International Journal of **Health Science**

EPIDEMIOLOGICAL PROFILE AND SOCIAL DETERMINANTS OF LEPROSY IN THE STATE OF RONDÔNIA BETWEEN 2015 TO 2020

Bárbara Bedim de Carvalho
Centro Universitário Maurício Nassau – UNINASSAU
Cacoal – Rondônia
http://lattes.cnpq.br/9313268675716624

Jaqueline Gheller Mascarello
Centro Universitário Maurício Nassau – UNINASSAU
Cacoal – Rondônia
https://lattes.cnpq.br/8622541490112061

Jordana Viana Aguiar
Centro Universitário Maurício Nassau – UNINASSAU
Cacoal – Rondônia
https://lattes.cnpq.br/5191260163039286

Silvio Cesar de Albernaz Faria
Centro Universitário Maurício Nassau – UNINASSAU
Cacoal – Rondônia
http://lattes.cnpq.br/2819467560909640

Abstract: Leprosy is an infectious, compulsorily notifiable, slow-evolving disease caused by Mycobacterium leprae, which manifests itself most often through dermatoneurological signs and symptoms. The present study aims to analyze the profile of leprosy in the state of Rondônia and understand the distribution of the disease in the state from 2015 to 2020. The study is descriptive, cross-sectional, quantitative and retrospective, where data collection was carried out in the DATASUS government domain, the sample was limited between the years 2015 to 2020 in the state of Rondônia and simple tabulation was carried out using Microsoft Excel® software. The state presented a total of 3638 cases between 2015 and 2020. Males represented 57.5% of those infected. The age group with the highest incidence (22.6%) was 40 to 49 years old and low education was observed with greater predominance among confirmed cases. The dimorphic form represented 61.1% of cases, especially 58.9% of cases were classified as disability level zero. The prevalence coefficient was classified as average within the period studied. Given the data presented, it is necessary to develop policies aimed at the population affected by the disease, promoting better social, cultural and economic conditions through the integration of health teams and surveillance actions.

Keywords: Leprosy. Epidemiological profile. Rondônia.

INTRODUCTION

The etiological agent of Leprosy, Mycobacterium leprae, also known as Hansen's bacillus, is defined as an intracellular parasite with a high power of penetration into nerve cells, especially Schwann cells, which are responsible for supporting peripheral nerves, causing infection in various tissues. and symptoms can range from light or reddish spots accompanied by numbness and also loss of sensitivity to deformities (SILVA, 2018).

Leprosy remains an important endemic for public health in Brazil, especially due to its magnitude and disabling power, a factor that contributes to the occurrence of stigma and discriminatory attitudes. (WHO, 2019).

In Brazil, the disease has a heterogeneous geographic distribution resulting from socioeconomic discrepancies present in different regions of the country. (BRAGANÇA, 2018)

A large part of the population exposed to the bacillus has immunological resistance. However, the clinical manifestations of the disease are defined according to the level of the host's cellular immune response to the bacteria, and are classified as: Indeterminate, Tuberculoid, Dimorphic and Virchowian. When not previously diagnosed and treated, they can lead to deformities, disabilities and serious complications resulting from the involvement of peripheral nerves (ARAUJO, 2014; RIBEIRO, 2014).

The Indeterminate form (I) is defined as the initial form of the disease, non-contagious and normally asymptomatic. Generally, it can evolve spontaneously towards healing, or even remain undetermined for many years. (RIBEIRO, 2014)

Characterized by the appearance of granulomatous lesions, the Tuberculoid form, on the extremities of the body, has the shape of papules or nodules that are well defined and not very elevated, without sensitivity and can manifest itself without skin lesions occurring, with involvement of nerve trunks, causing pain, weakness and muscle atrophy (RIBEIRO, 2014)

In its BB form, clinical characteristics of the Tuberculoid (T) and Virchowian (V) forms can be identified. And a high number of lesions distributed symmetrically. Depending on the lesion, few or numerous bacteria are detected, which can affect peripheral nerves,

causing motor and sensory deficiencies and even acute neuritis. The BT form presents more defined lesions, without sensitivity, and a dry surface, and also the presence of rare or absent bacilli and a positive intradermal Mitsuda reaction (RIBEIRO, 2014).

The Virchowian (V) or Lepromatous (L) form is known as a form of Leprosy that presents a high bacillary load and where the patient's cellular immune response is incapable of combating and eliminating the bacilli. The clinical characteristics can be evidenced by multiple reddish-brown nodular infiltrates on the skin and mucous membranes of the upper airways, as well as on the face, superciliary and ciliary madarosis, leprosy in the ear pinna, thickening and accentuation of the skin grooves. Consequently, a destructive inflammatory process develops, which is disseminated to the viscera and nervous tissue, and can compromise several organs such as the liver, kidneys, spleen, eyes and testicles. In this case, the sputum smear test is positive and in Mitsuda it is negative (RIBEIRO, 2014; FISCHER, 2017; PAVÃO, 2018).

In the 1982 World Health Organization Classification, Paucibacillary (PB) or Multibacillary (MB) was presented, based on clinical findings and the results of sputum smear microscopy. In PB patients (Indeterminate and Tuberculoid forms) and bacilloscopic index (BI) < 2; MB patients (Dimorphic and Virchowian forms) and IB > or = 2. However, due to the difficulties in performing sputum smear microscopy, the WHO adopted a new simplified operational classification, to conclude the MDT diagnosis and therapeutic scheme in accordance with the standardization and in relation According to the number of skin lesions, patients with up to five lesions and/or one peripheral nerve involvement are classified as Paucibacillary, patients with more than five skin lesions or more than one nerve as Multibacillary (CRUZ, 2017)

Two types of reaction can be classified, namely type 1 and type 2. The type 1 reaction, or reverse reaction, which presents hypersensitivity, and which normally occurs during treatment and is associated with a manifestation of the immune system in the mediation of the cellular immune response, the most common in Leprosy disease and which occurs in around 30% of Borderline forms, as a transition to the Tuberculoid form. And their lesions present urticarial, reddish edemas and inflamed and painful nerves. The type 2 reaction, or Erythema Nodosum Leprosy (ENL), is clinically characterized by the painful occurrence of erythematous cutaneous or subcutaneous nodules, distributed throughout the body, occurring predominantly in patients with the VV clinical form, and in patients with the BV form, with the beginning of treatment, where they present fever, malaise, decline in general condition and inflammation of internal organs (RIBEIRO, 2019).

Fischer (2017) reported in his study the occurrence of a type 3 reaction, or Lucio's Phenomenon, which can be seen in untreated Virchowian leprosy patients. Clinically, this reaction manifests itself with extensive violet spots and bullous infographics. If left untreated, lesions can ulcerate and necrote.

Regarding the pathophysiological peculiarities of the disease, and its epidemiology in cases with the presence of physical deformities, they are relevant factors and require monitoring, according to the longer evolution of the disease, which promotes a greater degree of physical impairment (BRAZIL, 2017).

Monitoring cases by health services, as well as assessing the integrity of neural function and determining the degree of physical disability (GIF) of patients, which encompasses both diagnosis and discharge due to cure and the end of treatment for promotion Care after

completion of the therapeutic regimen is essential for preventing neural damage and sequelae. (RAPOSO, 2017)

Leprosy is considered a public health problem and causes several losses, such as physical limitations, prejudice and economic losses. After the discovery of poliochemotherapy (MDT) in 1991, hope emerged for those affected by the disease, since the treatment was effective, leading to an individual being cured of the disease. In conjunction with this factor, the World Health Organization proposed goals for the elimination of the disease, establishing that the prevalence of the disease must be less than 1/10,000 inhabitants (WHO, 2000).

In order to achieve these objectives, Brazil developed public health policies focusing on campaigns, detection, treatment and also through leprosy control guidelines, through a National Leprosy Elimination Plan. Prioritizing early diagnosis and promoting cure discharge and reducing prevalence by around 15 to 20% per year, as well as anticipating the emergence of deformities (BRASIL, 2012).

Leprosy was no longer classified as a public health problem on a global scale in 2000, but Brazil remained within a group of 9 countries that failed to achieve this goal, so the Brazilian government committed to achieving this goal in 2010 and as it had not been reached, the deadline was changed to 2020 (BRAZIL, 2006; World Health Organization, 2016).

It is necessary to carry out muscle strength and sensitivity testing of the eyes, hands and feet. Checking the degree of disability of Leprosy, which varies from 0 to 2. Degree 0 indicates no disability, degree 1 defines the loss of sensation in the eyes, hands and/or feet, and degree 2 corresponds to the presence of disability. (TEIXEIRA, 2017)

Based on such conditions, the present study aims to analyze the profile of Leprosy in the state of Rondônia in order to understand and outline the epidemiological profile of this pathology, as well as to understand more about the aspects relating to the distribution of cases of the disease among the years from 2015 to 2020.

MATERIAL AND METHODS

The present study is descriptive, cross-sectional, quantitative and retrospective, where data collection was carried out from March to June 2021. The data used in the present study were collected from information available on the government websites TABNET/DATASUS (http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sinannet/cnv/hanswro.def). The study sample was delimited between the period from 2015 to 2020 in the state of Rondônia and data analysis was carried out using simple descriptive statistics using Microsoft Excel® software.

RESULTS

During the 5-year period (2015 to 2020) evaluated, it was observed that the state of Rondônia had a total of 3638 new cases of leprosy, with 2018 being the year with the highest incidence, presenting 833 cases and the year 2020 with the lowest number of cases, with a total of 405 registered cases of the disease as shown in Table 1.

Male individuals had a greater representation, totaling 2092 cases, equivalent to 57.5% of all confirmed cases, while women had a lower number of cases, with a total of 1546 (42.5%) of confirmed cases in the same period.

Over the period from 2015 to 2020, it was observed that the age group from 40 to 49 years old demonstrated the highest number of people affected, with a total of 822 (22.6%) of cases, followed by the age group from 50 to 59 with 725 (19.9%) of cases and 30 to 39 years old with 704 (19.4%) of cases.

The incidence of the disease in individuals under 15 years of age was low, since in individuals up to 14 years of age a total of 142 (3.9%) new cases of leprosy were recorded, when in the same period the group over 15 years of age represented the majority with a total of 3496 (96.1%) of cases.

Regarding education, it was possible to observe that 875 of the confirmed cases in the period from 2015 to 2020 were individuals who had an educational level between the 1st and 4th degree of elementary school, such individuals represented 24.1% of those affected by the disease.

At the time of diagnosis, it was possible to observe that the degree of disability with the highest incidence was Degree Zero, which was demonstrated in a total of 2142 (58.9%) of the cases, followed by Degree I with a total of 975 (26.8%) cases, as seen in graph 1.
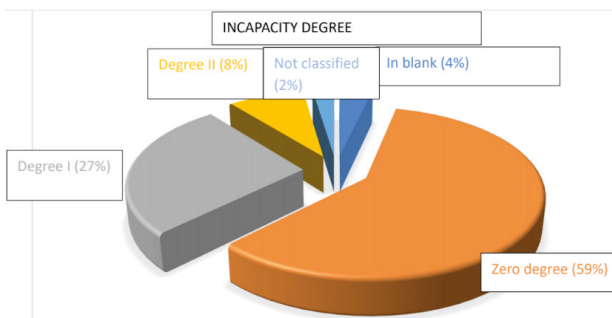
Graph 1 – Degree of disability in relation to leprosy in the state of Rondônia.

Among those affected by leprosy, it was observed that 2222 (61.1%) of the cases presented the Dimorph clinical form of the disease, the Virchowian form was the second most representative clinical form, with a total of 498 (13.7%) of cases, as can be seen in Table and Graph 2, the clinical forms and their predominance.
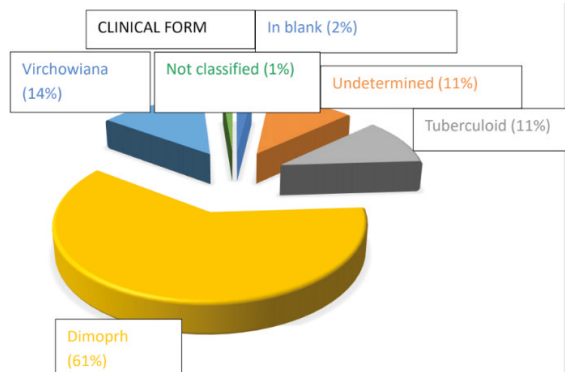
Graph 2 – Clinical forms of leprosy and its distribution in the state of Rondônia.

DISCUSSION

Throughout the period analyzed in the state of Rondônia, between 2015 and 2020, 3638 new cases of leprosy were reported. When evaluating the prevalence coefficient of the disease in the state, it is noted that in the year 2018, which presented the highest number of cases, this coefficient was considered average, representing 4.64/10,000 inhabitants. In 2020, this coefficient reduced to 2.25/10,000 inhabitants, but is still considered medium risk.

In 2020, it is noted that the state of Rondônia falls within the prevalence coefficient classified as low, which ranges from 0.00 to 0.99/10,000 inhabitants (BRASIL, 2012).

Among the confirmed cases, males represented 57.5% of those affected by the disease in the state of Rondônia. This data is in line with a study carried out in Maranhão in which it was observed that the male population was the most affected by the disease, representing a total of 76.43% among the group studied. In a study that sought to evaluate the relationship between oral health and leprosy reactions, it was noted that 67.9% of study participants were male. In a study aimed at evaluating the prevalence of leprosy cases in the city of Rondonópolis (MT), it also demonstrated that there was a prevalence of 53.6% of confirmed cases in

VARIABLE	Ano						Number	(%)
	2015	2016	2017	2018	2019	2020		
Confirmed cases	670	545	605	833	580	405	3638	-
Gender								
Male	405	311	362	445	335	234	2092	57,5
Female	265	234	243	388	245	171	1546	42,5
Age								
1 to 4 years	0	0	2	0	2	0	4	0,1
5 to 9 years	9	7	7	9	4	1	37	1
10 to 14 years	27	13	19	22	9	11	101	2,8
15 to 19 years	37	33	27	50	25	19	191	5,3
20 to 29 years	83	53	80	105	65	47	433	11,9
30 to 39 years	135	122	121	160	111	55	704	19,4
40 to 49 years	150	119	135	174	145	99	822	22,6
50 to 59 years	125	109	116	167	113	95	725	19,9
60 to 69 years	75	59	76	91	67	49	417	11,5
70 to 79 years	24	22	20	38	30	24	158	4,3
80 years and over	5	8	2	17	9	5	46	1,2
Age range (from 0 to 14 years old and over 15 years old)								
0 to 14 years	36	20	28	31	15	12	142	3,9
Over 15 years	634	525	577	802	565	393	3496	96,1
Education								
White	54	60	60	72	55	84	385	10,6
Illiterate	54	42	46	49	38	34	263	7,2
1st to 4th degree (EF)	180	143	131	203	140	78	875	24,1
4th complete series	66	46	59	64	50	34	319	8,8
5th to 8th degree	130	84	126	153	102	56	651	17,9
Complete primary education	39	33	36	62	58	26	254	7,0
Incomplete high school	43	32	30	53	36	27	221	6,1
Complete high school	71	79	91	142	66	44	493	13,6
Incomplete higher education	12	7	10	13	7	9	58	1,6
Complete higher education	18	18	14	19	25	12	106	2,9
Not applicable	3	1	2	3	3	1	13	0,4

Table 1 – Number of new leprosy cases and distribution by sex, age group, age group (over and under 15 years old) and education in Rondônia.

VARIABLE	Year						Number	(%)
	2015	2016	2017	2018	2019	2020		
Clinical form								
White	9	7	12	7	19	16	70	1,9
Undetermined	79	80	71	70	71	34	405	11,1
Tuberculoid	120	57	68	75	55	23	398	10,9
Dimorph	343	318	359	592	344	266	2222	61,1
Virchowiana	111	78	90	81	83	55	498	13,7
Not classified	8	5	5	8	8	11	45	1,3
Degree of disability								
In blank	15	14	15	24	34	29	131	3,6
Degree zero	431	343	365	477	317	209	2142	58,9
Degree I	150	142	163	231	173	116	975	26,8
Degree II	57	30	49	81	48	39	304	8,4
Not evaluated	17	16	13	20	8	12	86	2,3

Table 2 – Number of new cases of leprosy distributed by clinical form and degree of disability in Rondônia.

men. This difference between the sexes with the most confirmed cases was even greater in a study carried out in the municipality of Pombal-Paraiba from 2011 to 2015, where there was a 73.3% prevalence of diagnosis in males. Despite this prevalence in the male population, it was observed that the difference in the proportions of diagnosis between men and women has become smaller over these 5 years (OLIVEIRA, 2014; ALVES, 2018; FILGUEIRA, 2020; LOPES, 2021).

In a study carried out in the state of Maranhão, it was possible to observe that, according to the operational classification, the most affected age group was people aged between 30-59 years old, with a total of 1243 notifications among the 2468 confirmed cases of leprosy, followed by age group from 15 to 29 years old with a total of 554 cases. The study carried out in the state of Rondônia demonstrated a similar result, as the individuals most affected by the disease were between 30 and 59 years of age, being represented by a total of 2251 confirmed cases among the total of 3638. The second age group with the highest number of those affected in the present study was equivalent to

that found in Maranhão, where it is noted that in the state of Rondônia there were a total of 624 confirmed cases among individuals aged between 15 and 29 years (LOPES, 2021)

Although 10.6% of confirmed cases in the state do not have data relating to education, it is still possible to observe that in the state, confirmed cases of leprosy during the period studied are widely distributed among individuals with a lower level of education, a factor expressed by other authors, where it is noted that low family income and poor education are factors constantly highlighted in studies that address patients with a confirmed diagnosis of the disease. According to a study presented in 2020, it showed that factors linked to poverty, such as food deprivation, precarious housing, low level of education and reduced frequency of changing bed linen, increase the risk of disease transmission (SOUZA, 2020; FILGUEIRA, 2020).

During the 05 years analyzed in the study, the most diagnosed form in the state of Rondônia was Dimorph (multibacillary) with 61.1% of patients, in second place we observed the Virchowian form (multibacillary) with 13.7%, followed by the indeterminate form

7

(paucilbacillary) with 11.1% and lastly the tuberculoid form with 10.9% and 1.3% was not classified. Another data evaluated in the article was the degree of disability, which was divided into degree 0 (zero), degree I (one) and degree II (two). Degree zero, being the most prevalent in the 5 years studied, affecting a total of 2142 patients, which corresponds to 58.9%, degree I was diagnosed in 975 participants (26.8%) and degree II, considered the more severe due to its high disabling power was detected in 304 patients (8.4%). These epidemiological indicators are similar to the results obtained in a study carried out in the municipality of Sobral in the state of Ceará, from 2001 to 2016, where the multibacillary form of the disease also prevailed over the paucibacillary form in all years of the study, corresponding to 71. 1% in 2015. The degrees of disability assessed were also similar, with degree zero being classified in 68.7% of the population, degree I in 16.9% and degree II in 13.3%. (PEREIRA, 2019)

In the study carried out in Rondonópolis in the state of Mato Grosso between 2001 and 2015, the following results were obtained: 61.16% of new cases were multibacillary and 38.4% were paucibacillary, over the 15 years the number of multibacillary cases increased and paucibacillary cases decreased, and just as in the state of Rondônia, the most prevalent form diagnosed in Rondonópolis was the dimorphic form (51.37%), however the tuberculoid form (36%) was the second most prevalent, which differs from the data in this study. study, where it is possible to observe that the tuberculoid form corresponded to 10.9% of the population. Regarding the degrees of disability, the majority classified as degree zero (79.8%), degree I (8.27%) and degree II (3.23%) (SANTOS, 2017).

Another study carried out between 2014 and 2018 in the city of Porto Nacional, state of Tocantins, which is also located in the northern region, there was a predominance of males (59.8%), of the total cases diagnosed with the multibacillary form (75.7%). %) also represented the majority, with a predominance of diform and lepromatous clinical forms (60.6%), half of the patients (50.6%) were classified as degree zero disability, 31.7% degree I disability and 10% degree II, 7.7% of patients had no evaluation (CARVALHO, 2019).

In all studies analyzed, the epidemiological profile was similar. The degree of physical disability is an indicator of the effectiveness of timely and early detection actions for new cases of Leprosy. In Brazil, a decrease in the detection of cases with degree II disability has been observed, following the downward trend in the general detection of new cases (BRASIL, 2016).

FINAL CONSIDERATIONS

The study demonstrated that the number of confirmed cases of leprosy reduced, however the state's prevalence coefficient remains within the risk classification considered medium. Although Brazil has not achieved the goal of eradicating leprosy, it was also noted that the slow pace of decline in the prevalence of leprosy may be related to differences in development and standard of living between Brazilian regions. Likewise, early detection and reduction of disabilities seem to be related to the efficiency of basic health care services, as well as the search for health facilities by patients, even by those who have economic conditions or low education.

Given the high overlap of leprosy cases in the same Household Contact Network (RCD) in the regions approached for the preparation of the study, and verifying the great social and economic vulnerability in these scenarios, it highlights the demand for policies to be developed aimed at this population, so that they benefit from better

social, cultural and economic conditions, with the aim of achieving control of the disease and minimizing the neglect identified in these territories. This concept demands integration with surveillance and control actions with operational prioritization by the health area through primary care teams in order to effectively map cases and guidelines for this population.

REFERENCES

ALVES, R. D. Frequência de casos de hanseníase em um município do sertão paraibano. Temas em saúde. Edição especial. ISSN 2447-2131. João Pessoa. 2018.

ARAUJO, A. E. R. A. E. et al. **Neural complications and physical disabilities in leprosy in a capital of northeastern Brazil with high endemicity.** Rev. bras. epidemiol., São Paulo, v. 17, n. 4, p. 899- 910, Dec. 2014.

BRAGANÇA, G. M. G. et al. **Aspectos epidemiológicos de pacientes com diagnostico de hanseníase na região nordeste.** Revista Destaques Acadêmicos, [S.l.], v. 10, n. 3, nov. 2018. ISSN 2176-3070.

BRASIL – TABNET/DATASUS – MINISTÉRIO DA SAÚDE. **Acompanhamento dos dados de Hanseníase – Rondônia**. 2021. Disponível em: <http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sinannet/cnv/hanswro.def> Acesso em: 05 de maio de 2021.

BRASIL - MINISTÉRIO DA SAÚDE. **Plano Nacional de Eliminação da Hanseníase em nível municipal 2006-2010**. Brasília: Ministério da Saúde; 2006.

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: manual técnico-operacional** [Internet]. Brasília:(DF). 2016.

BRASIL - MINISTÉRIO DA SAÚDE. **Plano integrado de ações estratégicas de eliminação da hanseníase, filariose, esquistossomose e oncocercose como problema de saúde pública, tracoma como causa de cegueira e controle de geohelmintíases: plano de ação 2011-2015**. Brasília: Ministério da Saúde; 2012.

BRASIL. Ministério da Saúde. **Guia prático sobre a hanseníase**. Brasília – DF, 2017

CARVALHO, L. C. et al. **PERFIL EPIDEMIOLÓGICO DA HANSENÍASE EM PORTO NACIONAL NO PERÍODO DE 2014 A 2018**. Brazilian Journal of Surgery and Clinical Research – BJSCR. Vol.29, n.2, pp. 45-49 (Dez 2019 – Fev 2020).

CRUZ, R.C.D.S. et al. **Hanseníase: situação atual, aspectos clínicos e laboratoriais, história de tratamento e perspectiva da poliquimioterapia uniforme para todos os pacientes**. An Bras Dermatol. 2017; 92: 761-73.

FILGUEIRA, A. A. et al. **Relação da saúde bucal com reações hansênicas em município hiperendêmico para hanseníase**. Cadernos Saúde Coletiva [online]. 2020, v. 28, n. 1 [Acessado 2 Junho 2021], pp. 44-55.

FISCHER M. LEPROSY **Leprosy: current situation, clinical and laboratory aspects, treatment history and perspective of the uniform multidrug therapy for all patients.** An.Bras. Dermatol. [Internet]. 2017 Dec [cited 2019 Oct 01]; 92(6): 761-773.

LOPES, F. C. et al. **Hanseníase no contexto da Estratégia Saúde da Família em cenário endêmico do Maranhão: prevalência e fatores associados**. Ciência & Saúde Coletiva [online]. 2021, v. 26, n. 5 [Acessado 2 Junho 2021], pp. 1805-1816.

OLIVEIRA, J. C. F.; LEÃO, A. M. M.; BRITO, F. V. S. **Análise do perfil epidemiológico da hanseníase em Maricá, Rio de Janeiro: uma contribuição da enfermagem.** Rev enferm UERJ, Rio de Janeiro, 2014 nov/dez; 22(6):815-21.

ORGANIZAÇÃO MUNDIAL DA SAÚDE (OMS). **Estratégia mundial de eliminação da lepra 2016-2020: Acelerar a ação para um mundo sem lepra.** ISBN 978-92-9022-520-1. 2016.

ORGANIZAÇÃO MUNDIAL DA SAÚDE (OMS). **Guia para eliminação da Hanseníase como problema de saúde pública.** 1 edição, 2000.

PAVÃO, G. C.; CASEIRO, M.M.; GAGLIANI, L.H. **Hanseníase: aspectos clínicos, epidemiológicos, tratamento e diagnóstico laboratorial no Brasil**. Revista UNILUS Ensino e Pesquisa v. 15, n. 39, abr./jun. 2018 ISSN 2318-2083 (eletrônico)

PEREIRA, T. M. et al. **Temporal trend of leprosy in a region of high endemicity in the Brazilian Northeast. Rev Bras Enferm.** 2019; 72(5):1356-62. doi: http://dx.doi.org/10.1590/0034-7167-2018-0682.

RAPOSO, M. T. et al. **Degree 2 Disabilities In Leprosy Patients From Brazil: Need For Follow-Up After Completion Of Multidrug Therapy.** PLoS Negl Trop Dis 12(7): e0006645. 2017.

RIBEIRO, S. L. E; PASSOS, L. F. S.; DOS-SANTOS, M. C. **Anticorpos Naturais E Autoanticorpos Na Hanseníase.** Scientia Amazonia, v. 3, n.3, 01-19, 2014. Set-Dez ISSN: 2238.1910.

SANTOS, D. A. S. et al. **Prevalência de casos de hanseníase**. Rev enferm UFPE online., Recife, 11(Supl. 10):4045-55, out., 2017. Disponível em: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/viewFile/231164/25125> Acesso em 02 de junho de 2021.

SILVA, L. C. D; ALMEIDA, L. Q. D. **Os casos de hanseníase e a vulnerabilidade social no município de Natal, RN, Brasil**: análise das ocorrências e das áreas de risco à saúde pública. Hygeia [Internet]. 5º de julho de 2018.

SOUZA, C. D. F. et al. **Modelagem espacial da hanseníase no estado da Bahia, Brasil, (2001-2015) e determinantes sociais da saúde.** Ciência & Saúde Coletiva [online]. 2020, v. 25, n. 8 [Acessado 2 Junho 2021], pp. 2915-2926.

TEIXEIRA, R. L. et al. **Perfil epidemiológico dos pacientes de 0 a 15 anos de idade com hanseníase em centro de referência de doenças tropicais** (CRDT) de um estado da região amazônica. 2238-5339 © Rev Med Saude Brasilia 2017; 6(3): 291-302.

10