



Epidemiological analysis of leprosy in the state of Maranhão, Brazil

Análise epidemiológica da hanseníase no estado do Maranhão, Brasil

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ABSTRACT

The present study aims to analyze the epidemiological profile of leprosy in the state of Maranhão in the period from 2012 to 2020. This is a cross-sectional, descriptive, and quantitative population-based study, where secondary data from the Sistema de Informação de Agravos de Notificação (SINAN) were used. The sociodemographic variables used in this study were: age, gender, race, and education, epidemiological clinical variables, and clinical forms of the disease. According to the data extracted, between the years 2012 and 2020, 37,721 cases of leprosy were notified in the state, 24,774 multibacillary and 8,516 paucibacillary, with prevalence in male, aged 30 to 39 years, with low education, of brown race and in the dimorphic form. Thus, this study will be able to help guide health professionals in the planning and management of health policies and in the prevention and control of the disease, to ensure a standard of health care and prompt diagnosis and treatment for cases of leprosy throughout the country.

RESUMO

O presente estudo tem como objetivo analisar o perfil epidemiológico da hanseníase no estado do Maranhão no período de 2012 a 2020. Trata-se de um estudo transversal, descritivo e quantitativo, onde foram utilizados dados secundários provenientes do Sistema de Informação de Agravos de Notificação (SINAN). As variáveis sociodemográficas utilizadas neste estudo foram: idade, sexo, raça e escolaridade, variáveis clínicas epidemiológicas e formas clínicas da doença. De acordo com os dados, entre os anos de 2012 a 2020 foram notificados 37.721 casos de hanseníase no estado do Maranhã, sendo 24.774 multibacilar e 8.516 paucibacilar, com prevalência no sexo masculino, faixa etária entre 30 a 39 anos, baixa escolaridade, raça parda e na forma Dimorfa. Sendo assim, este estudo poderá auxiliar a orientação dos profissionais de saúde no planejamento e gestão das políticas de saúde e na prevenção e controle da doença, para garantir um padrão de atenção à saúde e um diagnóstico e tratamento imediato para os casos de hanseníase em todo o país.

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INTRODUCTION

Leprosy is a chronic infectious disease caused by the bacillus *Mycobacterium leprae*, which mainly affects the peripheral nerves, and is characterized by the appearance of asymptomatic and anesthetic lesions on the skin, red spots and nodules (Santos et al., 2023). Contaminated individuals are classified as Paucibacillary, with a low bacilli load in the body, or Multibacillary, with a high bacilli load (Oliveira et al., 2023).

Considered one of the oldest diseases affecting humans, leprosy is associated with social inequality and unfavourable socioeconomic conditions, such as illiteracy, precarious housing conditions, lack of basic sanitation, disorganized urban growth and ineffective health services (Rodrigues et al., 2020; Souza et al., 2020).

Leprosy is a chronic condition with a high potential for causing physical disabilities and aesthetic damage, regardless of gender and age (Souza et al., 2020; Cortela et al., 2020). In the world, only Brazil has not yet reached the goal of eliminating leprosy as a public health problem, agreed at less than one case for every 10 thousand inhabitants. Currently, the country has the second highest number of new diagnoses of the disease, behind only India. In the Americas, it accounts for more than 90% of all occurrences (Ministry of Health, 2016).

In this scenario, Maranhão ranks 1st in Brazil in the number of new leprosy cases, where 36,482 new cases of leprosy were registered between 2012 and 2019 in the Disease Information and Notification System (SINAN) (Ministry of Health, 2021). According to the Ministry of Health (2021), in Maranhão five municipalities are recognized as priorities, namely São Luís, Imperatriz, Timon, Caxias and Codó. Of this total, around 30% arrived at clinics and outpatient clinics with some degree of disability, that is, when the disease causes some physical deformity or causes a decrease or loss of sensitivity in the eyes, hands and/or feet.

Therefore, the present study aims to analyze the sociodemographic profile of the population with leprosy in the state of Maranhão, taking as a reference the epidemiological profile of cases between 2012 and 2020.

METHODOLOGY

This work is a cross-sectional study (Rouquayrol & Gurgel, 2021; Silva et al., 2018), with a population-based descriptive and quantitative nature, carried out on patients with leprosy from January 2012 to December 2020 in the state of Maranhão.

Epidemiological data were obtained from the Information Technology Department of the Unified Health System of the Ministry of Health (DATASUS), using the database of the Notifiable Diseases Information System (SINAN), and the supporting bibliography was consulted in the Scientific Electronic Library Online (SciELO) and Nursing Database (BDENF). The following Health Science Descriptors (DeCS) were used: Leprosy, primary health care, nursing, epidemiology and neglected diseases.

For data tabulation and analysis, the programs Tabwin 3.6 and Microsoft Office Excel were used. The data was analyzed and presented in the form of tables and graphs. As inclusion criteria, we used sociodemographic variables, such as age, sex, race and education; all cases of leprosy reported to (SINAN); and finally, clinical epidemiological variables and clinical form of the disease. As an exclusion criterion, we had cases that, despite being reported, did not present diagnostic confirmation or that contained inconsistencies.

RESULTS AND DISCUSSION

From the analysis of the data obtained, between 2012 and 2020, a number of 37,721 reported and confirmed cases of leprosy were observed in Maranhão, making an annual average of 4,191.3 cases. 21,971 (58.25%) male patients and 15,749 (41.75%) female patients were reported (**Table 1**). Gender must be recognized as an important determinant of the development of leprosy, especially when it is found that there is a greater health risk among men (Souza et al., 2019). According to the epidemiological bulletin of the Ministry of Health (2018), data showed that leprosy is more prevalent in men than in women (Lins, 2010). In our study, the number of cases prevailed in males, corresponding to 58.25% (n=21,971). For Souza et al., (2020), the prevalence of the disease in men is linked to treatment abandonment, thus reducing the cure and eradication of the disease. Therefore, attention and care for men's health, preventive measures, timely diagnosis and treatment must be considered essential for this population, in order to reduce the transmission of leprosy. Actions for national men's health policies must also be structured in a more coherent and expanded way (Souza et al., 2019).

The highest number of cases was recorded for the age group of 30 to 39 years (18.0%; n=67.20) and 40 to 59 years 16.2% (n=6111). This indicates that the economically active population is the most affected by leprosy, which could harm Maranhão's economy. In the study by Uchôa et al., (2017), in the northeast region of Brazil, an average age was found to be 39.3 years old, with 77.1% of cases between 15 and 60 years old. And regarding the age group, the results followed the trend observed in the literature, with a higher incidence among adults aged between 30 and 49 years (Silva et al., 2018; Oliveira et al., 2016). Furthermore, as it is considered a disease that mainly affects young people and adults, due to the long incubation period by *M. leprae*, Oliveira et al., (2020), it indicates a deficiency in the control and surveillance of the disease, in situations of early exposure. to the bacillus, the probability of developing the disease increases. **Table 1** also shows that patients aged 10-14 years were 5.5% (n=2112) and 5-9 years were 0.3% (n=1062). This fact is justified by the clinical signs of leprosy, as they are not easily recognized in childhood. However, the importance of this condition and its social, physical and psychological development problems cannot be neglected, due to the

high possibility of deformities, especially in some endemic regions (Oliveira et al., 2014). In children, diagnosing leprosy is expensive, due to the difficulty in applying and interpreting sensitivity tests (Pires et al., 2012). Therefore, operational factors assume greater importance in the management of the disease in childhood. These factors may be related to the difficulties inherent in diagnosis, such as weaknesses in examining contacts (Araújo & Lana, 2020; Ribeiro et al., 2018). These factors may be related to the difficulties inherent in diagnosis, such as weaknesses in examining contacts (Araújo & Lana, 2020; Ribeiro et al., 2018).

There was also a greater confirmation of cases in patients of mixed ethnicity (67.0%; n=84,950) and black (16.2%; n=20,476). This finding reproduces a historical process of colonization and mixing of races associated with leprosy in Maranhão, therefore the study of health and epidemiology is of great importance, as it allows us to observe social differences and inequalities in relation to access to healthcare (Barbosa et al., 2014; Gomes et al., 2020).

In relation to education, the prevalence was incomplete 1st to 4th grade of Elementary School - ES (22.2%; n=8389), followed by incomplete 5th to 8th grade of ES (15.2%). Individuals with incomplete Higher Education (1.1%; n=436) were the least frequent. According to a study by Melo et al., (2017), an important piece of data that deserves to be highlighted in their research refers to the education variable, which presented 21% and 19%, of incomplete primary and completed primary education, respectively, highlighting the importance of the need for carrying out and formulating more effective health education strategies. Another important point in education is the number of cases of missed detection, 11.9% (n=4,126), which means there are flaws in leprosy notification and makes tracking and directing care for the disease difficult. This behavior may be associated with failures in the supply of information systems, which is directly dependent on the commitment of municipalities and regions to provide data (Ribeiro et al., 2018).

During diagnosis, patients with leprosy are classified, for operational treatment purposes, as Paucibacillary (PB) with the presence of up to five lesions on the skin with negative intradermal scraping smear microscopy, or Multibacillary (MB) with the presence of six or more skin lesions or positive intradermal scraping smear microscopy (Oliveira et al., 2020). Based on operational surveillance indicators, it was possible to observe, among the cases with information, that 74.4% (n=24774) were Operational Class diagnosed in Multibacillary and 25.5% (n=8516) Paucibacillary. Other research corroborates the findings of this study, where a much larger portion of multibacillary patients were observed in other states, all of which confirmed the prevalence of multibacillary leprosy as the group responsible for the high potential for transmission of the disease (Lira et al., 2019; Campos et al., 2018; Cruz et al., 2018; Goiabeira et al., 2018).

Table 1.*Distribution of epidemiological variables regarding Leprosy cases in Maranhão, 2012-2020*

	Variables	N	%
Gender	Masculine	2,1971	58.25
	Feminine	1,5749	41.75
Age range	1-4	108	0.3
	5-9	1,062	3.0
	10-14	2,112	5.5
	15-19	2,185	5.7
	20-29	5,158	13.6
	30-39	6,720	18.0
	40-49	6,111	16.2
	50-59	5,849	15.5
	60-69	4,690	12.4
	70-79	2,749	7.2
	From 80 years old	976	2.5
Ethnicity	Ignored	2,047	1.6
	White	17,544	13.8
	Black	20,476	16.2
	Yellow	1,210	1.0
	Indigenous	422	0.4
	Brown	84,950	67.0
Education	Ignored	4,126	11.9
	Illiterate	5,679	15.0
	1st to 4th incomplete grade	8,389	22.2
	4th complete series	2,422	6.4
	5th to 8th incomplete grade	5,761	15.2
	Complete primary education	2,255	6.0
	Incomplete high school	2,417	6.4
	Complete high school	5,058	13.4
	Incomplete higher education	436	1.1
	College education complete	801	2.1
Not applicable	377	1.2	
Classification	Ignored	10	0.03
	Paucibacillary	8,516	25.5
	Multibacillary	24,774	74.4

Note: Ministério da Saúde/Sistema de Informação de Agravos de Notificação (SINAN)

As explained in **table 2**, the year with the highest number of cases was 2012, totaling 4,800 notifications, followed by 2013 (n=4,718). Furthermore, there was a decline in the number of cases from 2014 to 2018, with the exception of 2019-2020 (2012, n=4800; 2013, n=4718; 2014, n=4547; 2015, n=4474; 2016, n=4264; 2017, n=4142; 2018, n=4195; 2019, n=4265 and 2020, n=2396). For Oliveira et al., (2020) high leprosy detection rates may be related to low rates of economic development, associated with precarious health conditions. Despite this increase, it showed a decreasing trend during the period studied, a fact that can be justified by the intensification of leprosy control actions carried out by state and municipal

health bodies (Monteiro et al., 2015; Gonçalves et al., 2018). Furthermore, diagnosis according to the stage of the disease found a higher prevalence of the dimorphic form (52.9%), followed by the Virchowian form in 16.0% of patients with leprosy in the state of Maranhão. The results of the study by Silva et al., (2020) corroborate the findings of this research, where the prevalence of multibacillary dimorphic and lepromatous clinical forms is verified, which are considered the most serious forms of the disease, and can cause deformities and physical disabilities when untreated (Oliveira et al., 2020).

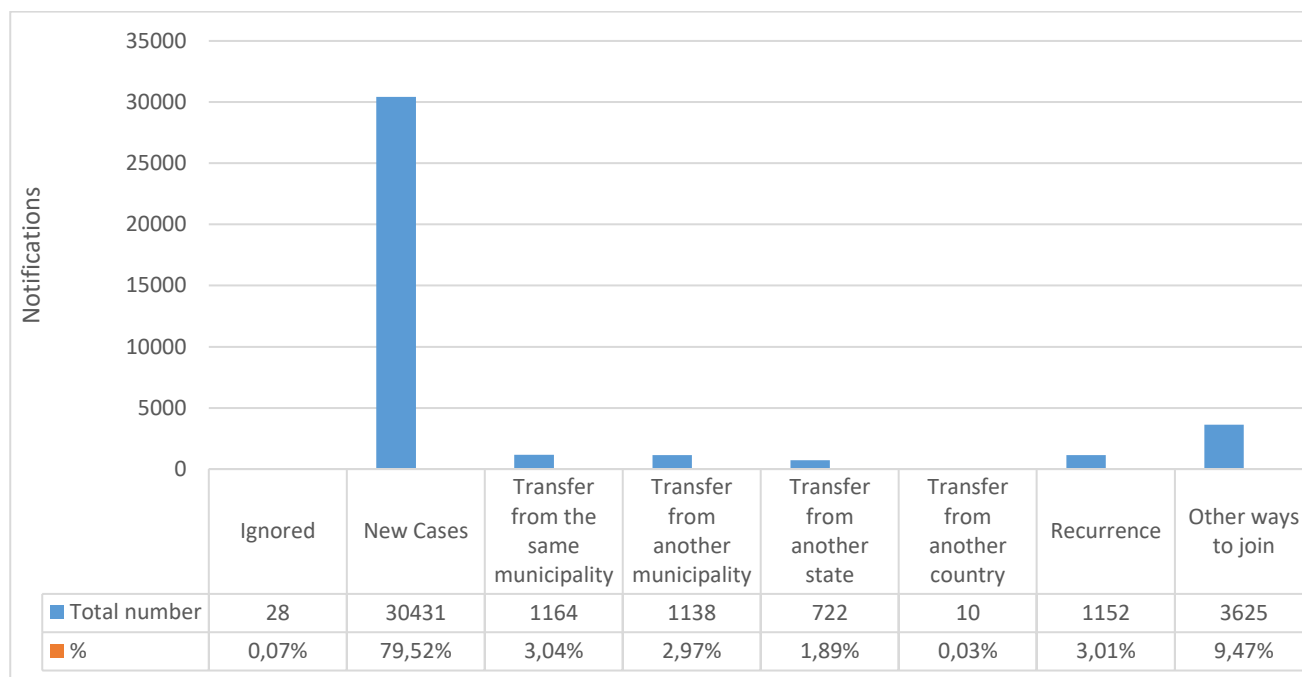
Table 2.

Distribution of Leprosy cases in Maranhão regarding the clinical form of the disease, 2012-2020

Clinical Form	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total (%)
Ignored	230	207	180	143	163	124	113	135	87	1,41 (3,7%)
Undetermined	722	549	529	400	374	398	401	401	194	4,03 (10,7%)
Tuberculoid	740	621	621	598	493	478	451	413	219	4,08 (10,7%)
Dimorph	2.130	2.291	2291	2.484	2.466	2.320	2.375	2.375	1.271	20,28 (53,9%)
Virchowiana	759	711	711	675	585	632	702	745	413	6,04 (16,0%)
Not classified	219	215	215	174	183	190	173	196	132	1,73 (4,5%)
Total	4.800	4.718	4.547	4.474	4.264	4.142	4.195	4.265	2.396	37,58 (100%)

Note: Ministério da Saúde/Sistema de Informação de Agravos de Notificação (SINAN)

The most frequent mode of entry was new cases with 80.0% (n=30,431). The form of relapse was responsible for 3% (n=1,152) cases, of which 8% occurred due to transfer (state/city/country) (**Figure 1**). This indicates that leprosy transmission is active, when observing its prevalence in the area and period of study. Similar results were obtained in the study of the epidemiological profile of leprosy patients with the highest frequency of new cases (68.7%) in a municipality in Maranhão (Gonçalves et al., 2018; Silva et al., 2020).

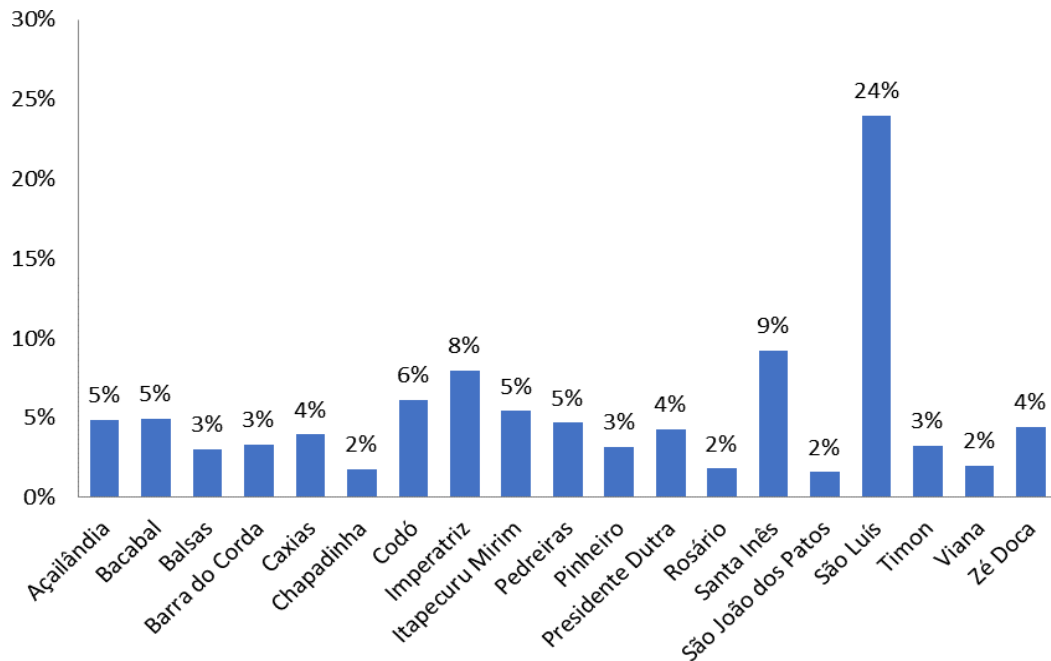
Figure 1.*Entry method regarding Leprosy cases in Maranhão, 2012-2020*

Note: Ministério da Saúde/Sistema de Informação de Agravos de Notificação (SINAN)

According to the municipalities, São Luís, Imperatriz, Timon, Caxias and Codó, it was observed that notifications were higher in the city of São Luís with a total of 24%, when compared to other municipalities, there was a prevalence of 9% (n= 29) in Santa Inês and 8% in Imperatriz. This uneven pattern in the trend of leprosy indicators may be a reflection of factors in health actions and services in some municipalities, while others have more difficulties in offering access to health services (Monteiro et al., 2015; Souza Junior et al., 2020). In Maranhão, there is a higher prevalence of the disease in municipalities with a larger number of inhabitants such as São Luís, Imperatriz and Timon, data corroborated by previous studies (Barbosa et al., 2014). For Ribeiro et al. (2018) in their study found that in 2015 the prevalence of leprosy in the Northeast and Central-West was mainly responsible for the state of Maranhão.

Figure 2.

Municipalities notified of Leprosy in Maranhão, 2012-2020



Note: Ministério da Saúde/Sistema de Informação de Agravos de Notificação (SINAN)

CONCLUSIONS

Through this study, it was possible to analyze the epidemiological aspects of leprosy in Maranhão, from 2012 to 2020, in which it was found that in 2012 there was a higher prevalence of leprosy cases in the period evaluated, with the gender variable being more significant for patients male, aged 30 to 39 years and with low education. The most prevalent forms of Leprosy presentation were the dimorphic form, followed by the Virchowian form. It is noteworthy that the understanding of health professionals in knowing the epidemiological profile and clinical characteristics of patients diagnosed with leprosy is fundamental for the development of strategies aimed at this group. In addition, the search for contacts of leprosy patients for dermatoneurological evaluation must be reinforced, offering care at alternative times, carrying out guidance and awareness-raising actions for early diagnosis of the disease, promoting the inclusion of men in educational and self-care activities.

Therefore, this study may contribute to the guidance of health professionals, especially nurses who work in planning, managing health policies, preventing and controlling the disease, to ensure a better standard of health care for immediate diagnosis and treatment of leprosy cases across the country, aiming to improve aspects related to education and health, paying greater attention to the public with the highest prevalence, so that the disease is treated efficiently.

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