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PROFILE OF LEPROSY NOTIFICATIONS IN CHILDREN UNDER 15 YEARS OF AGE IN NORTHEASTERN BRAZIL

*Perfil das notificações de hanseníase em menores de 15 anos no nordeste do Brasil**Perfil de notificaciones de lepra en niños menores de 15 años en el Noreste de Brasil***Carlos Antonio de Lima Filho¹** **Milena Tereza Torres do Couto²** **Sandra Alves de Assis³** **Simara Lopes Cruz Damázio⁴** **Débora Bruna Barbosa Guedes⁵** **Maria da Conceição Cavalcanti de Lira⁶** 

ABSTRACT

Objective: to analyze the epidemiological profile of new cases of leprosy in children under 15 years of age in Northeast Brazil, between 2012 and 2022. **Method:** ecological, retrospective, epidemiological study, carried out using data from the Ministry's Notifiable Diseases Information System of Health, in December 2023. **Results:** 9,252 new cases were reported in children under 15 years of age. Of these, 4,853 (52.5%) were male, 5,783 (62.5%) were aged 10-14, 6,245 (67.5%) were mixed race and 6,026 (65.1%) were educated fundamental incomplete. There was a predominance of paucibacillary cases (N=4,826/52.2%), dimorphic (N=3,170/34.3%), with zero degree of disability (N=6,975/75.4%), with a single lesion (N=3,645 /39.4%), negative smear microscopy (N=3,708/40.1%), no reaction (N=6,110/66.1%) and referred for six doses of multidrug therapy (N=4,772/51.6%). **Final considerations:** it was found that leprosy in children under 15 years of age is a serious public health problem, requiring actions to control it.

DESCRIPTORS: Leprosy; Child; Adolescent; Epidemiology; Public Health;

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RESUMO

Objetivo: analisar o perfil epidemiológico dos novos casos de hanseníase em menores de 15 anos no Nordeste do Brasil, entre 2012 e 2022. **Método:** estudo ecológico, retrospectivo, epidemiológico, realizado por meio de dados do Sistema de Informação de Agravos de Notificação do Ministério da Saúde, em dezembro de 2023. **Resultados:** Foram notificados 9.252 novos casos em menores de 15 anos. Destes, 4.853 (52,5%) foram no sexo masculino, 5.783 (62,5%) na faixa etária dos 10-14 anos, 6.245 (67,5%) em pardos e 6.026 (65,1%) com o ensino fundamental incompleto. Houve predominância de casos paucibacilares (N=4.826/52,2%), dimorfos (N=3.170/34,3%), com grau zero de incapacidade (N=6.975/75,4%), com lesão única (N=3.645/39,4%), baciloscopia negativa (N=3.708/40,1%), sem reação (N=6.110/66,1%) e encaminhado para seis doses da poliquimioterapia (N=4.772/51,6%). **Considerações finais:** constatou-se que a hanseníase em menores de 15 anos é um acentuado problema de saúde pública, necessitando de ações para seu controle.

DESCRITORES: Hanseníase; Criança; Adolescente; Epidemiologia; Saúde Pública;

RESUMEN

Objetivos: analizar el perfil epidemiológico de los nuevos casos de lepra en niños menores de 15 años en el Nordeste de Brasil, entre 2012 y 2022. **Método:** estudio epidemiológico, ecológico, retrospectivo, realizado con datos del Sistema de Información de Enfermedades de Declaración Obligatoria del Ministerio de Salud, en diciembre de 2023. **Resultados:** Se reportaron 9.252 nuevos casos en menores de 15 años. De ellos, 4.853 (52,5%) eran hombres, 5.783 (62,5%) tenían entre 10 y 14 años, 6.245 (67,5%) eran mestizos y 6.026 (65,1%) tenían educación fundamental incompleta. Hubo predominio de casos paucibacilares (N=4.826/52,2%), dimórficos (N=3.170/34,3%), con cero grado de discapacidad (N=6.975/75,4%), con lesión única (N=3.645/39,4%), baciloscopia negativa (N=3.708/40,1%), sin reacción (N=6.110/66,1%) y remitido para seis dosis de poliquimioterapia (N=4.772/51,6%). **Consideraciones finales:** se encontró que la lepra en niños menores de 15 años es un grave problema de salud pública, requiriendo acciones para su control.

DESCRIPTORES: Lepra; Niño; Adolescente; Epidemiología; Salud Pública.

INTRODUCTION

Leprosy is an infectious, chronic, slowly progressing disease caused by the gram-negative bacterium *Mycobacterium leprae*, also known as Hansen's bacillus.^{1,2} The bacterium has a predilection for peripheral nerves and skin cells, especially Schwann cells, the cell group responsible for producing the myelin sheath of the neurons of the Peripheral Nervous System, as well as the eyes and internal organs.^{2,3}

The bacillus is transmitted via the upper airway, through intimate and prolonged contact between a susceptible person and a patient who is not undergoing treatment.^{1,3} Leprosy is characterized by a high degree of infectivity, but it has low pathogenicity, since the human body has natural immune barriers against the bacillus.⁴

Diagnosis is preferably made through physical examination and epidemiological history, but sputum smear microscopy and skin biopsy can also be performed.³ Treatment is carried out using a combination of dapsone, clofazimine and rifampicin, known as Unified Polychemotherapy (MDT-U). Patients classified as paucibacillary (5 < spots) receive six doses, while multibacillary patients (5 > spots) receive twelve doses of MDT-U.³

A unique characteristic of leprosy is the bacillus' long incubation period, which can take up to ten years for the first symptoms to appear, with a higher prevalence in adults.¹ The disease affecting people in the pediatric age group (under 15) indicates the presence of undiagnosed leprosy foci, indicating the

existence of continuous and active transmission of the bacillus at home and/or in the community.⁵

According to the World Health Organization (WHO), 10,302 new cases of leprosy were diagnosed in children under 15 in 2022.⁶ Brazil was responsible for 836 new cases in children under 15, representing around 8.1% of cases worldwide and 95.5% in the Americas, ranking third in the world, behind India and Indonesia.⁶ In Brazil, leprosy has a heterogeneous distribution, with the South and Southeast regions having the lowest prevalence, while the North, Northeast and Central-West regions have the highest prevalence and endemicity.⁷

Of Brazil's regions, the Northeast has the highest numbers of notifications, detection of new cases and presence of disabilities.⁸ The annual detection rate of new leprosy cases in children under 15 is an important epidemiological indicator, which assesses the strength of recent transmission and the upward trend of the disease.⁹ In addition, this age group marks the transition between childhood and adulthood, with important milestones in psychosocial development, where the clinical (dermatoneurological lesions, spots and disability) and social aspects related to leprosy can significantly interfere in this transition process.¹⁰

Epidemiological studies on leprosy cases in children under 15 are an important tool for analysis, contributing to the planning of actions and the evaluation of control programs. However, studies on leprosy in this age group in Brazil are still scarce.^{5,10} Based on the above, the aim of this study was to analyze the epidemiological profile of new cases of leprosy in children under 15 in northeastern Brazil between 2012 and 2022.

METHOD

This is an ecological, epidemiological, retrospective, quantitative study. The epidemiological variables were analyzed in the following ways: 1. elaboration of the research problem; 2. origin of the data; 3. reasoning; 4. variables and hypotheses; and 5. development of the study.¹¹ The guidelines recommended by the Reporting of Studies Conducted Using Observational Routinely-Collected Health Data (RECORD) were followed.¹²

The data came from the Notifiable Diseases Information System (SINAN), a database linked to the Department of Information Technology of the Unified Health System (DATASUS), which aims to aggregate data and notifications of diseases and illnesses of compulsory notification throughout Brazil. The data was collected in December 2023 by a researcher with previous experience of collecting data on SINAN, using TabNet (<https://tabnet.datasus.gov.br/>).

The target population for the study was all new cases of leprosy diagnosed in individuals under the age of 15 in the Northeast region of Brazil, notified on the SINAN between 2012 and 2022. According to the Brazilian Institute of Geography and Statistics (IBGE), the Northeast region is one of the five regions of Brazil, with a population of 54,658,515 inhabitants, the second most populous in Brazil, in an area of 1,552,174Km², distributed over nine states (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe).¹³

Initially, the data collected from SINAN was tabulated using Microsoft Excel version 2019. The following variables were selected: gender, age group, race, schooling, operational classification, clinical form, degree of disability, skin lesions, bacilloscopy, leprosy reaction and MDT-U dosage adopted. Excel was used to analyze the absolute and relative measures, and to investigate the association between the variables, the Chi-Square Adherence test was used, adopting $p < 0.05$ as statistically significant, using BioEstat software version 5.0.

In addition, the percentage proportional variation was calculated (1. numerator: difference in the number of cases between the corresponding year and the previous one; 2. denominator: total for the previous year), using the simple average of the variation over the period studied. The trend in the detection rate was also analyzed using the Shapiro-Wilk normality test, where $p < 0.05$ indicated a drop in the detection rate and $p > 0.05$ indicated stability, and the analysis was carried out using BioEstat version 5.0.

Subsequently, the detection rate in children under 15 was calculated (1. numerator: leprosy cases in children under 15; 2. denominator: population under 15 in the same place and period; 3. multiplier: 100,000). The parameters recommended by the Guidelines for Surveillance, Care and Elimination of Leprosy as a Public Health Problem,⁹ shown in Table 1, were followed. In order to ensure better data consistency, the population estimates for each year, made available by the

Ministry of Health, were used to calculate the period from 2012 to 2021, while data from the 2022 population census was used for the year 2022.

The databases Google Scholar, Scientific Electronic Library Online, Latin American and Caribbean Literature in Health Sciences and the Virtual Health Library were used for the bibliographic survey of the study, and studies published between 2012 and 2023 were recommended. As this was a study using secondary data, where the individuals were not identified, and free access, there was no need for approval from the Research Ethics Committee, even so, all the ethical standards for this type of study were followed, as provided for in Resolution No. 466/2012.

Table 1 - Coefficient parameter for the detection rate in children under 15.

PARAMETER	COEFFICIENT
LOW	<0.50/100.000 HABITANTS
MEDIUM	0.50 to 2.49/100.000 HABITANTS
HIGH	2.50 to 4.99/100.000 HABITANTS
VERY HIGH	5.00 to 9.99/100.000 HABITANTS
HYPERENDEMIC	>10.00/100.000 HABITANTS

Source: Guidelines for the surveillance, care and elimination of leprosy as a public health problem.

RESULTS

A total of 126,982 new cases of leprosy were diagnosed in the Northeast, of which 9,252 (7.3%) were in children under 15. Table 1 shows the trends in detection rates among the states in the region. In general, the region had an average detection rate of 6.31/100,000 (very high), with a stable trend (p -value: > 0.05) and an average reduction of 3.0% over the years of study. The state of Rio Grande do Norte, despite showing an average positive variation (3.0%), had the lowest average detection rate (1.69/100,000 inhabitants) and a downward trend (p -value: 0.009), while the other states showed a stable trend. The states of Maranhão (15.47/100,000 inhab.), Pernambuco (8.51/100,000 inhab.) and Piauí (7.66/100,000 inhab.) had the highest average detection rates. It was also seen that, from 2020 onwards, the region and all the states showed a sharp drop, compared to previous years, however, with the exception of the state of Rio Grande do Norte, an increase was observed in 2022, compared to the years 2020 and 2021.

The sociodemographic variables are shown in Table 3. There was a balance between the sexes, with males showing a slight prevalence in relation to females, with 52.4% and 47.5%, respectively. There was a predominance of brown individuals (67.5%), in the 10-14 age group (62.5%), and the majority had incomplete primary education (65.1%).

The clinical variables are shown in Table 4, with a certain balance between the operational classifications paucibacillary (PB) (52.2%) and multibacillary (MB) (47.8%). The dimorphic clinical form was more prevalent among the cases, with 34.3%, followed by the tuberculoid (25.0%) and indeterminate (24.9%) forms. The majority had zero degree of physical disability (75.4%), with a single lesion (39.4%) followed by those with 2 to 5 lesions (31.1%).

It was noticeable that sputum smear microscopy was not performed in the majority of individuals (40.1%), and there was still a considerable percentage of cases reported as unknown/white (21.1%), especially in the period from 2018 to 2022. There were no episodes of leprosy reactions in the majority of cases (66.1%), but in 27.7% of notifications this variable was not filled in. Most individuals were instructed to take six doses of MDT-U (51.6%).

DISCUSSION

The aim of this study was to analyze the epidemiological profile of new cases of leprosy in children under 15 in the Northeast region of Brazil. The occurrence of leprosy in children under 15 is a serious public health problem, with high endemicity and heterogeneous geographical distribution, marked by constant inequalities, barriers to accessing health services, difficulties in diagnosis, follow-up and early treatment.^{14,15}

As in other studies, a downward trend has been observed, with episodes of stability.^{1,10,16} This characteristic may be the result of the difficulty in controlling leprosy in the Northeast.¹⁷ The scenario of reduction may be the result of underreporting, due to difficulties in diagnosis and the precariousness of health services and deficiencies in professional performance.¹ However, another study showed that MDT-U, immunoprophylaxis and access to health services may have a beneficial influence on this scenario.¹⁰

Table 2 - Trends in the leprosy detection rate in children under 15 in states in the Northeast region of Brazil, 2012-2022.

STATES	DETECTION RATE (CASES/100,000 INHABITANTS)											ANNUAL AVERAGE ¹	AVERAGE VARIATION ²	P-VALOR ³
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022			
ALAGOAS	2.93	2.55	3.05	2.88	2.59	3.12	3.55	2.36	1.64	1.15	1.97	2.53	+ 0,0%	0.698
BAHIA	5.50	5.02	5.79	6.60	3.44	4.56	4.03	3.90	1.70	1.50	1.89	3.99	- 5,0%	0.499
CEARÁ	5.64	6.69	6.51	4.77	4.68	2.98	3.35	3.47	2.33	1.58	1.89	3.94	- 8,0%	0.489
MARANHÃO	19.07	18.19	18.71	19.91	17.09	16.56	17.04	14.86	9.29	7.88	11.61	15.47	- 3,0%	0.091
PARAÍBA	5.04	4.29	3.16	3.09	3.24	3.05	2.40	3.22	2.09	1.76	1.93	3.02	- 7,0%	0.362
PERNAMBUCO	11.75	12.88	12.38	11.13	8.23	9.42	7.23	7.99	3.91	3.80	4.91	8.51	- 5,0%	0.387
PIAUI	10.92	8.25	10.53	10.10	8.00	10.25	8.79	7.28	3.69	2.91	3.52	7.66	- 7,4%	0.072
RIO GRANDE DO NORTE	2.24	2.65	2.05	4.65	1.04	1.05	1.20	0.80	1.08	1.09	0.76	1.69	+ 3,0%	0.009
SERGIPE	6.25	5.81	4.97	3.72	3.77	3.61	5.53	4.21	2.11	0.97	1.92	3.90	- 3,0%	0.653
NORTHEAST REGION	8.46	8.27	8.53	8.49	6.47	6.76	6.37	5.98	3.37	2.84	3.81	6.31	- 6,0%	0.090

Source: Authors, 2023. LEGENDS: 1. Average of the years studied; 2. Between the years studied; 3. Shapiro-Wilk Normality Test.

LOW	MEDIUM	HIGH	VERY HIGH	HYPERENDEMIC
STABLE (P-value:>0.05)		FALL (P-value:< 0.05)		POSITIVE VARIATION
				NEGATIVE VARIATION

Table 3 - Sociodemographic characteristics of leprosy cases in children under 15 in the Northeast region of Brazil, 2012-2022.

VARIABLES	CASES											TOTAL	%	P- VALUE ¹
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022			
GENDER														
MALE	615	599	610	571	470	464	427	418	239	203	237	4.853	52,5	<0.0001
FEMALE	589	556	559	576	391	425	402	352	191	155	203	4.399	47,5	
AGE GROUP														
1 – 4	55	55	54	38	47	45	31	37	26	24	9	421	4,6	<0.0001
5 – 9	392	373	377	388	308	298	289	231	134	112	146	3.048	32,9	
10 – 14	757	727	738	721	506	546	509	502	270	222	285	5.783	62,5	
RACE														
IGNORED/ WHITE ²	86	68	49	55	38	50	40	33	25	15	21	480	5,2	<0.0001
WHITE	180	170	158	158	118	119	111	104	65	36	62	1.281	13,8	
BLACK	158	140	160	132	108	98	106	101	49	45	50	1.147	12,4	
YELLOW	13	7	9	7	6	6	10	5	2	3	4	72	0,8	
BROWN	763	767	790	794	588	611	561	525	288	257	301	6.245	67,5	
INDIGENOUS	4	3	3	1	3	5	1	2	1	2	2	27	0,3	
SCHOOLING														
IGNORED/ WHITE ²	159	161	167	175	118	176	129	99	77	77	85	1.423	15,4	<0.0001
ANALPHABET	16	20	5	5	6	7	4	-	-	1	3	67	0,7	
INCOMPLETE ELEMENTARY SCHOOL ³	798	761	805	777	558	525	538	522	263	200	279	6.026	65,1	
COMPLETE ELEMENTARY SCHOOL ³	32	33	20	23	15	18	12	37	17	17	18	242	2,6	
INCOMPLETE HIGH SCHOOL ⁴	25	22	26	24	22	19	23	19	7	8	11	206	2,2	
COMPLETE HIGH SCHOOL ⁴	13	3	4	2	2	1	2	5	2	1	-	35	0,4	
INCOMPLETE HIGHER EDUCATION ⁵	-	1	-	-	-	-	-	-	-	-	-	1	0,0	
COMPLETE HIGHER EDUCATION ⁵	2	1	-	-	-	-	-	-	-	-	-	3	0,0	
DOES NOT APPLY	159	153	142	141	140	143	121	88	64	54	55	1.249	13,5	
TOTAL	1.204	1.155	1.169	1.147	861	889	829	770	430	358	440	9.252	100	

Source: Authors, 2023. LEGENDS: 1. chi-square test of adherence; 2. not included in the statistical analysis; 3. primary education; 4. secondary education; 5. higher education.

Table 4 - Sociodemographic characteristics of leprosy cases in children under 15 in the Northeast region of Brazil, 2012-2022.

VARIABLES	CASES											TOTAL	%	P-VALUE ¹
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022			
OPERATIONAL CLASSIFICATION														
IGNORED/ WHITE ²	1	-	-	-	1	-	1	1	-	-	-	4	0,0	<0.0001
PAUCIBACILAR	725	682	694	618	451	451	388	325	195	146	151	4.826	52,2	
MULTIBACILAR	478	473	475	529	409	438	440	444	235	212	289	4.422	47,8	
CLINICAL SHAPE														
IGNORED/ WHITE ²	45	36	44	32	38	39	26	21	14	16	29	330	3,6	<0.0001
INDETERMINATE	323	316	310	295	207	228	214	175	88	75	73	2.304	24,9	
TUBERCULOID	358	327	339	293	230	183	189	151	92	67	84	2.313	25,0	
DIMORPH	316	358	355	403	296	331	305	318	157	136	195	3.170	34,3	
VIRCHOWIAN	91	66	60	67	49	53	59	59	47	40	41	632	6,8	
UNCLASSIFIED	71	52	61	57	41	55	36	46	32	24	28	503	5,4	
DEGREE OF DISABILITY														
IGNORED/ WHITE ²	68	68	61	44	43	40	31	32	20	15	26	448	4,8	<0.0001
ZERO GRADE	903	881	909	897	665	661	641	565	314	255	284	6.975	75,4	
GRADE I	107	92	98	85	64	92	74	90	46	45	75	868	9,4	
GRADE II	32	39	25	26	12	25	20	26	15	11	21	252	2,7	
NOT EVALUATED	94	75	76	95	77	71	63	57	35	32	34	709	7,7	
SKIN LESIONS														
NÃO INFORMADO ²	68	73	67	53	59	62	45	60	31	28	32	578	6,2	<0.0001
UNICA	519	493	499	476	336	352	307	272	151	112	128	3.645	39,4	
2-5	355	352	372	343	263	282	265	234	150	122	143	2.881	31,1	
>5	262	237	231	275	203	193	212	204	98	96	137	2.148	23,2	
BACILOSCOPIA														
IGNORED/ WHITE ²	116	112	95	109	72	64	72	85	430	358	440	1.953	21,1	<0.0001
POSITIVE	191	137	168	132	131	117	102	105	-	-	-	1.083	11,7	
NEGATIVE	381	386	376	381	290	239	244	211	-	-	-	2.508	27,1	
NOT DONE	516	520	530	525	368	469	411	369	-	-	-	3.708	40,1	

LEPROSY REACTION														
NOT FILLED IN ²	346	310	272	268	223	238	197	208	123	109	223	2.517	27,2	<0.0001
TYPE I	74	64	66	47	49	36	47	41	32	15	21	492	5,3	
TYPE II	14	9	13	8	7	4	7	14	7	8	3	94	1,0	
TYPE I and II	5	4	3	3	3	3	6	6	3	-	3	39	0,4	
NO REACTION	765	768	815	821	579	608	572	501	265	226	190	6.110	66,1	
MULTIDRUG THERAPY														
IGNORED/ WHITE ²	1	2	3	-	1	3	1	1	-	2	2	16	0,2	<0.0001
6 DOSES	722	675	686	615	446	445	381	321	194	135	152	4.772	51,6	
12 DOSES	478	473	472	525	409	438	441	439	232	213	279	4.399	47,5	
OTHER SCHEMES	3	5	8	7	5	3	6	9	4	8	7	65	0,7	
TOTAL	1.204	1.155	1.169	1.147	861	889	829	770	430	358	440	9.252	100	

Source: Authors, 2023. LEGENDS: 1. chi-square test of adherence; 2. not included in the statistical analysis.

The sharp drop observed from 2020 onwards may not be consistent with reality, since, due to its chronic aspects, a significant drop only occurs slowly over the years. Another important aspect was the novel coronavirus pandemic, which began in 2020 and led to a significant reduction in the detection and diagnosis of new cases in children under ^{15,15,17} A study that evaluated the temporal trend of leprosy in Brazil, from 2011 to 2021, highlighted the states of Maranhão, Pernambuco and Piauí with the highest detection rates in the general population in the Northeast.¹⁸ In the present study, they had a high rate throughout the period. This specificity may indicate that the bacillus transmission chain is active and continuous, contributing to the contiguity of leprosy in the region.

Studies have shown that in adulthood, leprosy is more prevalent in men.^{2,7,8} In children under 15, studies point to a balanced picture, with some pointing to a slight predominance of females,^{1,5,19,20} while others, like this study, point to a predominance of males.^{16,17,21} The distribution of leprosy between the sexes can vary according to the group being studied; unlike adults, there is no relevant difference in children under 15, which explains the disparity between studies from different regions.²² There is a need for new studies to understand the difference between the sexes, but initial studies indicate that the greater social interaction and more frequent exposure of male children and adolescents, compared to females, make them more susceptible to infection by the bacillus.²³

With regard to age, as in other studies, there was a predominance of individuals aged between 10 and 14 years.^{16,17,19,21,22,24,25} The appearance of leprosy in children and adolescents at a higher age is to be expected and is the result of the bacillus' long incubation period.^{22,24,25} But it may also be associated with the fact that the older they get, the more they live in the community, making them more susceptible to infection by the bacillus.

Despite the low percentage in children under 10, they still represent around a third of cases, an event that cannot be disregarded, as it indicates possible untreated multibacillary foci.²² A study carried out with Brazilian and Vietnamese families pointed to the association of certain genetic factors with a higher risk of developing leprosy,²³ which may make children under 10 more susceptible to developing the disease.

In this study, the highest prevalence of detection was in brown individuals, supporting the findings of other studies.^{1,16,22,24} This finding is linked to the process of colonization and miscegenation of the Brazilian population, a marked characteristic in the Northeast region, which according to data from the 2022 census, around 60% of the population declared themselves to be brown or black.^{1,13} Leprosy is a neglected disease, prevalent in individuals who live with constant socio-economic inequalities, a characteristic that is more frequent in brown and black populations.^{2,24}

With regard to schooling, as in other studies, there was a predominance of those with incomplete primary schooling.^{1,22,24,25} According to data from the National Continuous Household Sample Survey of 2022, around 95% of children and adolescents are in elementary school. The schooling of children, adolescents and their families is an important characteristic, since it interferes with their understanding of the health-disease process and their adherence to treatment.²² From this perspective, the active search in the school environment, mainly through health education, is essential for the control of leprosy in children under 15.²⁶

There was a higher prevalence of the PB operating class, as in other studies; however, these studies showed a significant difference in the MB class, unlike this one.^{16,19,22} In addition, the most obvious clinical form was dimorphic, which is considered to be an MB form of leprosy.^{17,22,24,25} These data may indicate that diagnosis is occurring

late, which can lead to the appearance of more advanced forms. Diagnosis in children under 15 is considered difficult and clinical signs may not be recognized due to the difficulty in applying and interpreting tests in this age group.²⁰

A study carried out in a referral hospital in the northern region of Brazil, with children and adolescents with leprosy, showed a one-year delay in diagnosis in 67.6% of those assessed, 44.1% were assessed by three or more doctors and 61.8% received another diagnosis prior to leprosy.²⁷ Such a delay increases the possibility of complications and the appearance of deformities and disabilities.¹⁶ From this perspective, it can be seen that only a small proportion had some degree of disability, around 12.1%, other studies have also shown a low percentage of disabilities.^{1,16,17,20,22,25}

The high percentage of cases without disabilities is related to the shorter multiplication time of the bacillus in this age group.²² However, it may also be related to the higher prevalence of PB cases, since the onset of disabilities is related to the MB form.²⁸ Despite the low prevalence of cases with disabilities, this finding requires careful analysis, since, as this is a phase of full development, the appearance of disabilities has a negative influence on quality of life, negatively altering behavior and social relationships, school performance and future insertion into the job market.^{24,28}

What's more, children and adolescents who have a disability at diagnosis need specialized care to prevent the condition from worsening.²⁸ Studies relating to leprosy reactions in this age group are still scarce in the scientific literature, and this study found a lower prevalence compared to other studies.²⁵ Even so, it's a worrying factor, because as well as indicating sources of household contamination, reactions are one of the main problems related to leprosy, and can increase the risk of developing disabilities.

A striking sign of leprosy is the appearance of blemishes on the body. This study showed a higher number of notifications of individuals with fewer than five lesions, as has been done in other studies.^{16,22,24} This characteristic may be the result of the appearance of less severe forms and the short development period of the bacillus in children under 15. It also confirms the relationship between this finding and the predominance of the PB form of leprosy.^{3,24}

The majority of cases did not undergo bacilloscopy, and of those that did, the negative result was prevalent, which corroborates other studies in the scientific literature.^{22,24,25} Bacilloscopy is one of the secondary tests for diagnosing leprosy, and it helps in the investigation and follow-up of patient care.^{3,25} The greater presence of negative bacilloscopy may be the result of the prevalence of the PB form, since bacilloscopy is often negative in this classification.³

However, in a significant proportion of cases, sputum smear microscopy was not performed, which is a problem, since its performance is an important indicator of the quality of health services.²² There is still a considerable percentage reported as ignored/white, especially after the beginning of the new coronavirus pandemic, corroborating a study that showed a sharp drop in the performance of sputum smear microscopy by the Unified Health System during the pandemic.²⁹ From this perspective, it is important to carry out continuing education, based on training Primary Health Care pro-

fessionals to perform sputum smear microscopy and the importance of performing it.³⁰

The treatment of leprosy in children under 15 is different from that of adults. These children are treated with a supervised monthly dose of rifampicin (450mg), clofazimine (150mg) and dapsone (50mg), and a self-administered daily dose of dapsone and clofazimine (50mg) every other day, while those weighing less than 30kg have their dosage adjusted to their weight. Despite the importance of this variable for following up infected patients, there are still few epidemiological studies that address and discuss this variable.¹⁹ In this study, there were more individuals who received six doses, which is directly related to the higher prevalence of PB cases, since this classification receives six doses of MDT-U.³

The main limitations are the ecological fallacy, which refers to the attribution to individuals of associations found in the general population, and the deficiency in filling in the notification form and underreporting, leading to possible inconsistencies in the data on the variables studied. Even so, despite its limitations, this study is relevant in identifying the profile of those affected by leprosy in children under 15, which has so far been scarce in the Northeast region.

FINAL CONSIDERATIONS

Based on the results presented, it is possible to deduce that leprosy in children under 15 is a major public health problem in the Northeast. The majority of cases were in brown males aged 10 to 14, with incomplete primary education. The clinical variables showed a predominance of PB cases, with a dimorphic clinical form, fewer than five lesions, without the presence of physical disability or leprosy reactions. In addition, the lack of sputum smear microscopy and greater guidance on the use of six doses of MDT-U stood out.

In addition, it was seen that the novel coronavirus pandemic has negatively influenced the diagnosis of new leprosy cases, which demonstrates the importance of implementing and strengthening strategies aimed at its control, emphasizing the implementation of health action strategies and the continuing education of professionals.

This shows the importance of implementing control and prevention strategies and actions aimed at children under 15, especially health education in schools. It is also hoped that this study will contribute to further studies on the subject, especially on the prevalence in states with high endemicity.

REFERENCES

1. Santos ÁN, Costa AKAN, Souza JÉR, Alves KAN, Oliveira KPMM, Pereira ZB. Perfil epidemiológico e tendência da hanseníase em menores de 15 anos. *Rev. Esc. Enferm. USP.* [Internet]. 2020 [acesso em 23 de dezembro 2023];54:e03659. Disponível em: <https://doi.org/10.1590/S1980-220X2019016803659>.

2. Tavares AM. Perfil epidemiológico da hanseníase no estado de Mato Grosso: estudo descritivo. Einstein (São Paulo). [Internet]. 2021 [acesso em 23 de dezembro 2023];19:eAO5622. Disponível em: https://doi.org/10.31744/einstein_journal/2021AO5622.
3. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Guia prático sobre a Hanseníase. Brasília (DF): Ministério da Saúde; 2017 [acesso em 23 de dezembro 2023]. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/guia_pratico_hanseníase.pdf.
4. Yonemoto ACF, Choptian Júnior MC, Mattara VAO, Abreu MAMM. Pathophysiology of leprosy: immunological response related to clinical forms. RSD. [Internet]. 2022 [cited 2023 dec 23];11(9):e42211932058. Available from: <https://doi.org/10.33448/rsd-v11i9.32058>.
5. Martoreli Júnior JF, Ramos ACV, Berra TZ, Nascimento MC, Tavares RBV, Moura HSD, et al. Aglomerados de risco para ocorrência de hanseníase e as incapacidades em menores de 15 anos em Cuiabá: um estudo geoespacial. Rev. bras. epidemiol. [Internet]. 2023 [acesso em 23 de dezembro 2023];26:e230006. Disponível em: <https://doi.org/10.1590/1980-549720230006.2>.
6. World Health Organization. Global leprosy (Hansen disease) update, 2022: new paradigm – control to elimination. [Internet]. Geneva; 2023 [cited 2023 dec 2023]. Available from: <https://www.who.int/publications/i/item/who-wer9837-409-430>.
7. Marquetti CP, Sommer JAP, Silveira EF, Schröder NT, Périco E. Epidemiological profile of people affected by leprosy in three states in the northeast region of Brazil. RSD. [Internet]. 2022 [cited 2023 dec 23];11(1):e38811124872. Available from: <https://doi.org/10.33448/rsd-v11i1.24872>.
8. Vêras GCB, Soares MJGO, Silva LH, Moraes RM. Perfil epidemiológico e distribuição espacial dos casos de hanseníase na Paraíba. Cad. saúde colet., (Rio J.). [Internet]. 2023 [acesso em 23 de dezembro 2023];31(2):e31020488. Disponível em: <https://doi.org/10.1590/1414-462X202331020488>.
9. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Diretrizes para vigilância, atenção e eliminação da hanseníase como problema de saúde pública. Brasília (DF): Ministério da Saúde; 2016 [acesso em 23 de dezembro de 2023]. Disponível em: https://portal.saude.pe.gov.br/sites/portal.saude.pe.gov.br/files/diretrizes_para_eliminação_hanseníase_-_manual_-_3fev16_isbn_nucom_final_2.pdf.
10. Schneider PB, Freitas BHBM. Tendência da hanseníase em menores de 15 anos no Brasil, 2001-2016. Cad. Saúde Pública (Online). [Internet]. 2018 [acesso em 23 de dezembro 2023];34(3):e00101817. Disponível em: <https://doi.org/10.1590/0102-311X00101817>.
11. Merchán-Hamann E, Tauil PL. Proposta de classificação dos diferentes tipos de estudos epidemiológicos descritivos. Epidemiol. Serv. Saúde (Online). [Internet]. 2021 [acesso em 24 de dezembro 2023];30(1):e2018126. Disponível em: <https://doi.org/10.1590/s1679-49742021000100026>.
12. Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen I, et al. The reporting of studies conducted using observational routinely collected health data (RECORD) statement. PloS med. [Internet]. 2015 [cited 2023 dec 24];12(10):e1001885. Available from: <https://doi.org/10.1371/journal.pmed.1001885>.
13. Brasil. Instituto Brasileiro de Geografia e Estatística. Panorama. Censo 2022. [acesso em 24 de dezembro de 2023]. Disponível em: <https://censo2022.ibge.gov.br/panorama/>.
14. Oliveira RA, Sousa PMP, Silva JC, Santos LFS, Santos FS, Pascoal LM, et al. Distribuição espacial e tendência da prevalência da hanseníase em uma regional de saúde do Nordeste brasileiro, 2008-2017: um estudo ecológico. Epidemiol. Serv. Saúde (Online). [Internet]. 2023 [acesso em 24 de dezembro 2023];32(2):e2023522. Disponível em: <https://doi.org/10.1590/S2237-96222023000200021>.
15. Paz WS, Souza MR, Tavares DS, Jesus AR, Santos AD, Carmo RF, et al. Impact of the COVID-19 pandemic on the diagnosis of leprosy in Brazil: An ecological and population-based study. The Lancet Regional Health – Americas. [Internet]. 2022 [cited 2023 dec 24];9:100181. Available from: <https://doi.org/10.1016/j.lana.2021.100181>.
16. Monteiro LD, Mello FRM, Miranda TP, Heukelbach J. Hanseníase em menores de 15 anos no estado do Tocantins, Brasil, 2001-2012: padrão epidemiológico e tendência temporal. Rev. bras. epidemiol. [Internet]. 2019 [acesso em 24 de dezembro 2023];22:E190047. Disponível em: <https://doi.org/10.1590/1980-549720190047>.
17. Carvalho MLS, Carvalho MLS, Oliveira IRN, Sousa HR, Sampaio SS, Frutuoso AKM, et al. Análise do perfil clínico e epidemiológico de hanseníase em menores de 15 anos

- nos últimos 10 anos em um município localizado no sudoeste do Maranhão. REAS. [Internet]. 2022 [acesso em 24 de dezembro 2023];15(7):e10641. Disponível em: <https://doi.org/10.25248/reas.e10641.2022>.
18. Lima LV, Pavinati G, Silva IGP, Moura DRO, Gil NL, Magnabosco GT. Tendência temporal, distribuição e autocorrelação espacial da hanseníase no Brasil: estudo ecológico, 2011 a 2021. *Rev. bras. epidemiol.* [Internet]. 2022 [acesso em 25 de dezembro 2023];25:e220040. Disponível em: <https://doi.org/10.1590/1980-549720220040.2>.
 19. Santos SD, Penna GO, Costa MCN, Natividade MS, Teixeira MG. Leprosy in children and adolescents under 15 years old in an urban centre in Brazil. *Mem. Inst. Oswaldo Cruz.* [Internet]. 2016 [cited 2023 dec 25];111(6). Available from: <https://doi.org/10.1590/0074-02760160002>.
 20. Costa RM, Menezes MS, Guimarães MSA, Franchi EPP, Monteiro LD, Alvim MCT. Leprosy in children under fifteen years of age in the most hyperendemic municipality in Brazil. *Rev. Paul. Pediatr.* (Ed. Port., Online). [Internet]. 2023 [cited 2023 dec 25];42:e2023022. Available from: <https://doi.org/10.1590/1984-0462/2024/42/2023022>.
 21. Pinto Filho JM, Silva ML. Caracterização da hanseníase em menores de 15 anos na Amazônia legal. *Recei.* [Internet]. 2022 [Acesso em 25 de dezembro de 2023];8(26). Disponível em: <https://periodicos.apps.uern.br/index.php/RECEI/article/view/3927>.
 22. Silva FJLA, Aquino DMC, Monteiro EMLM, Coutinho NPS, Corrêa RGCF, Paiva M de FL. Hanseníase em menores de 15 anos: caracterização sociodemográfica e clínica dos casos em um município hiperendêmico. *Cogitare Enferm.* (Online). [Internet]. 2022 [Acesso em 25 de dezembro 2023];27:e82221. Disponível em: <https://doi.org/10.5380/ce.v27i0.82221>.
 23. Vieira MCA, Nery JS, Paixão ES, Andrade KVF, Penna GO, Teixeira MG. Leprosy in children under 15 years of age in Brazil: A systematic review of the literature. *Plos negl. trop. dis.* [Internet]. 2018 [cited 2023 dec 28];12(10):e0006788. Available from: <https://doi.org/10.1371/journal.pntd.0006788>.
 24. Freitas BHBM, Xavier DR, Cortela DCB, Ferreira SMB. Hanseníase em menores de quinze anos em municípios prioritários, Mato Grosso, Brasil. *Rev. bras. epidemiol.* [Internet]. 2018 [acesso em 28 de dezembro 2023];21:e180015. Disponível em: <https://doi.org/10.1590/1980-549720180016>.
 25. Oppermann K, Salvi CS, Casali HM, Moraes PC, Cattani CAS, Eidt LM. Aspectos Epidemiológicos da Hanseníase em menores de 15 anos, diagnosticados em um Centro de Referência do Sul do Brasil, entre 2007 e 2017: uma tendência à mudança na detecção de casos novos?. *Hansen Int.* [Internet]. 2018 [acesso em 28 de dezembro 2023];43:e-2366. Disponível em: <https://doi.org/10.47878/hi.2018.v43.34607>.
 26. Maia MAC, Silva BAA, Silva RC. Extensão universitária: Hanseníase na escola, em busca de um diagnóstico precoce. *Revista Brasileira de Extensão Universitária.* [Internet]. 2020 [acesso em 28 de dezembro 2023];11(1). Disponível em: <https://doi.org/10.36661/2358-0399.2020v11i1.10778>.
 27. Bandeira SS, Pires CA, Quaresma JAS. Leprosy Reactions In Childhood: A Prospective Cohort Study In The Brazilian Amazon. *Infection and Drug Resistance.* [Internet]. 2019 [cited 2023 dec 28];12:3249–57. Available from: <https://doi.org/10.2147/idr.s217181>.
 28. Carvalho RA, Alencar JLG, Souza SM, Araújo VNB, Monteiro LD. Incapacidades físicas da hanseníase em menores de 15 anos no estado do Tocantins, Brasil, 2001 a 2020. *RSD.* [Internet]. 2022 [acesso em 30 de dezembro 2023];11(5):e18311527995. Disponível em: <https://doi.org/10.33448/rsd-v11i5.27995>.
 29. Barbosa-Lima R, Ramos-Silva FF, Santos JCO, Santos DKC, Silva GM, Kameo SY. Leprosy bacilloscopy notifications in the Brazilian Unified Health System and COVID-19 pandemic: an ecological investigation. *J. Health Biol. Sci.* (Online). [Internet]. 2023 [cited 2023 dec 30];11(1). Available from: <https://doi.org/10.12662/2317-3076jhbs.v11i1.4656.p1-5.2023>.
 30. Lima FC, Alencar OM, Pereira TM, Abreu LDP, Albuquerque MD, Rocha RMGS. Aspectos que dificultam a descentralização das ações de controle da Hanseníase em um Município da Região do Cariri-CE. *Cadernos ESP.* [Internet]. 2019 [acesso em 30 de dezembro 2023];12(2):. Disponível em: <https://cadernos.esp.ce.gov.br/index.php/cadernos/article/view/142>.