Socio-demographic and Epidemiological Characterisation of Leprosy in the Population of Pará, Amazon, from 2016 to 2020

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Authors' contributions

This work was carried out in collaboration among all authors. Author MRAD designed the study, performed statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author NVG performed the study analyses. Authors LFMF, DNRC, TAFA and VRCMP managed the literature search. All authors have read and approved the final manuscript.

Original Research Article

ABSTRACT

Objective: To describe the sociodemographic and epidemiological characteristics of the population with leprosy in the State of Pará from 2016 to 2020.
Methodology: Cross-sectional ecological study, based on data from the Disease Information and Notification System (SINAN). The study was conductedin 144 municipalities in Pará, Amazon. The data were organised and distributed by 12 integration Regions.
Results and Discussion: In the analysed data, a total of 11,687 cases of leprosy were verified in Pará from 2016 to 2020. Sociodemographic data showed a predominance in the male population, in the brown race, and in those with low education, this study demonstrated that leprosy is prevalent in vulnerable populations with low socioeconomic status, highlighting social inequalities.
Conclusion: Monitoring epidemiological and operational indicators of leprosy is essential for evaluating programs and planning public health policies to contribute to epidemiological surveillance.

1. INTRODUCTION

Leprosy is a public health concern worldwide, is an infectious disease caused by Mycobacterium leprae and has tropism for the skin and peripheral nerves, causing skin lesions with altered sensitivity and, in the long term, physical deformitiessecondary to nerve damage [1]. According to the World Health Organization, disease control services in endemic countries are currently facing challenges related to the prevention and care of disabilities that may occur during infection, including those after treatment [2].

India and Brazil have the highest global prevalence rates of leprosy. According to data from the Notifiable Diseases Information System (SINAN), 17,979 new cases of leprosy were diagnosedin Brazil in 2020.In Brazil, the State of Pará ranks fifth among the federative units with the highest rate of detection of new cases, with 18.91/100,000 inhabitants [3].

The spatial distribution of leprosy in Brazil shows a heterogeneous pattern.Risk clusters reveal inconsistent behaviour between the country's regions, indicating areas that requirepriority intervention actions in the North, Midwest, and Northeast regions [4].

The main difficulties during treatment and post-discharge of leprosy in northeastern Brazil were the delay in diagnosis and the consequent presence of disabilities, which reduces the effectiveness of treatment, thus, leprosy is still a neglected, stigmatized, and difficult to diagnose disease [5].

Regarding the epidemiological and sociodemographic characteristics of leprosy in the state of Pará, some regions such as the Mesoregion of Marajó have a high detection rate of the disease, and the difficulty in accessing basic health services is a problem correlated with the progression of leprosy, being a scenario of active transmission of the disease [6].

In this context, some factors of the disease compromise its elimination as a public health concern, such as underreporting, failures in data entry, poor coverage by health teams, lack of trained professionals for diagnosis and treatment, monitoring of patients, deficiency of surveillance sectors, and little investment in sustainable action [7].

Therefore, this study aimed to describe the sociodemographic and epidemiological characteristics of the population with leprosy in Pará from 2016 to 2020.

2. MATERIALS AND METHODS

Cross-sectional ecological study, based on data from the Disease Information and Notification System (SINAN), obtained from the Pará State Health Department..The study was conducted in 144 municipalities in Pará, and the data were distributed across 12 IRs.

The following inclusion criteria were applied: all cases of leprosy reported through the SINAN during the study period. The following exclusion criteria were applied: incomplete information and inconsistencies in the notification.

The sociodemographic and epidemiological characteristics of the study population were

determined by selecting variables according to sex, age, education, ethnicity, year, integration regions and proportion of multibacillary cases. The age variable was presented according to the age group using the standard leprosy notification form.

Data analysis proceeded with the hypothesis of the presence of a positive relationship between the study variables for illness from leprosy. The associations between the variables were analysed using the chi-square test of adherence, with a significance level of 5% (α=0.05). This statistical test aimed to verify possible differences in proportions between the various variables related to the illness in the study [8]. The study complies with the terms of Resolution nº 466 of the National Health Council (CNS) of December 12, 2012.

3. RESULTS

Data analysis identified that the high number of leprosy cases in the population residing in Pará may be associated with socioeconomic level, demographic density and failure in early diagnosis in health reference centers. In the analysed data, 11,687 cases of leprosy were reported, which were distributed among 2,407 cases in 2016, 2,554 in 2017, 2,537 in 2018, 2,538 in 2019, and 1,651 in 2020.

Regarding sociodemographic characteristics, Table 1 shows that the disease had a higher proportion in the male population than that in the female populations, with 7,162 (61.28%) and 4,524 (38.71%) cases in the male and female population, respectively. In terms of ethnicity, brown had the highest prevalence with 8,619 cases (73.75%), followed by black with 1,383 (11.83%), white with 1,352 (11.57%), yellow with 92 (0.79%), and indigenous with 40 (0.34%).

Analysis of the age variables showed that the population aged 15–59 years comprised the majority of notifications with 8,367 cases (71.59%), followed by the population aged>60 years with 2,206 cases (18.88%), and the population <15 years old with 1,114 cases (9.53%). Regarding education, there were 6,356 (54.39%) individuals with complete primary education.

Regarding the proportion of multibacillary cases, the IRs with the highest cases from 2019 to 2020 were Tapajós in 2019 at 94.91%, Lago de Tucuruí in 2018 at 86.52%, and Xingu in 2017 at 82.97%.Therewas also an increase in multibacillary cases in sixIRs, namely, Lago do Tucuruí, Metropolitana, Capim, Xingu, Tocantins, and Carajás.

Table 1. Sociodemographic characterisation of leprosy in the State of Pará, Brazil, from 2016 to 2020

Variables		n = 11687	%	p-value
Sex	Feminine	4524	38.71	< 0.0001
	Masculine	7162	61.28	
	ignored	1	0.01	
ethnicity	White	1352	11.57	< 0.0001
	Black	1383	11.83	
	Yellow	92	0.79	
	brown	8619	73.75	
	Indigenous	40	0.34	
	Ignored	201	1.72	
Age range (in years)	< 15	1114	9.53	<0.0001
	15 - 59	8367	71.59	
	≥ 60	2206	18.88	
Education	Illiterate	1064	9.10	< 0.0001
	Elementary	6356	54.39	
	Average	2384	20.40	
	Higher	445	3.81	
	ignored	1357	11.61	
	Not applicable	81	0.69	

*Research protocol 2022

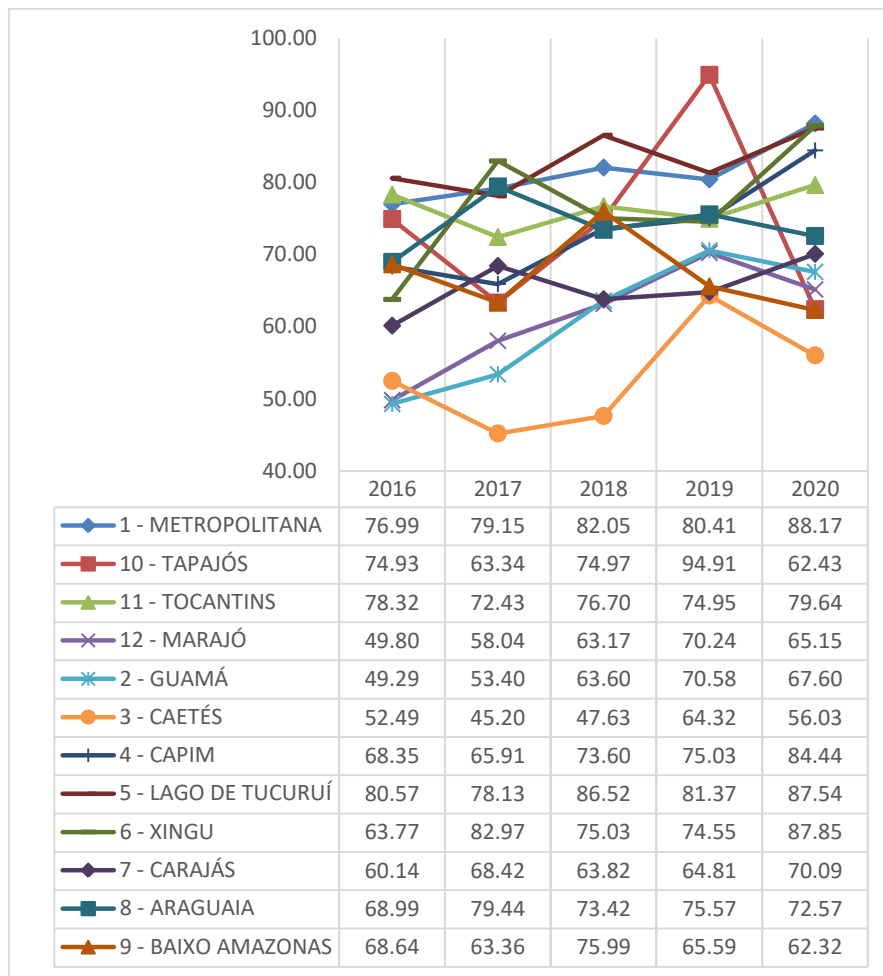|	2016	2017	2018	2019	2020
1 - METROPOLITANA	76.99	79.15	82.05	80.41	88.17
10 - TAPAJÓS	74.93	63.34	74.97	94.91	62.43
11 - TOCANTINS	78.32	72.43	76.70	74.95	79.64
12 - MARAJÓ	49.80	58.04	63.17	70.24	65.15
2 - GUAMÁ	49.29	53.40	63.60	70.58	67.60
3 - CAETÉS	52.49	45.20	47.63	64.32	56.03
4 - CAPIM	68.35	65.91	73.60	75.03	84.44
5 - LAGO DE TUCURUÍ	80.57	78.13	86.52	81.37	87.54
6 - XINGU	63.77	82.97	75.03	74.55	87.85
7 - CARAJÁS	60.14	68.42	63.82	64.81	70.09
8 - ARAGUAIA	68.99	79.44	73.42	75.57	72.57
9 - BAIXO AMAZONAS	68.64	63.36	75.99	65.59	62.32

Fig. 1. Proportion of multibacillary cases among the total number of cases according to the integration region of the State of Pará, Brazil, from 2016 to 2020
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4. DISCUSSION

The higher proportion of leprosy cases in males than that in females is consistent with the findings of available literature. However, despite the proportion of cases being more evident in men than that in women, differences exist in the prevalence of leprosy according to sex, as there is no evidence that women present protective factors; lack of care in relation to health and aesthetics in the male population; and troublein accessing health services due to work activities and the scarcity of public policies, justifying the predominance of female sex in some studies [9].

The high frequency of cases in individuals with brown and/or black skin in the State's IR is consistent with the IBGE census (2010), which indicatedthat 76.5% of people in Pará self-declared as having black and/or brownskin colour. Notably, there is a relationship between existing inequalities in this variable and leprosy, as socioeconomic differences corroborate difficulties in accessing the health system [10].

A similar finding was reportedin a study on leprosy in the mesoregions of Pará, with high frequencies for black and/or brown skin colour in the Northeast (84.64%), Marajó (85.76%), and Baixo Amazonas (84. 84%) [11].

This study demonstrated that leprosy is prevalent in vulnerable populations with low socioeconomic status, highlighting social inequalities, since resources aimed at health do not coincide with the interests and health needs of the population in certain regions of the country [12].

The detection rate in children under 15 years old shows the high endemicity and active

transmission of the disease, this factor is due to the presence of large and single-parent families, and this early exposure to Hansen's bacillus demonstrated the difficulties of health services in controlling the disease [13].

In this context, in a study on leprosy associated with pregnancy in Pará, a detection coefficient for epidemiological studies of the subject was created. The IRs with the highest prevalence of the disease were Xingu, Araguaia, Carajás, Lago do Tucuruí, Capim, and Marajó, which are regions with active economic growth and unplanned urbanisation, factors that confirm that the epidemiological surveillance program in the state is still unsatisfactory and highlights the need for intensive actions on the disease [14].

Leprosy is also a public health problem in other states in the northern region, such as Tocantins, where the proportion and severity of the forms detected in the population under 15 years of age stand out and where there is a large dispersion of cases in the peripheral areas of municipalities [15].

In other studies, on leprosy in Pará, the regions with the highest prevalence of the disease were also Xingu, Araguaia, Carajás, Lago do Tucuruí, Capim and Marajó, locations with active economic growth and disorderly urbanization, factors that justified the difficulties in the actions of the epidemiological surveillance program in the state [16].

Access to early diagnosis, treatment and rehabilitation are essential factors to prevent the development of physical disabilities, as well as the lower possibility of transmission, that is, the delay in diagnosing leprosy increases individual and collective risks and causes negative impacts on the health of the person. population [17].

The eradication of this endemic disease involves cultural, political and economic issues, especially in aspects involving stigma, as it implies social deprivation of the patient due to isolation,in this context, the World Health Organization (WHO) created programs aimed at eradicating leprosy in partnership with several countries, among which is the Global Strategy for Leprosy, which is based on actions that seek to reduce new cases and eliminate the disease [18].

5. CONCLUSION

Monitoring epidemiological indicators of leprosy is essential for evaluating programs and planning public health policies. However, only limited studies in Brazil haveevaluated the relationship between such indicators and the endemicity of the disease.This information can serve in the daily practice of primary health care teams to determine priorities and evaluate actions and interventions.

This study confirms and highlights the occurrence of leprosy associated with areas of low socioeconomic levels; the occurrence of cases in children aged<15 years reflects a hidden prevalence, highlighting the gaps in care and follow-up of cases. Therefore, early diagnosis of leprosy helps interrupt the disease transmission cycle, in addition to reducing physical disabilities in patients.

ETHICAL APPROVAL

The study was approved by the Research Ethics Committee (CEP) of the institution, opinion number 5.114.539, and by the Certificate of Presentation of Ethical Appreciation (CAAE) No. 522.526.21.3.0000.8767.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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