Socioeconomic and epidemiological characteristics of leprosy in Maranhão

Características socioeconomicas e epidemiológicas da hanseníase no Maranhão

Características socioeconómicas y epidemiológicas de la lepra en Maranhão

RESUMO

Objetivo: Avaliar as características sociodemográficas e epidemiológicas da hanseníase no Estado do Maranhão no período de 2015 a 2021. Método: estudo ecológico de série temporal, utilizando os indicadores epidemiológicos do Programa de Controle da Hanseníase. Resultados: O perfil dos casos é composto na sua maioria por indivíduos do sexo masculino, com idade entre 30 e 50 anos, pardos, com baixo nível de escolaridade. Observou-se crescimento de novos casos da doença sendo diagnosticados com o grau 2 e de casos multibacilares. Conclusão: apresenta um grave problema de saúde, principalmente quando se analisa os indicadores de casos que são diagnosticados tardiamente e a situação de pacientes com o grau mais acentuado da doença. Portanto, cabe ao poder público a formulação e implantação de políticas de saúde com vistas à melhoria da capacidade e da qualidade dos serviços prestados, no sentido de potencializar a assistência aos indivíduos com hanseníase..

DESCRITORES: Hanseníase; Epidemiologia; Perfil Epidemiológico.

ABSTRACT

Objective: To evaluate the sociodemographycall and epidemiological characteristics of leprosy in the State of Maranhão from 2015 to 2021. Method: ecological time series study, using the epidemiological indicators of the Leprosy Control Program, in the State of Maranhão. Results: The epidemiological profile of leprosy cases reported in Maranhão is composed mostly of male individuals, aged between 30 and 50 years, mixed race, with a low level of education. There was an increase in new cases of the disease being diagnosed with grade 2 and multibacillary cases. Conclusion: leprosy in the State of Maranhão is a serious health problem, especially when analyzing the indicators of cases that are diagnosed late and the situation of patients with the most severe degree of the disease. Therefore, it is up to the government to formulate and implement health policies, with a view to improving the capacity and quality of the services provided, in order to enhance assistance to individuals with leprosy.

DESCRIPTORS: Leprosy, Epidemiology. Epidemiological Profile.

RESUMEN

Objetivo: evaluar las características clínicas y epidemiológicas de la lepra en el Estado de Maranhão de 2015 a 2021. Método: estudio de serie temporal ecológica, utilizando los indicadores epidemiológicos del Programa de Control de la Lepra, en el Estado de Maranhão. Resultados: El perfil de los casos de lepra está compuesto por individuos del sexo masculino, con edad entre 30 y 50 años, mestizos, con bajo nivel educativo. Hubo un aumento de nuevos casos de la enfermedad diagnosticados con grado 2 y casos multibacilares. Conclusión: la lepra en el Estado de Maranhão es un grave problema de salud, sobre todo cuando se analizan los indicadores de casos que son diagnosticados tardíamente y la situación de los pacientes con el grado más grave de la enfermedad. Por lo tanto, corresponde al gobierno formular e implementar políticas de salud, con miras a mejorar la capacidad y la calidad de los servicios prestados, a fin de mejorar la asistencia a las personas con lepra.

DESCRIPTORES: Lepra, Epidemiología. Perfil Epidemiológico.

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INTRODUÇÃO

Leprosy, although a well-known disease, is still considered a public health problem [1]. This pathology is caused by Mycobacterium leprae. In Brazil, it is a health problem that requires compulsory notification and investigation [2].

The disease affects the skin, mucous membranes and the peripheral nervous system (PNS), causing extensive axonal losses when not treated, and may develop deficiencies and deformities, as well as physical disabilities, impacting morbidity, causing limitations in the social life of the affected person, in addition to psychological suffering [3].

Despite the significant reduction in new cases of the disease after the introduction of multidrug therapy (MDT) in the 1980s, the World Health Organization (WHO) points out that in 2020, 127,396 new cases of the disease were reported worldwide. Of these, 19,195 (15.1%) occurred in the Americas region and 17,979 were reported in Brazil, which corresponds to 93.6% of the number of new cases in the Americas. Brazil, India, and Indonesia reported more than 10,000 new cases, corresponding to 74% of new cases detected in the year 2020. In this context, Brazil ranks second among the countries with the highest number of cases in the world, behind only India [4].

According to the Ministry of Health, between 2016 and 2020, 155,359 new cases of leprosy were diagnosed in Brazil. With regard to the Federative Units, the state of Maranhão was the second in new cases of the disease, second only to Mato Grosso. In addition, the State is the 3rd in general detection rate of new cases of leprosy per 100,000 inhabitants, from 2010 to 2021 [5].

Knowing the leprosy profile is essential to help contain it [6]. Thus, the objective was to evaluate the sociodemographic and epidemiological characteristics of leprosy in the state of Maranhão from 2015 to 2021.

METHODS

This is an ecological time series study, using the epidemiological indicators of the Leprosy Control Program in Maranhão. The State is in the Northeast region of Brazil, bordering Piauí, Tocantins, Pará and the Atlantic Ocean. With an area of 331,936.949 km², it has 217 municipalities and about 7,153,262 inhabitants (IBGE - Brazilian Institute of Geography and Statistics, 2021).

The study population consisted of leprosy cases registered and notified in the period from 2015 to 2021, taken from the Notifiable Diseases Information System (SINAN), available online on the website of the Department of Informatics of the Unified Health System (DATASUS), in November 2022. Data processing and analysis took place in December 2022.

Four epidemiological indicators were analyzed. Their descriptions, calculation, use, and analysis parameters are described in Table 1.

Data interpretation was based on

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Table 1 – Epidemiological indicators of leprosy: construction, usefulness, and evaluation parameters, 2022.

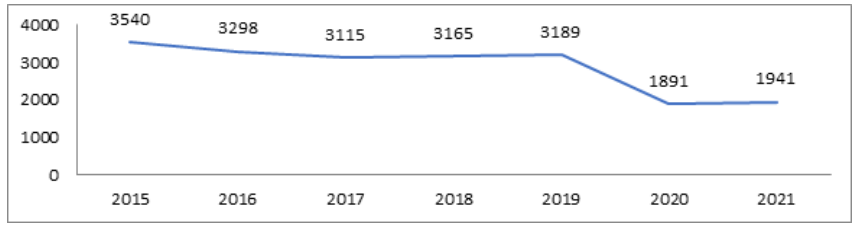
EPIDEMIOLOGICAL INDICATORS	CONSTRUCTION	USE	PARAMETER
Annual detection coefficient of new cases per 100,000 population.	New resident cases diagnosed in the year divided by Total resident population x 100,000	New resident cases tested in the year divided by Total resident population x 100,000	• 40.0/10,000 inhabitants. • Very High: 40.0–| 20.0/100,000 inhabitants. • High: 20.0–|10.0/100,000 inhabitants. • Medium: 10.0–| 2/100,000 inhabitants. Low: < 2/100,000 inhabitants.
Annual detection coefficient of new cases in the population aged 0 to 14 years, per 100,000 inhabitants.	New cases of residents aged 0 to 14 years old diagnosed in the year divided by the resident population aged 0 to 14 years old	Determine the secular trend of the endemic	•Hyperendemic: greater than 10.0/100,000 inhabitants •Very: High: 10.0–|5/100,000 inhabitants. •High: 5 –|2.5/100,000 inhabitants. •Medium: 5 –|2.5/100,000 inhabitants. •Low: < 2/100,000 inhabitants.
Prevalence coefficient by 10,000 inhabitants.	Existing cases residing on active registry divided by total resident population x 10,000	Measuring the magnitude of the disease	•Hyperendemic: greater than 20.0/10,000 inhabitants •Very High: 20.0–| 10.0/10,000 inhabitants. •High: 10.0–|5.0/10,000 inhabitants. •Medium: 5.0–|1.0/10,000 inhabitants. •Low: < 1.0/10,000 inhabitants.
Proportion of cases with physical disability among new cases detected and evaluated in the year	New resident cases diagnosed in the year with physical disability grade II divided by new resident cases diagnosed in the year with assessed physical disability grade x 100	Estimate the effectiveness of activities for early detection of cases. Estimate the hidden endemic	• High: C> 10% • Medium: 5–|10% • Low: <5%

Source: data adapted by the authors for the demonstrative table, 2022.

the assessment of these indicators according to the leprosy control parameters established by the Ministry of Health (MS) in 2002.

Because it is a documental study of official secondary data in the public domain, without the identification of the participating subjects, there was no need for appreciation by the Research Ethics Committee (CEP). Thus, the research followed the recommendations established by the National Health Council (CNS) in Resolution No. 466/2012.

Graph 1 – Historical series of new cases of leprosy notified in Maranhão from 2015 to 2021.



Source: SINAN (2022), adapted by the authors for a demonstrative chart, 2022.

RESULTS

After carrying out the data collection at SINAN, referring to registered and notified leprosy cases, in the period from 2015 to 2021, the following results were shown in the form of graphs and tables.

After analyzing data obtained from the Notifiable Diseases Information System (SINAN) corresponding to the period 2015-2021, 20,139 new cases of leprosy were reported in Maranhão. Between 2015 and 2019, an average of 3,261.4 cases per year was observed, with 2017 being the year with the lowest number of cases. It should be noted that between 2020 and 2021 there was a considerable drop in the number of new cases reported.

Another relevant data in the context of the research concerns the sociodemographic profile of new cases of leprosy notified in the State of Maranhão, in the period from 2015 to

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Table 1 - Sociodemographic profile of new cases of leprosy notified in Maranhão from 2015 to 2021.

Variables	2015	2016	2017	2018	2019	2020	2021	Total
			Gender					
Male	2.051	1.854	1.733	1.788	1.865	1.112	1.222	11.625
Female	1.489	1.443	1.382	1.377	1.324	779	719	8.513
			Age					
0 to 4 years old	24	15	16	9	8	8	8	88
5 to 9 years old	113	106	106	107	83	43	42	600
10 to 14 years old	250	199	206	196	183	119	91	1244
UNDER 15 years old	387	320	328	312	274	170	141	1932
15 to 19 years old	226	195	186	169	229	123	104	1232
20 to 29 years old	451	413	368	409	363	209	204	2417
30 to 39 years old	616	629	524	566	514	318	304	3471
40 to 49 years old	526	502	483	508	517	306	341	3159
50 to 59 years old	552	527	477	462	540	283	318	3159
60 to 69 years old	450	401	416	431	426	255	286	2665
70 to 79 years old	246	249	219	224	244	164	177	1523
80 years old and over	98	92	92	84	82	63	66	576
			Race					
White	477	483	422	450	430	284	272	2818
Black	547	508	496	467	521	263	278	3080
Yellow	29	30	30	45	29	12	22	197
Mixed	2425	2213	2109	2151	2158	1290	1330	11567
Indigenous	20	12	10	4	13	0	6	65
Ignored/white	42	52	48	48	38	42	33	303
			Education					
Illiterate	585	462	484	435	444	242	235	2887
1st to 4th grades incomplete from Elementary School *	794	746	643	699	628	370	386	4266
4th grades complete from Elementary School	266	209	172	163	170	104	105	1099
5th to 8th grades incomplete from Elementary School *	603	508	485	532	494	277	280	3179
Elementary School complete	191	196	164	170	225	107	119	1172
High School incomplete	215	206	200	198	245	109	129	1302
High School complete	471	473	420	449	488	288	272	2861
Higher Education complete	39	39	39	42	43	34	25	261
Higher Education complete	67	77	66	82	90	54	50	489
Not applicable	36	43	43	37	27	20	16	222
Ignored/white	273	339	399	358	335	286	324	2314

*ES = Elementary School Source: SINAN/SVS/MS, adapted by the authors for demonstrative table, 2022.

2021, as can be seen in the table below. Based on this information, the government can design strategies for coping with the disease.

Table 1 presents sociodemographic characteristics of new cases of le-

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prosy diagnosed in the last seven years (2015 to 2021), according to sex, age group, race, and education. During the period, it was identified that males show the highest proportion of cases (57.7%) of the total. Of the 20,139 reported cases, the 30-39 age group stands out with 3,471 cases (17.2%), followed by the 40-49 age group with 3,183 cases (15.8%). In the population under 15 years old, it was quantified in 1,932 cases, with an annual average of 276 cases, showing a downward trend in the period from 2015 to 2021, with a sharp drop between 2020 and 2021.

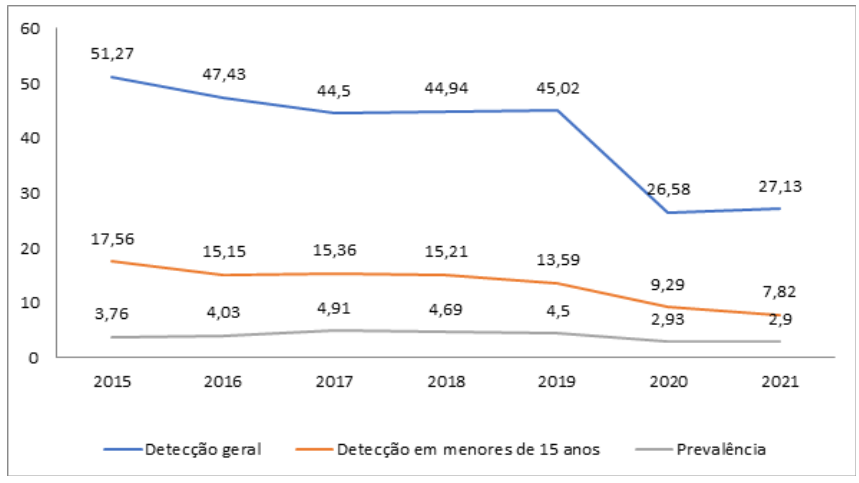
As for race/color, the predominance of new cases of leprosy in the brown population stood out in comparison to black and white. In the education variable, there was a predominance of new cases of leprosy in individuals with incomplete primary education, totaling 8544 cases.

With regard to the detection rate of new cases of leprosy in the state of Maranhão, a reduction was observed between the years 2015 (51.27 per 100,000 inhabitants), 2016 (47.43 per 100,000 inhabitants) and 2017 (44 .5 per 100,000 inhabitants), slight growth in the following years, 2018 and 2019, and a significant decline in the last years of the historical series.

It was identified that there was a reduction throughout the study period in the detection rate of new cases of leprosy in children under 15 years of age per 100,000 inhabitants, highlighting the period 2020 and 2021 with the lowest rates of 9.29 and 7.82, respectively.

Still in Graph 2, the prevalence of reported cases ranged from 3.76 per 100,000 inhabitants. in 2015 to 2.9 per 10,000 inhabitants. in 2021, with 2017 being the year with the highest rate (4.91 per 10,000 inhabitants), followed by 2018 (4.69 per 10,000 inhabitants) and 2019 (4.5 per 10,000 inhabitants). The years 2020 (2.93 per 10,000 inhabitants) and 2021 (2.9 per 10,000 inhabitants) had the lowest prevalence rates.

Graph 2 – Detection rates of new cases of leprosy and in children under 15 years old per 100,000 inhabitants and prevalence rate per 10,000 inhabitants.



Source: SINAN (2022), adapted by the authors for a demonstrative chart, 2022.

Table 2 – New cases of multibacillary leprosy and proportion of new cases of multibacillary leprosy among all new cases reported in Maranhão from 2015 to 2021.

Variables	2015	2016	2017	2018	2019	2020	2021
New multibacillary cases	2.646	2.573	2.395	2.447	2.573	1.571	1.584
Proportion of new multibacillary cases	74,7	78,0	76,9	77,3	80,7	83,1	81,6

Source: SINAN/SVS/MS, adapted by the authors for demonstrative table, 2022.

Table 3 – Ratio of new leprosy cases evaluated and grade 2 physical disability at diagnosis.

Ratio	2015	2016	2017	2018	2019	2020	2021
Evaluated at diagnosis	85,5	83,8	84,6	84,9	86,2	85,0	91,0
Grade 2 physical disability	7,9	6,9	7,3	7,7	8,1	8,0	9,6

Source: SINAN/SVS/MS, adapted by the authors for demonstrative table, 2022.

Continuing the proposed study, the data regarding new cases of multibacillary leprosy and among all new

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cases reported in Maranhão in the period from 2015 to 2021 are highlighted.

In Maranhão, from 2015 to 2021, 15,789 new cases of multibacillary leprosy were diagnosed, in the year 2020 it totaled 83.1% of all reported cases, followed by the year 2021 with 81.6% (Graphic 1). There is an increase in the proportion of multibacillary cases during the historical series analyzed.

Finally, the proportion of new cases of leprosy assessed and grade 2 and physical disability at diagnosis are highlighted, as shown in table 3.

In the analyzed period, it was observed that the ratio of people evaluated for disability at diagnosis increased, from 85.5% in 2015 to 91.0% in 2021. As for the ratio of degree 2 disability indicator, there is an increase in the percentage of patients who already present this level of disability at diagnosis, with a variation of this indicator in the studied period (from 7.9% in 2015 to 9.6% in 2021).

DISCUSSION

Maranhão is in third place in the national ranking of notification of new cases of leprosy in the country [5]. It was observed that in the period from 2015 to 2019 the State maintained an average of 3,261 cases, however due to the COVID-19 pandemic, there was a significant reduction in notification.

According to Freitas et al.[8] with the arrival of the new coronavirus pandemic and the consequent restrictive measures for the movement of people (especially social isolation during the peak period of the disease), many cities across the country decreed lockdown (total closure of activities considered non-essential), in addition to the concern with health issues (hand hygiene, use of masks, among other factors) may have contributed to a reduction in the number of leprosy notifications throughout the Brazilian territory .

However, other authors indicate a counterpoint during the pandemic period: the restructuring of health services to respond to the high demand of patients with Covid-19. Thus, there was an important impact on the implementation and operation of some public policies considered essential for the prevention and coping with leprosy throughout the country, such as, for example, the Family Health Strategy (ESF). This public policy aims to enable primary health care for individuals and the community that lives in areas farther from urban centers, reaching more isolated peoples and communities that sometimes suffer from lack of access to public health services to treat leprosy properly [9].

According to Paz et al. [10], all twenty-six states and the Federal District followed this trend of reduction in leprosy notifications. The states of Espírito Santo (88.45%), Roraima (69.61%), Piauí (56.51%), Amazonas (54.19%) and Bahia (52.99%) were those that presented the greatest reductions , during the period from 2020 to 2021. These are expressive numbers that show the need to improve the implementation of public policies aimed at preventing and combating leprosy throughout the country.

Silva et. al.[11], when analyzing the Brazilian regions, highlighted that the Southeast presented a reduction of 48.67%, North a reduction of 42.23%, South presented a decrease equivalent to 41.06%, Northeast had a low of 39.96 % and in the Midwest, there was a decrease of 38.72%.

The historical series shows high rates in Maranhão in the pre-pandemic period, with a change in the curve during the Covid-19 outbreaks. From the point of view of Ribeiro et al. [12], some aspects can be analyzed with the objective of understanding why leprosy has higher records of notifications in some regions of Brazil.

One of the factors is that regions with lower Human Development Indexes (HDI), that is, in general, have a poorly structured health network and less access to basic sanitation and public health services, as well as lower per capita income. Historically, the disease is related to poverty and lack of hygiene, which justifies its high presence in less affluent locations [12] .

As for the sociodemographic profile, there was a predominance of males, which corroborates other studies [13-15]. The literature suggests that the higher prevalence of leprosy in men can be explained by the lesser care given to health by this population group, linked to aspects related to genetic susceptibility and the immune response to the etiological agent of the disease [16].

Another aspect that draws attention is the high number of cases in the public under 15 (fifteen) years old. Much of this is due to the lack of care needed to deal with risk situations. In addition to being more open and prone to contacts, lack of information often conditions the respective group not to take the necessary precautions. Therefore, it is of fundamental importance that families, together with the government and basic education institutions be able to carry out awareness campaigns and disseminate information about leprosy with the aim of minimizing contamination among young people [9].

The high proportions of brown-skinned people with incomplete primary education among leprosy cases stand out, which is like the results of other studies [15,14,17,18].

Regarding the general detection rate of new leprosy cases in Maranhão, it was observed that between the years 2015 to 2019, the state was considered hyperendemic (rate above 40 cases per 100,000 inhabitants), and that in the years from 2020 and 2021, your ranking moves to 'very high'. The sharpest reduction in the last two years may be related to the lower detection of cases caused by the covid-19 pandemic, which continues to challenge the

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health system in its ability to maintain the supply of services and guarantee the necessary care for the population [19].

It is worth mentioning that, despite the decrease in leprosy indicators in the period studied, Brazil has not yet reached the goal of eradicating leprosy and remains one of the priority countries for its confrontation. The behavior of the detection rate of new cases in children under 15 followed the general trend, with the state being classified as hyperendemic from 2015 to 2019 and very high in the years 2020 and 2021. Maranhão occupies the first position in number of new cases in children under 15 years old, followed by Pará and Pernambuco [19].

According to the parameter of the Ministry of Health, the prevalence of leprosy in Maranhão was classified as medium in the years 2015 to 1019, and as low in 2020 and 2021, with a rate of 2.93 and 2.90 per 10,000 inhabitants, respectively. The leprosy prevalence coefficient is considered an essential indicator to support the formulation of disease control actions and strategies with a view to timely treatment of patients, discontinuity of the transmission chain and prevention of physical disabilities [20].

Also noteworthy is the number of cases of multibacillary leprosy (MB), despite the reduction in the number of notifications throughout Maranhão, in 2020 and 2021, the ratio of multibacillary leprosy was above 80% in these two years of the historical series. Several authors [13,15] such[21] as Oliveira and colleagues, in a study carried out in an endemic region of the Brazilian Amazon, also found similar results.

According to Farias[22] multibacillary leprosy is characterized by the presence of many bacilli, which can cause five more types of lesions on the skin of the same victim, leaving him in a more critical situation, since the symptoms are more severe. It is known that the MB forms occur due to the immunological instability against the etiological agent and that individuals with the lepromatous clinical form, without treatment, are considered the main transmitters of the disease [23]. Thus, the active search for MB cases in men should be used as a strategy for the prevention of new cases of leprosy in Maranhão.

Finally, there was an increase in the assessment of disability at the time of diagnosis, between the years 2015 to 2021. However, the growth in the proportion of individuals with grade 2 disability is noteworthy, which is similar to the national data on the increase in this grade of disability in the last two years[5]. This finding means that the diagnosis of the disease has occurred late, relating, according to the literature, the population's lack of knowledge about the disease, lack of professional qualification to identify signs and symptoms and the silent evolution of the disease [15].

Leprosy is a silent disease and in some cases imperceptible at first. However, usually when the victim begins to perceive the symptoms more sharply, it is because the stage is already more advanced. Hence the reason why one must take all the necessary precautions, in any case of suspicion, undergo the examination and, if diagnosed, start the treatment as soon as possible [22].

Often, the occurrence of disabilities implies permanent sequelae, due to damage to peripheral nerves and ocular structures, which makes the patient more susceptible to various accidents (such as burns, infections, falls, wounds) in addition to interfering with quality of life [24].

Among the limitations of this study, those inherent to the use of secondary data from the Information System for Notifiable Diseases - SINAN stand out, as well as operational factors linked to endemic control actions, such as insufficient active search and diagnosis of cases. , which may result in underreporting [25].

CONCLUSION

The epidemiological profile of leprosy cases reported in Maranhão between 2015 and 2021 is mostly composed of male individuals, of economically active age, brown, with a low level of education. There was an increase in new cases of the disease being diagnosed with grade 2 and a high proportion of multibacillary cases, showing late diagnosis.

These findings reinforce the need to better direct efforts around early diagnosis and the implementation of public policies focused on raising awareness and raising awareness among the population, as well as improving the capacity and quality of services provided by health professionals, in the sense of enhancing assistance to individuals with leprosy in the State.

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