary schooling from 5th to 8th grade” (16.5%) and “illiterate” (14.9%). The lowest proportions were present in people having incomplete (1.8%) and complete (3.3%) higher education. Regarding the regional health agencies, “ignored/not answered” had the highest proportion (**Table 1**). Of the total confirmed cases of tuberculosis in the *Rio de Janeiro* State, 61.3% were not institutionalized and a high proportion of “ignored/not answered” (32.8%) was found for this variable. In relation to the institutionalized cases, the highest proportion was observed in people in prison (3.2%). A similar pattern was observed in most regional health agencies. For “street population” variable, 159 (1.3%) of the cases were confirmed for tuberculosis, and 10,032 (77.3%) were “ignored/not answered”. The largest number was observed in the *Metropolitana I* regional health agency (141 cases). About the distribution of confirmed cases of tuberculosis associated with AIDS in 2014, the highest proportion was found in people with AIDS (63.9%), and the lowest proportion was found for “ignored/not answered” (26.4%). With regard to the regional health care regions, a similar pattern was found, with the highest proportion observed in people without AIDS. Concerning the distribution of the population with tuberculosis that received DOT in 2014, the highest proportion was 54.1% for those that did not receive it. The *Metropolitana I* regional health agency had the highest values for “yes” and “no”.

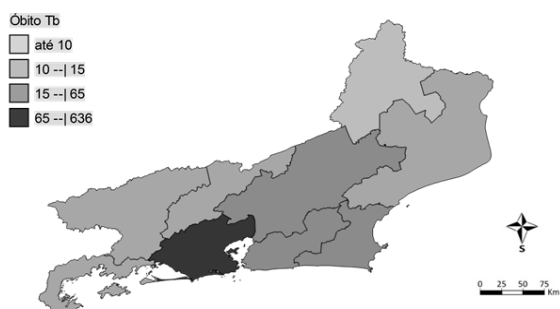
**Table 1** - Distribution of variables related to the epidemiological profile of the population with tuberculosis by regional health agencies in the Rio de Janeiro State in 2014.

Variables	SINAN																	
	Regional Health Agency																	
	33001 Baía da Ilha Grande [Big Island Bay]		33002 Baixa da Litorã nea [Coast al Flat Land]		33003 Centro- Sul [Center- south]		33004 Médio Paraíba [Middle Paraíba]		33005 Metro polita na I [Metro politan I]		33006 Metrop olitana II [Metrop olitan II]		33007 Noroest e [Northw est]		33008 Norte [North ]		33009 Serrana [Mountai nous]	
Age group	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<1 year	3	2.1	1	0.3	1	0.7	2	0.6	63	0.6	6	0.5	1	0.9	2	0.5	2	0.6
1-9 years	-	0	7	1.9	1	0.7	4	1.1	141	1.4	16	1.3	1	0.9	3	0.8	2	0.6
10-19 years	10	7.1	34	9	7	5.2	16	4.5	784	7.9	91	7.4	7	6.2	30	7.7	12	3.9
20-39 years	66	46.8	158	42	55	40.7	147	41.3	4,55	45.4	509	41.4	40	35.4	210	53.6	132	42.9
40-59 years	51	36.2	128	34	52	38.5	143	40.2	3,197	32.2	424	34.5	43	38.1	106	27	113	36.7
≥ 60 years	10	7.1	48	12.8	19	14.1	44	12.4	1,228	12.4	184	15	21	18.6	41	10.5	47	15.3
<b>Gender</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Male	103	73.0	269	71.5	98	72.6	244	68.5	6,454	65.1	878	71.4	84	74.3	282	71.9	206	66.9
Female	38	27.0	107	28.5	37	27.4	112	31.5	3,463	34.9	352	28.6	29	25.7	110	28.1	102	33.1
<b>Color/Race</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
White	62	1.5	134	3.3	37	0.9	149	3.7	3,014	74.1	404	9.9	34	0.8	79	1.9	154	3.8
Black	24	0.9	47	1.8	39	1.5	74,0	2.8	1,992	76	265	10.1	40	1.5	60	2.3	79	3,0
Yellow	1	1.1	-	-	1	1.1	1	1.1	77	84.6	5	5.5	3	3.3	1	1.1	2	2.2
Brown	39	0.8	91	1.9	42	0.9	84	1.8	3,912	81.6	488	10.2	27	0.6	52	1.1	60	1.3
Indigenous	2	8.3	1	4.2	-	-	1	4.2	17	70.8	3	12.5	-	-	-	-	-	-
<b>Education Level</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Illiterate	32	22.7	56	14.9	19	14.1	53	14.9	1,406	14.2	104	8.5	13	11.5	190	48.5	55	17.9
Incomplete Elementary School from 1th to 4th Grade	14	9.9	24	6.4	4	3.0	39	11	941	9.6	166	13.5	19	16.8	68	17.3	38	12.3
4th Grade of Elementary School	14	10.6	15	3.7	9	6.7	18	5.1	673	6.8	93	7.6	6	5.3	19	4.8	35	11.4
Incomplete Elementary School from 5th to 8th Grade	26	18.4	61	16.2	7	5.3	1634	17.4	274	16.5	15	22.3	18	13.3	42	4.6	2139	13.6
Complete Elementary School	10	7.1	14	3.7	15	11.1	32	9.0	658	6.6	96	7.8	4	3.5	14	3.6	12	3.9
Incomplete High School	11	7.8	19	5.1	3	2.2	14	3.9	689	6.9	86	7,0	4	3.5	10	2.6	18	5.8
Complete High School	9	6.4	24	6.4	9	6.7	58	16.3	1,183	11.9	176	14.3	11	9.7	24	6.1	21	6.8
Incomplete Higher Education	1	0.7	5	1.3	2	1.5	-	-	192	1.9	28	2.3	2	1.8	1	0.3	4	1.3
Complete Higher Education	2	1.4	7	1.9	1	0.7	16	4.5	337	3.4	48	3.9	3	2.7	3	0.8	10	3.2
Ignored/Not Answered	18	12.8	146	38.8	64	47.4	99	16.6	2,029	20.5	140	11.4	34	30.1	41	10.5	70	22.7
<b>Institutionalized cases</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Prison	11	7.8	8	2.1	5	3.7	14	3.9	274	2.8	34	2.8	10	8.8	46	11.7	12	3.9
Asylum	-	-	-	-	-	-	1	0.3	5	0.1	4	0.3	1	0.9	1	0.3	-	-
Orphanage	-	-	-	-	-	-	-	-	15	0.2	2	0.2	1	-	-	-	1	0.3
Psychiatric Hospital	-	-	-	-	-	-	2	0.6	6	0.1	5	0.4	-	-	1	0.3	-	-
Other	2	1.4	8	2.1	1	0.7	6	1.7	252	2.5	9	0.7	3	2.7	7	1.8	21	6.8
Non-institutionalized	93	66	262	69.9	99	73.3	224	62.9	6,094	61.4	763	62	63	55.8	216	55.1	135	43.8
Ignored/Not answered	35	24.8	97	25.8	30	22.2	109	30.6	3,273	33,0	413	33.6	36	31.9	121	30.9	139	45.1
<b>Street Population</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Yes	-	-	2	1.3	1	0.6	-	-	141	88.7	12	7.5	1	0.6	-	-	2	1.3
No	21	0.8	87	3.1	60	2.2	47	1.7	1,825	65.7	593	21.3	18	0.6	42	1.5	86	3.1
<b>AIDS</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Yes	7	5	22	5.9	19	14.1	24	6.7	1,013	10.2	109	8.9	10	8.8	30	7.7	21	6.8
No	64	45.4	246	65.4	100	74.1	208	58.4	6,555	66.1	626	50.9	55	48.7	249	63.5	183	59.4
<b>Received DOT</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Yes	22	0.4	32	0.6	21	0.4	122	2.4	4,432	88.3	232	4.6	54	1.1	69	1.4	34	0.7

Source: SINAN (2017).

A total of 17,880 deaths from pulmonary and extrapulmonary tuberculosis were observed according to data from the SIM between 1996 and 2014. There was a slight decrease in the number of deaths over the years; in 2010, however, it increased slightly, and then continued to decline. Concerning the regional health agencies, the highest proportion of deaths found was in *Metropolitana I* (75%) (Figure 2).

**Figure 2** - Spatial distribution of deaths from tuberculosis in the Rio de Janeiro State in 2014.



Source: SIM (2017).

The epidemiological profile of the population with tuberculosis in 2014 showed that “pulmonary tuberculosis without bacteriological or histological diagnosis” as the

primary cause of deaths had the highest proportion (87.6%). On the other hand, the lowest proportion was nervous system tuberculosis (1.2%). A similar pattern was observed in regional health agencies. Regarding gender, the highest proportion was observed in males (75.6%). A similar pattern was observed in regard to the regional health agencies because the highest proportion was found in the *Centro-Sul* [South-Central] agency (81.8% of males). In relation to age, people aged 35 to 54 years old had the highest proportion (33.7%). On the other hand, people aged up to 24 years old had the lowest proportion (4.8%) followed by “ignored/not answered” (4.1%). Concerning the regional health agencies, there was a similar pattern was observed. In this case, the highest proportion was found in the 35-54 age group, except the *Centro-Sul* and *Metropolitana II* [Metropolitan II] agencies. As for color/race, the highest proportion was observed in the brown population (41.5%) followed by the white population (34.1%) in 2014. Observing the marital status, the highest proportion was found in single people (51.8%) followed by married people (19.8%). A similar pattern was observed in the regional health agencies, except the *Centro-Sul* agency due to the same proportion found for single (36.4%) and married (36.4%) people (Table 2).

**Table 2** - Distribution of variables related to the epidemiological profile of deaths from tuberculosis by regional health agencies in the Rio de Janeiro State in 2014.

Variable	SIM																	
	33001 Baía da Ilha Grande		33002 Baixada Litorânea		33003 Centro- Sul		33004 Média Paraíba		33005 Metropoli- tana I		33006 Metropolit- ana II		33007 Noroeste		33008 Norte		33009 Serrana	
Primary cause	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
A15 Pulmonary Tuberculosis with a Bacteriological and Histological Diagnosis	-	-	-	-	-	-	-	-	36	5.66	3	4.69	1	11.11	-	-	-	-
A16 Pulmonary Tuberculosis without a Bacteriological and Histological Diagnosis	13	92.86	27	100.00	10	90.91	12	1.62	548	86.16	60	93.75	7	77.78	12	100.00	15	93.75
A17 Nervous System Tuberculosis	-	-	-	-	-	-	-	-	9	1.42	1	1.56	-	-	-	-	-	-
A18 Tuberculosis Affecting Other Organs	1	7.14	-	-	1	9.09	-	-	13	2.04	-	-	-	-	-	-	1	6.25
A19 Military Tuberculosis	-	-	-	-	-	-	-	-	30	4.72	-	-	1	11.11	-	-	-	-
<b>Gender</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Male	11	78.57	22	81.48	9	81.82	9	75.00	478	75.20	48	75.00	6	66.70	8	66.70	8	50.00
Female	3	21.43	5	18.52	2	18.20	3	25.00	158	24.80	16	25.00	3	33.30	4	33.30	8	50.00
<b>Age Group</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
< 24 years	-	0.00	1	3.70	-	0.00	-	0.00	30	4.70	4	6.30	-	0.00	3	2.50	-	0.00
25-34 years	2	14.30	3	11.10	2	18.20	-	-	55	8.60	4	6.30	1	11.10	2	16.70	2	12.50
35-54 years	5	35.70	10	37.00	-	0.00	5	41.70	233	35.10	19	29.70	4	44.40	3	25.00	7	43.80
55-64 years	4	28.60	4	14.80	4	36.40	4	33.30	138	21.70	22	34.40	2	22.20	2	16.70	2	12.50
> 65 years	3	21.40	8	29.60	5	45.50	3	25.00	183	28.80	15	23.40	2	22.20	2	16.70	5	31.30
unknown age	-	-	-	3.70	-	-	-	-	-	1.10	-	-	-	-	-	-	-	-
<b>Color/Race</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
White	5	1.90	8	3.00	5	1.90	7	2.60	206	76.30	24	8.90	4	1.50	3	1.10	6	2.20
Black	5	1.90	12	3.00	2	1.90	2	2.60	139	76.30	13	8.90	3	1.50	4	1.10	7	2.20
Yellow	1	2.50	-	6.00	-	1.00	-	1.00	-	69.50	1	6.50	-	1.50	-	2.00	-	3.50
Brown	2	50.00	7	-	4	-	3	-	276	-	26	50.00	2	-	3	-	3	-
Indigenous	1	0.60	-	2.00	-	1.20	-	0.90	2	80.20	-	7.60	-	0.60	-	0.90	-	0.90
<b>Marital Status</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
Single	7	50.00	14	51.90	4	36.40	8	66.70	349	54.90	36	56.30	5	55.60	6	50.00	9	56.30
Married	3	21.40	5	4.00	4	36.40	2	16.70	135	21.20	8	12.50	3	33.30	4	33.30	4	25.00
Widower	1	7.10	3	11.10	1	9.10	-	-	78	12.30	8	12.50	1	11.10	-	-	2	12.50
Divorced	1	7.10	3	11.10	1	9.10	1	8.30	40	6.30	9	14.10	-	-	1	8.30	-	-
Other	1	7.10	-	-	-	-	-	-	6	0.90	1	1.60	-	-	-	-	1	6.30

## DISCUSSION

The study results pointed out that most cases of tuberculosis occurred in the *Metropolitana I* regional health agency in 2014. The variables selected from SINAN and SIM databases showed an unfavorable demographic, social and economic scenario, in which the disease has established and spread in a worrying way, consequently becoming a public health problem of great magnitude. PEDRO et al.<sup>7</sup> pointed out that tuberculosis mainly affects the poorest Brazilian population. These people live in crowded, precarious places without basic sanitation.

In 2014, the largest proportion of deaths from tuberculosis in the *Rio de Janeiro* State was found in brown men aged 20 to 39 years old having low education level (incomplete elementary schooling from 5th and 8th grade) or being illiterate. In a study conducted in metropolitan regions of Brazil, including the metropolitan region of *Rio de Janeiro* State, tuberculosis was present in the adult male population living in unfavorable socioeconomic conditions.<sup>9</sup>

In relation to age group, individuals aged from 20 to 39 years old had the highest proportion of tuberculosis in the *Rio de Janeiro* State in 2014. A study conducted in 2012 revealed that the adult population was the most affected by tuberculosis in the same State, suggesting that the possible cause was large groups of adult people in the same age group moving in common places, which contributed to the spread of the disease among these people.<sup>10</sup>

The brown race had the highest proportions of individuals with tuberculosis in the *Rio de Janeiro* State. A similar pattern occurred in *Juiz de Fora* city, *Minas Gerais* State, Brazil, in 2011.<sup>10</sup> Corroborating this statistic, the 2015 Epidemiological Bulletin of the Brazilian Ministry of Health stated that the black race (57.5%) concentrated the highest proportion of tuberculosis cases in 2014. The majority of the people with the disease were brown (45.2%), and the minority were black (12.3%).<sup>11</sup>

In 2014, most cases of tuberculosis in the *Rio de Janeiro* State were among men. According to the Brazilian Ministry of Health,<sup>12</sup> Brazil already had the highest incidence of tuberculosis among males in 2012. Furthermore, according to a similar study conducted in the *Rio de Janeiro* State in 2014,<sup>10</sup> this high incidence among males may be justified by the self-care performed by women and active and effective national policies aimed at women's health in the State.

In relation to the cases of tuberculosis by education level, individuals having incomplete elementary school (5th to 8th grade) and illiterate individuals form the profile of this variable in the present study. Nonetheless, a high proportion of the variable "ignored/not answered" was observed according to the SINAN, which may be due to a possible failure in the process of collecting and organizing the data. According to PINHEIRO et al.,<sup>9</sup> poor socioeconomic conditions, not low education level, is a determining factor for contracting tuberculosis. On the other hand, according to PEREIRA et al.,<sup>11</sup> low education level is considered a vulnerability factor

for tuberculosis. Also, socioeconomic problems linked to low education level may increase the incidence of the disease and even abandonment of treatment.

Regarding the underreporting of tuberculosis cases, SOUZA and PINHEIRO,<sup>14</sup> argues that the SIM and SINAN are universal and important tools for providing valuable information that allows the determination of the epidemiological profile not only of the *Rio de Janeiro* State but also of the entire Brazilian population. The neglected data in the information systems make it difficult to evaluate the real cause of the problem and still point to a possible failure in primary care.

Concerning the institutionalized population in the *Rio de Janeiro* State in 2014, most of it is in prison. Nevertheless, the largest proportion of tuberculosis cases were found among the non-institutionalized population. However, the frequency of "ignored/not answered" was considerable (32.8%). According to the 2014 Epidemiological Bulletin of *Rio de Janeiro* State, 6.0% of the tuberculosis cases occurred in people in prison in 2012. The study findings showed that this percentage decreased when compared to 2014. Transferring prisoners or even granting them freedom, which made them abandon treatment, may be the cause of the high number of tuberculosis cases among people in prison in 2012. Another cause is the difficulty of scheduling medical appointments within prisons.<sup>6-15</sup> It is important to note that there was an increased incidence of the disease among people in prison between 2009 and 2010 in *Pernambuco* State, Brazil. Despite the high occurrence of the disease in the State, approximately 4,200 new cases per year and the population in prison has significantly increased these statistics.<sup>16</sup>

According to PEDRO et al.,<sup>7</sup> the street people are more likely to contract tuberculosis, followed by people with HIV/AIDS and people in prison. According to data from the Brazilian Ministry of Health,<sup>13</sup> the street population in *São Paulo* State, Brazil, have a 44 times greater chance of contracting tuberculosis. Also, it was revealed a rate of abandonment of treatment of 33.8% in 2012. The data point to the need for adequate strategies to deal with this reality in order to achieve adherence to treatment.

In the *Rio de Janeiro* State, the street population represented a small proportion of the confirmed tuberculosis cases in 2014. Most cases were reported as "ignored/not answered". This population has all risk factors since they live in extremely poor conditions. These people eat precarious food, live in unsafe housing or have no place to live, and have a low level of education or are illiterate. Furthermore, they are more likely to use drugs and contract sexually transmitted infections such as AIDS. Their access to health services is minimal, which contributes to the difficulty of diagnosing and the abandonment of treatment. The low proportion of tuberculosis cases among this population resulted from the fact that the tuberculosis notification form does not have a variable identifying this population.<sup>13</sup>

The largest proportion of confirmed cases in the *Rio de Janeiro* State in 2014 was found in people without HIV/AIDS. A similar pattern can be observed in a study carried out in the same State in 2012, in which the highest proportion was also observed in these people.<sup>10</sup>

In relation to the DOT, the study results showed that the highest proportion was found in people that did not receive it in 2014. The *Metropolitana I* regional health agency had the highest proportion among those who received DOT and those who did not.

OLIVEIRA et al<sup>17</sup> carried out a study in 2013 with health professionals responsible for coordinating, monitoring and organizing tuberculosis control actions in *Paraíba* State, Brazil. Some participants had no knowledge of the DOT or its guidelines. This directly reflects the difficulty of successfully implement the strategy for treating the population with tuberculosis. It is worth noting that the function of the DOT is to contain the advance of tuberculosis through cure and avoid resistance to multidrug therapy.

According to the study results, the epidemiological profile of deaths from tuberculosis in the *Rio de Janeiro* State in 2014 is characterized by brown men aged from 35 to 54 years old with pulmonary tuberculosis without a bacteriological and histological diagnosis.

In a similar study in *Bauru* city, *São Paulo* State, Brazil, the highest proportion of deaths from tuberculosis was found among men in 2012.<sup>18</sup> In relation to age group, the highest proportion of deaths in the *Rio de Janeiro* State in 2014 was observed among individuals aged from 35 to 54 years old. In relation to regional health agencies, the same pattern was evidenced, except in *Centro Sul* and *Metropolitana II*. A divergent pattern was observed in the municipality of *Bauru*, *São Paulo* State, in which most people who died from tuberculosis aged up to one year or over 60 years old in 2012.<sup>18</sup>

The epidemiological profile of deaths from tuberculosis regarding the variable “race” revealed the highest proportion among the brown population in 2014. A similar pattern can be observed in a study in the municipality of *Rio Branco*, *Acre* State, Brazil, in which the brown population had the highest proportion of deaths in 2013, followed by the white population.<sup>19</sup> Another study carried out in the big Brazilian capitals in 2010 attributed the highest proportion of deaths to the black/brown population. The study considered low socioeconomic and cultural conditions as favorable factors in causing this result since most people living in poor conditions are black/brown.<sup>20</sup>

These study findings revealed that the highest proportion of deaths from tuberculosis in the *Rio de Janeiro* State in 2014 was observed among single people. According to SIQUEIRA,<sup>21</sup> mortality rates among single, divorced and widowed people might be linked to the fact that they have more spatial mobility but receive no family care. This situation suggests that they are more vulnerable to contract and die from tuberculosis.

## CONCLUSIONS

Bearing in mind the aforementioned, tuberculosis presents itself as a serious public health problem and a major social one because it is directly associated with poverty. It is worrying that tuberculosis affects the population with low education level, which makes patients unaware that the disease can become serious if it is not treated adequately and early.

The nurses' difficulty in preventing and detecting tuberculosis early, whether due to a lack of human or material resources, needs to be addressed to prevent the disease from circulating freely in the population. The DOT strategy and contact investigation are critical to increase cure rates and avoid resistance to multidrug therapy. Therefore, it is essential to coordinate actions among the three spheres of government to meet these needs and undertake effective work so that tuberculosis can be prevented in the *Rio de Janeiro* State.

## REFERENCES

1. Brasil. Política Nacional de Atenção Básica. Ministério da Saúde. Brasília-DF. 2012. Available from: <http://189.28.128.100/dab/docs/publicacoes/geral/pnab.pdf>.
2. Gomes T. Tuberculose extrapulmonar: uma abordagem epidemiológica e molecular. Universidade Federal do Espírito Santo – Centro de Ciências da Saúde – Programa de pós-graduação em doenças infecciosas. Vitória, 2013. Available from: [http://portais4.ufes.br/posgrad/teses/tese\\_6376\\_Disserta%E7%E3o%20-%20Teresa-27maio.pdf](http://portais4.ufes.br/posgrad/teses/tese_6376_Disserta%E7%E3o%20-%20Teresa-27maio.pdf).
3. Barros PG et al. Perfil Epidemiológico dos Casos de Tuberculose Extrapulmonar em um município da Paraíba, 2001-2010. *Rio de Janeiro. Caderno de Saúde Coletiva*. 2014;22. Available from: [http://www.scielo.br/scielo.php?pid=S1414-462X2014000400343&script=sci\\_abstract&tlng=pt](http://www.scielo.br/scielo.php?pid=S1414-462X2014000400343&script=sci_abstract&tlng=pt).
4. Brasil.Ministério da Saúde. Taxa de Mortalidade por Tuberculose.2015. Available from: <http://portalms.saude.gov.br/noticias/722-svs-noticias/17141-taxa-de-mortalidade-por-tuberculose-cai-20-7-em-10-anos>.
5. Fiocruz, Fiocruz lança programa integrado de combate à Tuberculose, com diversas ações.. Available from: <http://portal.fiocruz.br/pt-br/content/fiocruz-lanca-programa-integrado-de-combate-tuberculose-com-acoes-que-vao-do-ensino-procura>.
6. Brasil. O Controle da Tuberculose no Brasil: avanços, inovações e desafios. *Boletim Epidemiológico - Secretaria de Vigilância em Saúde – Ministério da Saúde*.2014; 44(2). Available from: <http://www.vigilanciaensaude.ba.gov.br/sites/default/files/Boletim-Tuberculose-2014.pdf>.
7. Pedro HSP et al. Cenário Atual da Tuberculose. *Hansen Int*. 2014;39(1):40-55. Available from: <https://www.google.com.br/webhp?sourceid=chrome=instant&ion1=&espv2=&ie=UTF8-#q=Cen%C3%A1rio+Atual+da+Tuberculose>.
8. IBGE. Instituto Brasileiro de Geografia e Estatística. Available from: [http://www.ibge.gov.br/estadosat/temas.php?sigla=rj&tema=censodemog2010\\_amostra](http://www.ibge.gov.br/estadosat/temas.php?sigla=rj&tema=censodemog2010_amostra).
9. Pinheiro RS et al. Determinantes sociais e autorrelato de tuberculose nas regiões metropolitanas conforme a Pesquisa Nacional por Amostra de Domicílios, Brasil. *Ver. Panam Salud Publica*. 2013;34(6):446-51. Available from: <http://www.scielosp.org/pdf/rpsp/v34n6/v34n6a11.pdf>.
10. Barcelos SSL, Mattos RM, Fulco TO. Análise epidemiológica da tuberculose no Rio de Janeiro, uma visão integrativa. 2015;9(2). Available from: <http://www2.ugb.edu.br/Conteudo/Revista/ARTIGO5.pdf>.
11. Pereira JC et al. Perfil e seguimento dos pacientes com tuberculose em município prioritário no Brasil. *Rev. de Saúde Pública*. 2015; 49:6. Available from: [http://www.scielo.br/pdf/rsp/v49/pt\\_0034-8910-rsp-S0034-89102015049005304.pdf](http://www.scielo.br/pdf/rsp/v49/pt_0034-8910-rsp-S0034-89102015049005304.pdf).

12. Brasil. Boletim Epidemiológico. Secretaria de Vigilância em Saúde – Ministério da Saúde. Brasil.2015; 46(09). Available from: <http://portalquiuivos2.saude.gov.br/images/pdf/2015/marco/27/2015-007---BE-Tuberculose--para-substitui-o-no-site.pdf>.
13. Brasil. Boletim Epidemiológico. Secretaria de Vigilância em Saúde – Ministério da Saúde. Brasil. 2013;44(02).
14. Sousa LMO, Pinheiro RS. Óbitos e internações por tuberculose no Município do Rio de Janeiro. Rev. Saúde Pública.2011; 45(1):31-9. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0034-89102011000100004](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102011000100004).
15. Alcântara LM et al. Ações para o controle da tuberculose no sistema penitenciário masculino. Rev. Enferm. UFPE online, Recife. 2014 ;8(11):3832-32. Available from: <https://www.google.com.br/search?q=A%C3%A7%C3%B5es+para+o+controle+da+tuberculose+no+sistema+penitenci%C3%A1rio+masculino&oq=A%C3%A7%C3%B5es+para+o+controle+da+tuberculose+no+sistema+penitenci%C3%A1rio+masculino&aqs=chrome.69i57.1410j0j7&sourceid=chrome&ie=UTF-8#q=A%C3%A7%C3%B5es+para+o+controle+da+tuberculose+no+sistema+penitenci%C3%A1rio+masculino+cieolo>.
16. Programa de enfrentamento das doenças negligenciadas no Estado de Pernambuco SANAR – 2011/2014. Secretaria Estadual de Saúde. Secretaria Executiva de Vigilância em Saúde. Série A. Normas e Manuais Técnicos. 2.ed. 2014. Available from: [http://portal.saude.pe.gov.br/sites/portal.saude.pe.gov.br/files/plano\\_sanar\\_2011-2014.pdf](http://portal.saude.pe.gov.br/sites/portal.saude.pe.gov.br/files/plano_sanar_2011-2014.pdf).
17. Oliveira RCC et al. Discursos de gestores sobre a política do tratamento diretamente observado para tuberculose. Ver. Brasileira de Enfermagem. .2015; 68(6):1069-77. Available from: <http://www.scielo.br/pdf/reben/v68n6/0034-7167-reben-68-06-1069.pdf>.
18. Souza MVN. Tuberculose em gestantes: um importante problema de saúde pública mundial. Rev. Bras. Far.2006;87(4):132-138. Available from: [http://www.rbfarma.org.br/files/pag\\_132a138\\_TUBERCULOSE.pdf](http://www.rbfarma.org.br/files/pag_132a138_TUBERCULOSE.pdf).
19. Bepa. Boletim Epidemiológico Paulista. 2015; 12(144). Available from: [http://www.saude.sp.gov.br/resources/ccd/homepage/bepa/edicao-2015/edicao\\_144\\_-\\_dezembro.pdf](http://www.saude.sp.gov.br/resources/ccd/homepage/bepa/edicao-2015/edicao_144_-_dezembro.pdf).
20. Silva AGS, Martins DA. Ocorrência da tuberculose registrada no Sistema de Informação de Agravos de Notificação para o município de Rio Branco-AC. FAMETA – Faculdade Meta. Available from: [http://fameta.edu.br/media/files/35/35\\_1196.pdf](http://fameta.edu.br/media/files/35/35_1196.pdf).
21. Ceccon RF et al. Mortalidade por tuberculose nas capitais brasileiras, 2008-2010. Epidemiol. Serv. Saude. Brasília, 2009;26(2):349-358. Available from: <http://www.scielo.br/pdf/ress/v26n2/2237-9622-ress-26-02-00349.pdf>.
22. Siqueira ASP. Determinantes socioeconômicos da produção da tuberculose: um estudo no município de Itaboraí, Região Metropolitana do Rio de Janeiro, no período de 2000 a 2011. FIOCRUZ – Ministério da Saúde – Escola Nacional de Saúde Pública – RJ. 2014. Available from: <https://www.arca.fiocruz.br/handle/icict/13143>.

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