



EPIDEMIOLOGICAL ASPECTS OF LEPROSY IN A MUNICIPALITY IN NORTHEASTERN BRAZIL

Aspectos epidemiológicos da hanseníase em um município nordestino do Brasil

Aspectos epidemiológicos de la lepra en un municipio del noreste de Brasil

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ABSTRACT

Objective: To analyze the epidemiological aspects of leprosy in a municipality in northeastern Brazil. **Methods:** A cross-sectional study was conducted with secondary data on leprosy from the Notifiable Disease Information System (Sistema de Informação de Agravos de Notificação – Sinan) of the municipality of Maracanaú, Ceará, from 2009 to 2018. The data were analyzed using Stata software version 11.2. **Results:** A total of 639 new cases of leprosy were diagnosed in the municipality of Maracanaú. Most of the new cases were men. The predominant clinical classification of the disease is the dimorphic form, with a mean rate of 42.4%. Of the 639 cases diagnosed in Maracanaú, 33 (5.2%) were identified by contact examination, 23 (3.6%) by collective examination and 583 (91.2%) by passive detection. **Conclusion:** The municipality has an annual detection rate that indicates hyperendemicity, thus indicating high case detection found in children under fifteen years old and permanence of transmission sources. The clinical and epidemiological characteristics point to the male sex, multibacillary operational classification, the most common being the dimorphic clinical form, and predominantly zero degree of disability at the time of diagnosis. Parte superior do formulário

Descriptors: Leprosy; Epidemiology; Epidemiological Monitoring.

RESUMO

Objetivo: Analisar os aspectos epidemiológicos da hanseníase em um município nordestino do Brasil. **Métodos:** Realizou-se um estudo transversal a partir de dados secundários sobre a hanseníase oriundos do Sistema de Informação de Agravos de Notificação (Sinan) do município de Maracanaú, Ceará, de 2009 a 2018. Os dados foram analisados pelo software Stata, versão 11.2. **Resultados:** Diagnosticaram-se 639 casos novos de hanseníase no município de Maracanaú. A maioria dos casos novos foi do sexo masculino. A classificação clínica da doença predominante é a forma dimorfa, com proporção média de 42,4%. Dos 639 casos diagnosticados em Maracanaú, 33 (5,2%) ocorreram através de exame de contato, 23 (3,6%) por exame de coletividade e 583 (91,2%) pelas formas de detecção passiva. **Conclusão:** O município encontra-se com taxa de detecção anual que indica hiperendemicidade, indicando alta detecção de casos, com registro em menores de quinze anos, indicando a permanência de fontes de transmissibilidade. As características clínicas e epidemiológicas são do sexo masculino, classificação operacional multibacilar, sendo a forma clínica dimorfa a mais frequente e com predomínio para o grau zero de incapacidade no momento do diagnóstico.

Descritores: Hanseníase; Epidemiologia; Monitoramento Epidemiológico.



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RESUMEN

Objetivo: Analizar los aspectos epidemiológicos de la lepra en un municipio del noreste de Brasil. **Métodos:** Se ha realizado un estudio transversal de los datos secundarios de la lepra a través del Sistema de Información de Agravios de Notificación (Sinan) del municipio de Maracanaú, Ceará, entre 2009 y 2018. Se analizaron los datos por el software Stata, versión 11.2. **Resultados:** Se ha diagnosticado 639 casos nuevos de la lepra en el municipio de Maracanaú. La mayoría de los casos nuevos ha sido del sexo masculino. La clasificación clínica de la enfermedad que ha predominado ha sido la forma dimorfa con la proporción media del 42,4%. De los 639 casos diagnosticados en Maracanaú, 33 (5,2%) se dieron por la prueba de contacto, 23 (3,6%) por la prueba de colectividad y 583 (91,2%) por las formas de detección pasiva. **Conclusión:** La tasa de detección anual del municipio indica hiperendemicidad con elevada detección de casos con el registro en menores de quince años lo que indica la permanencia de fuentes de transmisibilidad. Las características clínicas y epidemiológicas son del sexo masculino, la clasificación operacional multibacilar y la forma clínica dimorfa es la más frecuente con el predominio para el grado cero de discapacidad en el momento del diagnóstico.

Descriptor: Lepra; Epidemiología; Monitoreo Epidemiológico.

INTRODUCTION

Leprosy is an infectious process caused by bacteria called *Mycobacterium leprae*. Such bacteria can specifically infect a large number of individuals, but only a small number of these individuals will present clinical manifestations⁽¹⁾.

Thus, it is an inciting public health problem due to its socioeconomic impact and its psychological repercussion caused by the disease process⁽²⁾. Despite efforts made by the Ministry of Health and international health institutions to eliminate it through strategies and programmatic actions, the active transmission of this disease remains present^(2,3).

In 2016, according to the World Health Organization (WHO), 143 countries reported 214,783 new leprosy cases – a detection rate of 2.9 cases per 100 thousand inhabitants. In the same year in Brazil, 25,218 new cases were reported, with a detection rate of 12.2/100 thousand inhabitants. These parameters classify the country as one with a high disease burden ranking second in number of new cases worldwide⁽⁴⁾.

In the Northeast region, the detection rate of new cases per 100 thousand inhabitants was 23.42, with the state of Maranhão standing out with the highest detection rate – 53.91 cases per 100 thousand inhabitants – and the state of Rio Grande do Norte with the lowest detection rate – 7.89 cases per 100 thousand inhabitants⁽⁴⁾.

In Ceará, the rate of detection of new cases was 22.24 cases per 100 thousand inhabitants from 2012 to 2016. According to the State Health Secretariat, the state of Ceará reported 8,536 new cases of the disease and there was a predominance of men among the new cases of the disease between 2014 and 2018 (4,909). Also, there has been a noticeable reduction in the detection rate in all age groups, but there is still a significant number of cases in the population over 60 years old^(4,5).

The National Leprosy Control Program (*Programa Nacional de Controle da Hanseníase - PNCH*) provides for health communication actions, continuing education and social mobilization. According to current policies, the participation of different stakeholders in the planning, execution and evaluation of actions should be promoted to favor the democratization and decentralization of such actions^(6,7).

Given the challenges for the implementation of the National Leprosy Elimination Plan, municipalities should prioritize the training of professionals in the Primary Health Care Network⁽³⁾, the decentralization of leprosy actions and the involvement of municipal health care managers and teams⁽⁸⁾.

Thus, the present study aimed to analyze the epidemiological aspects of leprosy in a municipality in Northeastern Brazil.

METHODS

We conducted a cross-sectional study of secondary data collected from the leprosy notification forms of the Notifiable Disease Information System (*Sistema de Informação de Agravos de Notificação – Sinan*) of the the Epidemiological Surveillance sector of the Maracanaú Health Secretariat, Ceará, Brazil. Information was collected in February 2019 and the study included all new confirmed leprosy cases reported from January 2009 to December 2018.

Demographic data on annual population distribution were obtained from the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística - IBGE*). The municipality of Maracanaú is located about 20 km from the state capital. Its neighboring municipalities are Fortaleza, Caucaia, Maranguape and Pacatuba and it has an area of 105 km². In 2018, it had an estimated population of 226,128 inhabitants, mostly urban (99.69%), and a human development index (HDI) of 0.686 and a demographic density of 2,134.13 inhab/km²(9).

The city of Maracanaú is historically marked by the care delivered to leprosy patients. In December 1942, the city inaugurated the *Colônia de São Bento* (St. Benedict Colony), which was later called *Colônia Antônio Justa* (Antônio Justa Colony), a place founded to shelter about 500 patients with “Hansen’s disease”. Currently, the place is no longer intended for such care. The National Leprosy Control Program was implemented in the city with the objective of establishing goals and guidelines to expand prevention, diagnosis, treatment and control of the disease through the reorganization of health care work in Primary Health Care Centers (*Unidades Básicas de Saúde – UBASF*) and the development of actions aimed at diagnosing new cases in the early stage of the disease, assessing contacts of patients following treatment, and decentralizing care to UBASF in order to refer only the most serious cases to the reference physicians.

There were 656 individual notification forms dated from the period analyzed and consolidated by the Sinan of the Maracanaú Municipal Health Secretariat. Of these, cases with misdiagnosis (n=8), duplicates (n=4) and forms with data inconsistencies (n=5) were excluded, thus resulting in 639 new leprosy cases.

After that, the database was refined to identify and select the variables of interest: age, sex, clinical form of the disease, operational classification, degree of disability in diagnosis, mode of entry and mode of detection.

Data were organized and exported using the Libre Office and TabWin version 3.2 software and analyzed using Stata version 11.2 (Stata Corp LP, College Station, TX, USA). The calculation of detection proportions and rates was based on the indicators of the Guidelines for leprosy surveillance and elimination as a public health problem prepared by the Ministry of Health.

The evaluation of leprosy – as a public health problem – elimination progress monitoring indicators was performed considering the following WHO parameters: proportion of leprosy cases by sex among total new cases (female leprosy cases divided by the total of new cases multiplied by 100); proportion of cases by operational classification among total new cases (multibacillary leprosy cases divided by total new cases multiplied by 100); annual detection rate of new leprosy cases per 100 thousand inhabitants (new cases in a given location and diagnosed in the year of assessment divided by the total population living in the same location and period multiplied by 100 thousand); annual detection rate of new leprosy cases in the population aged 0 to 14 years per 100 thousand inhabitants (new cases among children under 15 years of age living in a given location and diagnosed in the year of assessment divided by the population aged 0 to 14 years in the same place and period multiplied by 100 thousand).

The two indicators used to assess the quality of leprosy services were: proportion of leprosy cure among new cases diagnosed in the cohort years (new leprosy cases living in a given location diagnosed in the cohort years and cured by 12/31 of the year of assessment divided by the total number of new leprosy cases living in the same location and diagnosed in the cohort years multiplied by 100) and the proportion of new leprosy cases with a degree of physical disability assessed at diagnosis (new leprosy cases with a degree of physical disability assessed at diagnosis living in a given location and detected in the year of assessment divided by new leprosy cases living in the same location and diagnosed in the year of assessment multiplied by 100). The cohorts are composed of new paucibacillary (PB) cases diagnosed in the year prior to the assessment and contacts of the new multibacillary cases diagnosed two years before the assessment.

This study used official secondary data available in the public domain that do not identify subjects; therefore, approval by a Research Ethics Committee was waived

RESULTS

From 2009 to 2018, 639 new cases of leprosy were diagnosed in the municipality of Maracanaú, which is equivalent to a mean detection rate of 29.3 new cases per 100 thousand inhabitants. Most new cases were among men (n=344; 53.8%); however, notifications of cases among women predominated in 2013 (56%) and 2018 (65%) (Figure I).

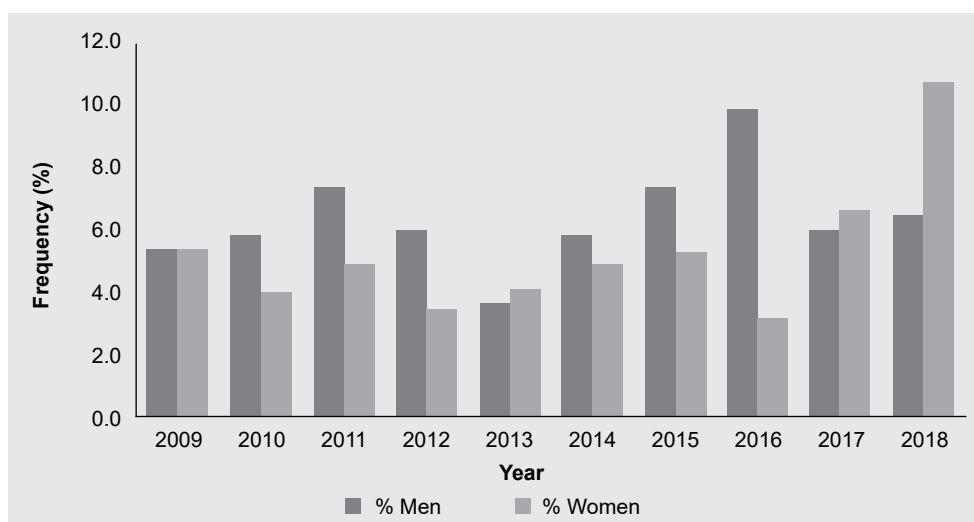


Figure I - Proportion of new leprosy cases by sex, Maracanaú/Ceará, 2009-2018 (n=639). Maracanaú, 2019. Source: Sinan/Epidemiological Surveillance – Maracanaú Health Secretariat. Data collected on February 6, 2019

With regard to the assessment of the degree of disability, more than 90% of the new cases were assessed for the degree of physical disability at diagnosis. Of these, 13.6% had grade II disability and 60% of the new cases underwent assessment at discharge. It should be noted that 15.6% of the new cases were still actively registered and 17% had started treatment in 2017 and 83% in 2018 (Table I).

From 2009 to 2018, 77% of the contacts of new leprosy cases diagnosed in Maracanaú were examined. In the first three years evaluated, the rate of contacts was over 80, exceeding 90% in all subsequent years (Table I).

Table I shows that the clinical classification of the predominant disease is the dimorphic form, which is classified as multibacillary, with a mean rate of 42.4%. In addition, the predominant mode of entry of patients was that of new cases (86.1%); however, although the Ministry of Health does not specify a parameter to evaluate the relapse indicator, the rate was 3.1%.

Of the 639 cases diagnosed in Maracanaú, 33 (5.2%) were identified through contact examination, 23 (3.6%) through collective examination and 583 (91.2%) through passive detection (referral, spontaneous demand, and other modes) (Table I).

Table I - Distribution of new leprosy cases by sex, clinical form, operational classification at notification, degree of disability at diagnosis, mode of entry and mode of detection in the municipality of Maracanaú, 2009-2018. Maracanaú, 2019.

Variables	n	%
Sex		
Men	344	53.8
Women	295	46.2
Clinical form at notification		
Undetermined	93	14.6
Tuberculoid	136	21.3
Dimorphic	271	42.4
Virchowian	171	18.9
Ignored/blank	12	1.9
Not classified	6	0.9
Operational classification at notification		
Paucibacillary	222	34.7
Multibacillary	417	65.3

Degree of disability at diagnosis		
Degree 0	277	43.4
Degree I	212	33.2
Degree II	87	13.6
Ignored/blank	6	0.9
Not assessed	54	8.5
Mode of entry		
New case	639	86.9
Referral from the same municipality	9	1.2
Referral from another municipality (state, country)	47	6.4
Relapse	23	3.1
Other reentries	17	2.4
Mode of detection		
Referral	202	31.6
Spontaneous demand	354	55.4
Collective examination	23	3.6
Contact examination	33	5.2
Ignored/blank	4	0.6
Other modes	23	3.6

Source: Sinan/Epidemiological Surveillance – Maracanaú Health Secretariat. Data collected on February 6, 2019

The coefficient of detection of new cases per 10,000 inhabitants was classified as “very high” in eight of the ten years analyzed. It was also classified as “high” in 2013 and as “hyperendemic” in 2018 since in all years this coefficient was above 1/10,000 inhabitants (Chart I).

On the other hand, the detection coefficient in children under 15 years of age fluctuated over the period analyzed, with values above 1/10,000 in 2012, 2014, 2016 and 2018 (Figure II).

In 2013 and 2015, the proportion of new cases of leprosy cured exceeded 90%; and the proportion was higher than 80% in the other years analyzed (Figure III).

Chart I - Distribution of the detection of new leprosy cases in Maracanaú from 2009 to 2018. Maracanaú, 2019.

Year	New cases	Overall detection coefficient per 100,000 inhabitants	Classification *	Detection coefficient 0-14 years per 100,000 inhabitants	Classification *
2009	65	3.2	Very high	0.35	Medium
2010	52	2.5	Very high	0.55	Medium
2011	71	3.3	Very high	0.37	Medium
2012	54	2.5	Very high	1.09	High
2013	41	1.9	High	0	Low
2014	58	2.6	Very high	1.06	High
2015	67	3.0	Very high	0.71	Medium
2016	69	3.1	Very high	1.4	High
2017	67	3.0	Very high	0.35	Medium
2018	95	4.2	Hyperendemic	1.79	High
TOTAL	639	-	-	-	-

Source: Sinan/Epidemiological Surveillance – Maracanaú Health Secretariat. Data collected on February 6, 2019

*Hyperendemic: $\geq 4.0/10,000$ inhab.; Very high: $4.0 - | 2.0/10,000$ inhab.; High: $2.0 - | 1.0/10,000$ inhab.; Medium: $1.0 - | 0.2/10,000$ inhab.; Low: $< 0.2/10,000$ inhabitants

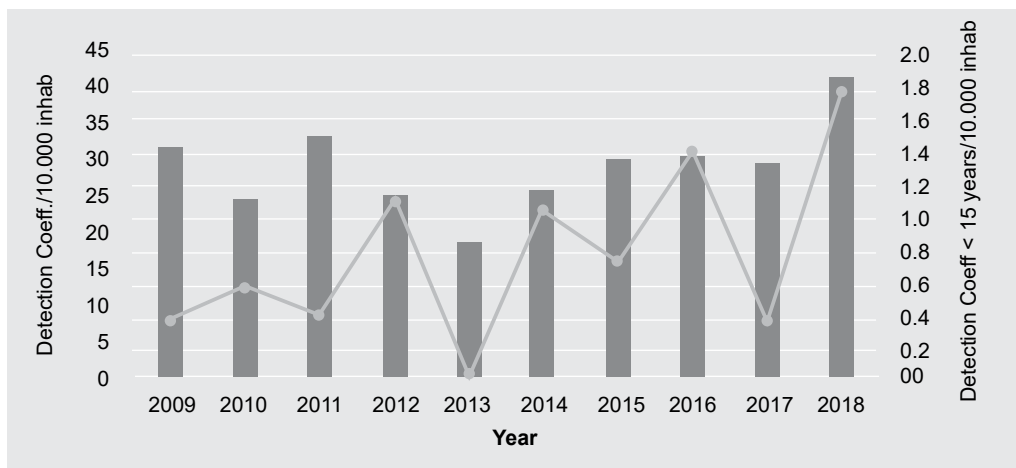


Figure II - Coefficient of detection of new cases per year in Maracanaú from 2009 to 2018. Maracanaú, 2019. Source: Sinan/Epidemiological Surveillance – Maracanaú Health Secretariat. Data collected on February 6, 2019

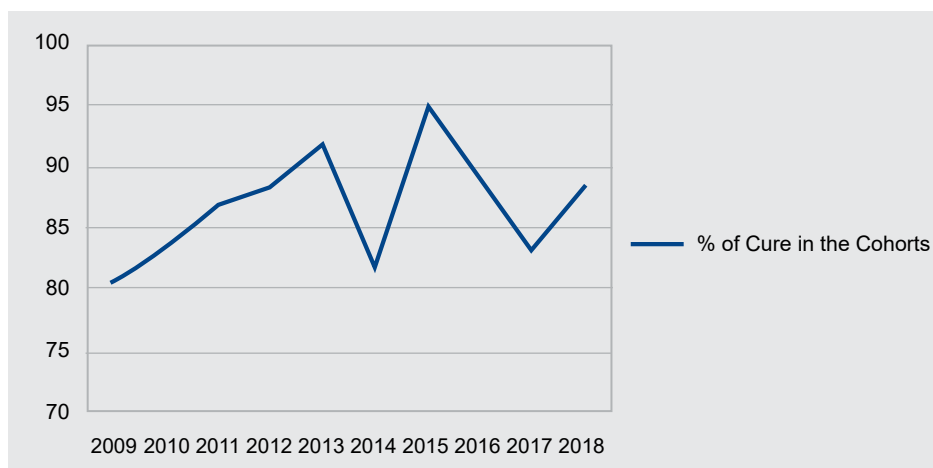


Figure III - Maracanaú, 2019. Proportion of new leprosy cases cured in the municipality of Maracanaú from 2009 to 2018. Maracanaú, 2019. Source: Sinan/Epidemiological Surveillance – Maracanaú Health Secretariat. Data collected on February 6, 2019

DISCUSSION

In recent years there has been a reduction in the number of leprosy cases worldwide, but its elimination in some countries, including Brazil, is still challenging. Despite the commitment of the World Health Organization (WHO) and governments to eradicate the disease, it remains a major public health problem⁽¹⁰⁾.

The present study showed that the diagnosis of leprosy in the municipality of Maracanaú was more frequent among men from 2009 to 2018. According to data from the Ministry of Health, the detection rate per 100 thousand inhabitants in the male population was higher than in the female population in all age groups from 2012 to 2016⁽⁴⁾.

In that regard, health education, contact surveillance, diagnosis quality improvement, and prevention and treatment of disabilities should be prioritized. There should be a differentiated focus for men and women and men should be influenced for self-care actions and for seeking health services in the early stage of the disease, thereby avoiding late diagnosis and, consequently, physical disabilities. The annual detection rate in 2018 was 4.2/10,000 inhabitants, which is considered hyperendemic according to the parameters used by the Ministry of Health⁽⁴⁾. In the population from zero to 14 years old, the detection coefficient ranged medium to high from 2015 to 2018. This parameter evaluates the strength of recent endemic transmission and its trends.

Over the period analyzed, dimorphic leprosy, which is classified as multibacillary, remained significantly present in the municipality, a finding that is similar to that found in the state of Ceará and in other studies^(5,6,11).

With a perspective focused on actions aimed at early detection and reduction of new leprosy cases, the Ministry of Health guides the epidemiological investigation of all intra-household contacts, including: dermatoneurological evaluation of all intra-household contacts of new leprosy cases and guidance on signs and symptoms of the disease, period of incubation, transmission and guidelines^(3,12).

This strategic action favors active detection for case discovery and aims at early diagnosis, thus contributing to break the transmission chain and reduce disabilities that arise as a result of late diagnosis. In Brazil, from 2012 to 2016, 77% of the contacts of newly diagnosed leprosy cases were examined, and the Northeast region exhibited the lowest percentage (71.8%)^(4,13).

With regard to the state of Ceará, from 2008 to 2017, 76,029 contacts were registered in Sinan and 53,802 (70.8%) were examined. Thus, there was a 7.2% increase in the proportion of contacts examined, from 65.4% in 2008 to 70.1% in 2017. However, it is still below the recommendation of the Ministry of Health⁽⁵⁾.

The municipality of Maracanaú presented in 2018 a proportion of contact exams well above the national average; however, the data also show that the number of cases diagnosed through contact exam (33 cases) represents 5.2% of the total diagnoses, being lower than the rates found in other municipalities^(14,15).

Still regarding the mode of entry, spontaneous demand, referral and other modes were predominant in the present study to the detriment of contact exam. This finding is similar to the one found in a study⁽¹⁶⁾ that highlights that the lower proportion of cases diagnosed through contact exam suggests passivity and/or neglect in the services provided by Family Health Strategy professionals in the active search of cases or a lower occurrence in this population due to immunological factors. However, further studies are needed to evaluate these hypotheses.

Of the cases assessed for the degree of physical disability at diagnosis, a significant number of patients had undergone this assessment, which is considered a good parameter; however the proportion of grade 2 disability at diagnosis remained high for new leprosy cases, thus demonstrating that although patients have access to the service at the municipal level the diagnosis is late in the analyzed municipality. In addition, because the disease is potentially disabling, it may cause physical deformities, which may influence school life during childhood and adolescence due to social limitations, discrimination, low self-esteem and stigma^(2,17).

As for the cure indicator, there is a fair parameter in the analyzed municipality, with a proportion of 88.4%. This finding is similar to the one reported in the state of Ceará⁽⁵⁾. Cure of leprosy is the condition in which the patient, initially infected with *Mycobacterium leprae* and diagnosed as a case of leprosy, initiated and completed treatment for paucibacillary (PB) or multibacillary (MB) forms within the WHO-estimated timeframe. However, in some cases, especially in multibacillary forms, although the patient has completed MDT (multidrug treatment) and has already been excluded from the active registration of leprosy cases, the person affected by the disease usually continues to receive follow-up due to acquired physical disabilities and/or the possibility of leprosy reaction⁽¹⁶⁾.

Thus, an adequate structure of the local health care network is expected for systematic evaluation of leprosy patients after discharge as the proper management of these people will largely determine the prevention of complications, the reduction of rehabilitation costs and improvement in the quality of life of these patients⁽¹³⁾.

In Brazil, leprosy prevention depends primarily on the actions of the Family Health Team, which allow a rearrangement of health priorities, such as the control of leprosy, particularly: epidemiological surveillance; management focused on decentralization, planning, monitoring and evaluation; comprehensive care; communication and education; and the development of research⁽¹⁸⁾.

The health promotion activities focused on this issue should indispensably count on the participation of professionals of the Family Health Strategy, especially in the replacement of traditional methodologies for resources that may contribute to an educational practice in a non-vertical, playful, innovative, creative, interactive and reflective perspective seeking to promote the empowerment of the individuals regarding their health, rights and living conditions. These actions should go beyond the actions aimed only at the distribution of multidrug therapy, the referral of patients to other care settings and the entry of data into information systems^(19,20).

For Brazil to eliminate leprosy as a public health problem, it is necessary that health services have professionals capable of working in teams, interacting with different people and social segments, capturing and processing information through communication and applying their skills and competences in the daily exercise of their work⁽²¹⁾.

Limitations of the present study should be highlighted. For instance, issues related to the Sinan database, which is a system that may present inconsistent information in terms of quantity and quality, such as typing errors, inconsistencies and data duplication. However, despite these limitations, this study provides important clinical and epidemiological information about leprosy patients and may provide support for planning, diagnosis, prevention,

control and reduction of physical disabilities resulting from late diagnosis, thus favoring the quality of life of patients affected with the disease.

CONCLUSION

The analyzed municipality has an annual detection rate that indicates hyperendemicity, thus indicating high case detection. It also presents cases among children under fifteen years old, thus indicating the permanence of transmissibility sources. The clinical and epidemiological characteristics of leprosy patients were male sex, multibacillary operational classification, the most common being the dimorphic clinical form, and predominantly zero degree of disability at diagnosis.

CONFLICTS OF INTEREST

The authors state that there were no conflicts of interest in the development of this study.

CONTRIBUTIONS

Carmem Rita Sampaio de Sousa, Mariana Campos da Rocha Feitosa and Kellyn Kessiene de Sousa Cavalcante contributed to the study conception and design; the acquisition, analysis and interpretation of data; the writing of the manuscript. **Ana Beatriz Ferreira Pinheiro** contributed to the acquisition, analysis and interpretation of data.

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