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Geoepidemiological Profile of Leprosy in Rondônia, Brazil

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Abstract— *The research aimed to evaluate the geoepidemiological profile of leprosy and its spatially uneven production in the state of Rondonia in the period from 2011 to 2014, from the perspective of medical geography, identifying and performing mapping of critical areas of the spatial production of leprosy. The study it is quantitative, descriptive and retrospective research. Information System Diseases and Reportable - the database SINAN (Sistema de Informação de Agravos e Notificáveis) was used. For the clothing of thematic maps was used ArcGIS program. The research universe was created by the registration of all new cases of leprosy reported in the period from 2011 to 2014, living in Rondonia. The State of Rondonia had 2,972 (two thousand nine hundred seventy-two) new cases of leprosy in the period studied, respectively 827 new cases in 2011, 779 in 2012, 2013 686 and 2014 680, which corresponds to 5.24 detection rate in 2011 4.93 2012 3.96 3.88 2013 and 2014 and are classified as hyperendemic area with detection rate/average incidence of 4.50 per 10,000 inhabitants. Leprosy is present in virtually 100% of the municipalities of Rondonia.*

Keywords— ***Geoepidemiological Profile, Epidemiology, Medical Geography and Leprosy.***

I. INTRODUCTION

The epidemiology of leprosy, particularly their geographical distribution remains with numerous gaps and puzzles. Several major areas - historically - endemic in the world are under tropical climate, high temperatures and rainfall[1]. In temperate and cold regions, however, leprosy has also presented high incidences, nevertheless were eliminated without a definitive explanation[2].

According to the World Health Organization[3] (1982) currently, 80% of new cases are concentrated in countries located in the intertropical band: India; Brazil; Myamar; Madagascar; Nepal; and Mozambique.

Some leprosy medical geography works discuss the role of the occupation in the history of the territories as a foundation for maintenance of outbreaks [4,5]. On the other hand, usually is accepted the association of leprosy with unfavorable living conditions, considering economic, hygienic and sanitary and biological [4,5].

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Brazil maintains, in recent decades, the most unfavorable situation in America and the diagnosis of the second largest number of cases in the world after India. Leprosy among Brazilians is therefore a public health problem whose elimination program is among the priority actions of the Ministry of Health.

The geographical distribution of the disease in Brazil is studied, usually for its macro-regions and states, it does not have a systematic knowledge of their spatial distribution. With the implementation of Notifiable Diseases Information System (SINAN) by the Ministry of Health (MS), co-administered by the Department of Health Surveillance (SVS/MS) and Department of the Unified Health System (Datasus/MS) in a gradual improvement process it is currently possible to develop detailed explorations of disease in different geographical scales[1].

Factors associated with spatial distribution of leprosy, in general, can be grouped into natural and social. Among the natural assumptions, the weather are, relief, vegetation types and particular ecosystems. Among the social premises, it highlights unfavorable living conditions, malnutrition, migration and others.

Few investigations of leprosy infection focus on non - human sources. The *Mycobacterium leprae* can survive for months outside the human body and favorable moisture conditions. Thus, wet soils, low temperatures and high environmental humidity favor the survival of the bacillus; Beyond these more known environmental sources, should be considered, also, vegetation, water, some arthropods and monkeys [6.7].

According to the work of Fine *et al*[8] the most important source of infection are probably non-treated patients multibacillar where multibacillar contacts of patients had a risk of illness five to ten times higher than the general population; however, there are few multibacillary patients in certain areas indicates other sources of infection [9] .

In this line of research, we discuss about the meaning of armadillo in the incidence of leprosy since thebeginning of the 70s Opromola[10] states that, although not proved leprosy a zoonotic disease, the presence of bacilli in wild animals would have serious implications for the control and eradication program of the disease in humans.

Among the social assumptions associated with the geographic distribution of the disease, reaffirm to poverty, malnutrition or some nutritional deficiencies, as well as unfavorable hygienic conditions and migration. The disease often relates to indicators such as low income or *per capita*, low education and lack of basic health conditions, among others. Nevertheless, historical documents about the factors associated with the transmission of leprosy suggest that its great spread and rapid decline in medieval Europe are due to the existence of some unknown epidemic factor.

As knowledge popularized leprosy is still a serious health problem in the world. Besides being a disease aggravated inherent to socioeconomic and cultural borne diseases, it is also marked by the psychological impact generated by deformities, disabilities, stigma causes and people's isolation in society. This fact contributes to decreased self-esteem and self-segregation of leprosy carrier. Precisely for this reason, its sufferers hide their problem in order not to be discriminated against by society[11].

According to Cunha[11] leprosy is known for millennia, in the biblical account was cited as an impurity of mind and their carriers were isolated from society. Hence arose the prejudices about the disease. A public health problem already was considered as caused mutilations, disabilities and that deformed his face and body, with the loss of body parts, has long been known as leprosy until the change of nomenclature for leprosy, through Law Brazilian Federal No. 9010 of March 29, 1995.

Leprosy is simple to diagnose, treat and can be cured provided it is diagnosed early because their injuries can lead to physical disabilities.

The *M. leprae* has an interesting feature, has high infectivity and low pathogenicity, it means that many are infected, but few get sick[12].

The production and distribution of leprosy in the state of Rondonia deserve special attention by high detection rates presented, ranking third in the national ranking in reported cases of the disease. The study of the spatial behavior of this indicator can be an important tool to assist in planning, monitoring and evaluation of health actions by directing interventions to reduce the high rates of the disease. So geoepidemiological characterize the pattern of leprosy in the State of Rondonia, means contributing to spatial visualization of leprosy, for applying control measures in places considered risk areas.

The research aims to evaluate the geoepidemiológico pattern of leprosy and its spatially uneven production in the state of Rondonia in the period from 2011 to 2014, from the perspective of medical geography and specific objectives, describe the geoepidemiológico pattern of leprosy; identify the spatially uneven production; perform mapping of critical areas of the spatial production of leprosy in the state of Rondonia.

II. METHODS

2.1 Type of study

The study is conducted by quantitative, descriptive and retrospective study. Seeks to identify events (...), or even describe how certain phenomena are distributed in the population, or part of, or their sample quantitatively measuring the problem will contribute to a spatial analysis of leprosy in the state of Rondonia in the 2011 period 2014.

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2.2 Data collection instruments

Data were requested from ANVISA - National Agency of Sanitary Vigilance, by application, in which it sent the information SINAN database - Notifiable Diseases and Information Service.

The SINAN-NET was developed by SVS / MS together to DATASUS, it aims to modify the information production logic for the analysis on levels of increasingly decentralized health system. Subsidizes the construction of epidemiological surveillance systems of territorial base, to be aware of what happens to the Internet, the transmission of data from reporting daily to the other levels of government, so that these data are available in a timely manner, the three spheres government.

The systematic use of data generated by the system from outside decentralized, contributes to the democratization of information, allowing all health professionals have access to information and make available to the community. It is therefore an important tool to assist the planning of health, set intervention properties, in addition to enabling that evaluate the impact of interventions.

The System for Notifiable Diseases Information System (SINAN) is an important system for epidemiological surveillance, was created in 1990 by the Ministry of Health (MOH) in order to collect, process and transmit data on notification of diseases throughout the country, providing information for the analysis of morbidity profile, as well as carry out the process of data collection and transfer related to diseases and reportable diseases. Leprosy is the object of this system, which enables therefore get consolidated information on the disease and the SINAN was the main data for this work [13].

With possession of information obtained ANVISA, the database was done in ArcGIS program for later preparation of thematic maps with spatial distribution of leprosy in the state of Rondonia, containing new cases of distribution map.

Because it is study used secondary data there was no need for project submission to a Research Ethics Committee meeting the provisions of Resolution 196 of the CNS/CES. - National Health Council/Committee Ethics and Health Still, It has officially requested authorization from the primary data holders, by application to ANVISA.

It was created by the registration of all new cases of leprosy reported in the period from 2011 to 2014, livingin Rondonia.

The selection of variables to study based on the relationship of those variables used for the construction of epidemiological and operational indicators officially used by the Ministry of Health. In order to analyze the evolution of leprosy and describe their geographical distribution in Rondonia the following variables were selected, and their categorizations:

Table.1: Main variable: overall case detection coefficient

COEFFICIENT	PARAMETERS
Low	<0,2/10.000 inhabitants
Medium:	0,2 ├ 1,0/10.000 inhabitants
High	1,0 ├ 2,0/10.000 inhabitants
Very High	2,0 ├ 4,0/10.000 inhabitants
Hiperendemic	≥4,0 /10.000 inhabitants

Table.2: Independent Variables

GENRE	MALE	FEMALE			
Age	0-14 years	15-44 years	45 e years		
Race/Color	White	Black	Brown	Yellow	Indigenous
Clinical fFrm of the Disease	Indeterminate	Tuberculoid	Dimorphic	Virchowian	Not Rated
Operational Rating	Multibacillary	Paucibacillar	Not Rated		

The state of Rondonia is located in northern Brazil, located between parallels 7 58 'and 13º43' south latitude and the meridians 59º 50 'and 66 48' west longitude from Greenwich. It has an area of 238,512.80 square kilometers and includes 52 municipalities. (National Atlas of Brazil, IBGE 2010).

III. RESULTS AND DISCUSSIONS

As SINAN data, the state of Rondonia had 2,972 (two thousand nine hundred seventy-two) new cases of leprosy in the period studied, respectively 827 new cases in 2011, 779 in 2012, 686 in 2013 and 680 in 2014, which corresponds to detection rate of 5.24 2011 4.93 2012 3.96 3.88 2013 and 2014 and are classified as hyperendemic area with detection rate / average incidence of 10 thousand 4.50 (table 3). Figures 1, 2, 3 and 4 illustrate the distribution of new cases of leprosy by the municipality. Leprosy is present in virtually 100% of the municipalities of Rondonia. The municipalities that were

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not reported new cases are probably devoid of the actions of the control program of the disease or lack of health professionals to diagnose the disease. In the period studied leprosy remains hyperendemic or very high incidence in most municipalities, regardless of their socioeconomic characteristics, social, environmental organization, hygiene, health, lifestyles, genetic pool, urban or rural characteristics. Detection rates / incidence of the production and distribution of leprosy does not follow a pattern in the territory, building its own configuration with their arrangements in geographic space.

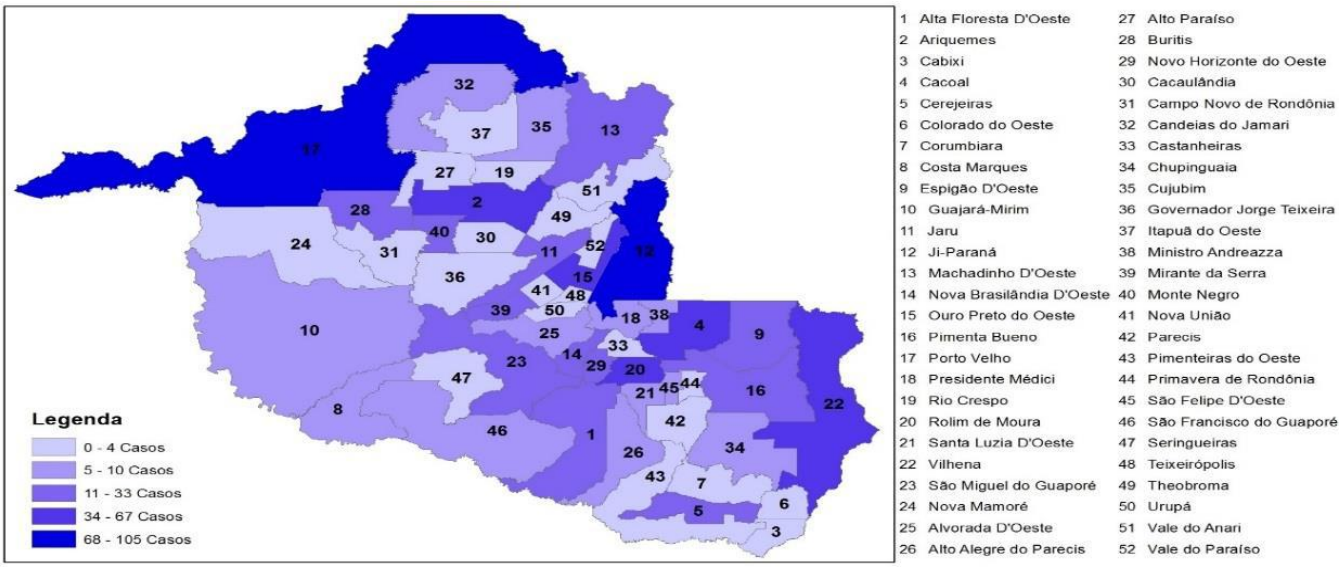
However the municipalities that have the highest new cases numbers are the most urbanized, with the highest population index and the 1st generation of municipal units, geographically spread from north to south of the state, located on the axis of BR 364: Old Port with 105, 135, 117 and 78 respectively in the years 2011, 2012, 2013 and 2014 has the highest number of new cases, following the Ji-Parana municipalities with respectively 101, 97, 76 and 64, Cacoal 67, 49, 37 and 59, rolim Moura 60, 53, 42 and 68; Velho 44, 45, 34 and 53, and Vilhena 44, 37, 30 and 29 new cases studied for years respectively.

Because the distribution rate per 10,000 inhabitants detection, the towns of Ariquemes, Cacoal, Ji-Parana, Rolim de Moura and Vilhena are classified as hyperendemic, with the exception of Porto Velho with very high parameter. All other hyperendemic municipal units have different characteristics as to population issues, urbanization, socioeconomic, hygienic-sanitary and others.

Table.3: New Cases Reported in Study Period

Year	New Cases	Detection Rate/Impact
2011	827	5, 24
2012	779	4,93
2013	686	3,96
2014	680	3,88
Total	**2972**	**4,50**

Source: SINAN / MS, 2015.



Source: Edited image in ArcGIS program

Fig.1: Production Map and Leprosy Distribution by County in 2011

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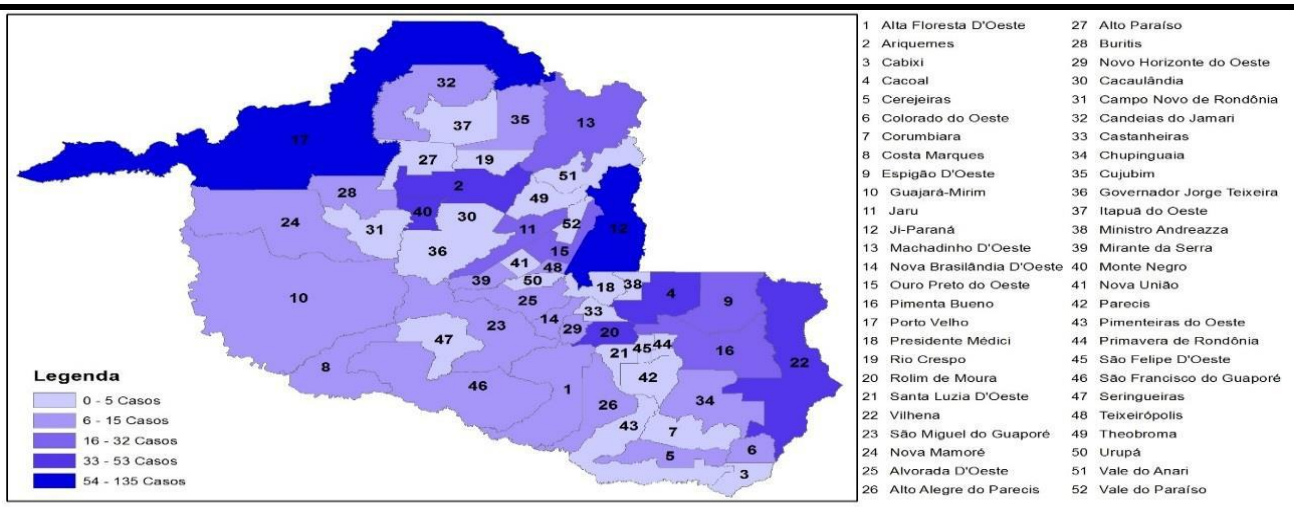
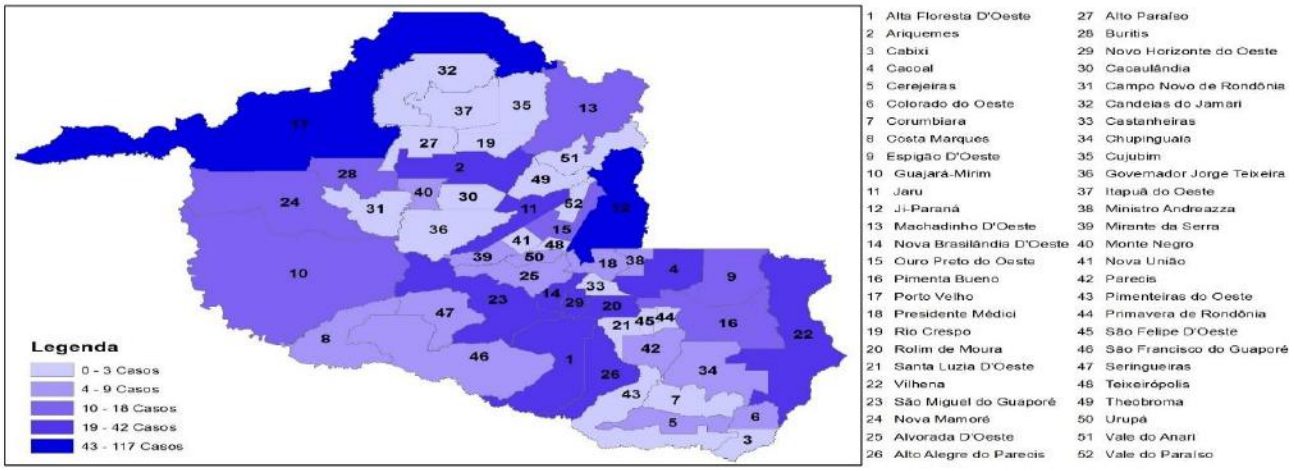


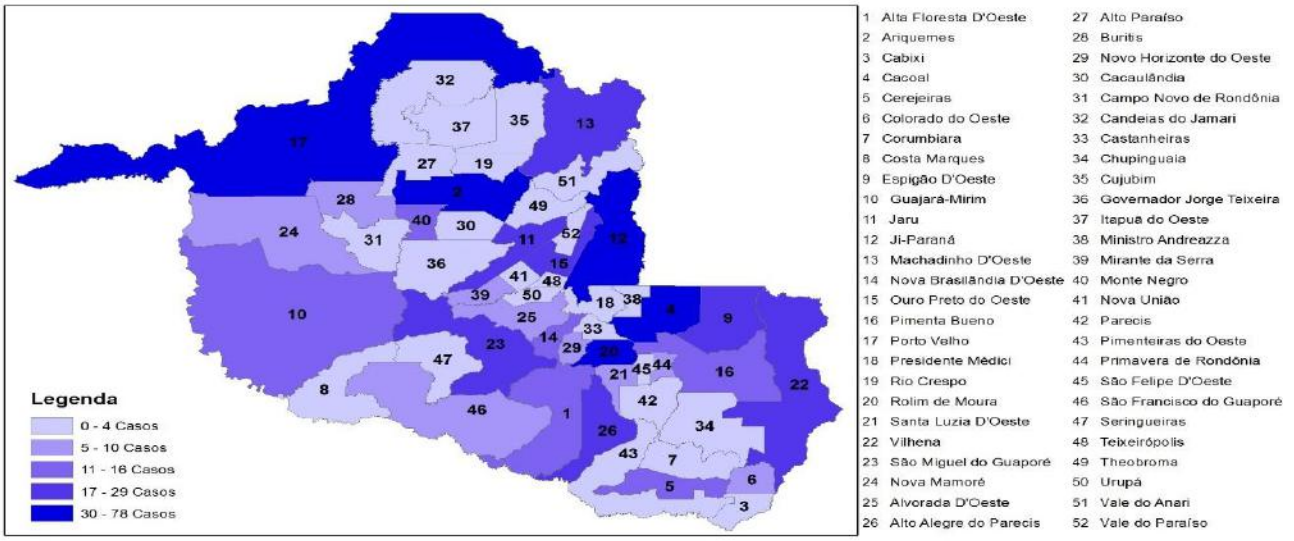
Source: Edited image in ArcGIS program

Fig.2: Production Map and Leprosy Distribution by County in 2012



Source: Edited image in ArcGIS program

Fig.3: Production Map and Leprosy Distribution by County in 2013



Source: Edited image in ArcGIS program

Fig.4: Production Map and Leprosy Distribution by County in 2014

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Table.4: Detection Rate/incidence per 10,000 inhabitants. by municipalities of Rondonia

Municipalities	2014	2013	2012	2011
Alta Floresta D'Oeste	6,23	8,93	3,73	9,0
Alto Alegre dos Parecis	15,84	19,52	10,9	3,9
Alto Paraíso	11,0	0,5	1,12	1,7
Alvorada D'Oeste	3,48	2,87	3,65	3,0
Ariquemes	5,15	3,35	4,85	4,0
Buritis	2,68	3,28	4,49	4,9
Cabixi	0,0	0,0	3,26	0,0
Cacaulândia	1,58	1,59	6,17	6,9
Cacoal	6,8	4,3	0,77	8,48
Campo Novo de Rondonia	0,7	0,7	3,36	0,78
Candeias do Jamari	0,4	0,87	0,0	3,44
Castanheiras	8,2	0,0	4,15	0,0
Cerejeiras	7,2	2,77	9,0	10,0
Chupinguaia	0,0	5,0	5,52	9,39
Colorado do Oeste	4,7	3,0	2,34	2,18
Corumbiara	2,23	0,0	8,35	3,36
Costa Marques	2,46	2,52	6,37	3,56
Cujubim	0,49	1,54	6,5	6,0
Espigão D'Oeste	6,55	4,4	0,99	5,86
Governador Jorge Teixeira	0,0	0,0	0,0	0,97
Guajará-Mirim	2,59	3,0	1,42	1,19
Itapuã do Oeste	2,0	0,0	2,26	3,44
Jaru	3,77	4,49	4,24	3,27
Ji-Paraná	4,95	5,93	8,2	8,6
Machadinho D'Oeste	7,14	3,0	8,33	4,72
Ministro Andreazza	1,08	7,34	3,9	4,86
Mirante da Serra	7,24	5,6	11,68	12,7
Monte Negro	7,63	5,79	27,24	10,56
Nova Brasilândia D'Oeste	6,0	12,6	6,53	16,59
Nova Mamoré	2,59	5,7	2,9	1,72
Nova União	3,82	2,53	4,0	2,68
Novo Horizonte do Oeste	8,65	22,82	6,0	16,85
Ouro Preto do Oeste	6,24	4,48	8,5	13,79
Parecis	5,36	3,65	4,0	8,16
Pimenta Bueno	4,0	3,79	4,98	6,17
Pimenteiras do Oeste	0,0	0,0	4,38	0,0
Porto Velho	1,57	2,4	3,0	2,4
Presidente Médici	0,87	2,17	2,3	4,0
Primavera de Rondonia	16,91	2,78	14,67	2,88
Rio Crespo	0,0	2,72	0,0	2,98
Rolim de Moura	3,79	7,58	10,36	11,78
Santa Luzia D'Oeste	8,0	3,37	4,7	6,91
São Felipe D'Oeste	1,62	3,2	3,4	16,84
São Francisco do Guaporé	4,82	2,1	6,0	4,28
São Miguel do Guaporé	8,4	13,52	3,64	10,96
Seringueiras	2,39	6,39	0,86	3,44
Teixeirópolis	3,96	0,0	12,55	6,2
Theobroma	0,0	0,0	0,0	0,94
Urupá	2,24	4,44	1,57	1,55
Vale do Anari	0,0	0,95	0,0	0,0
Vale do Paraíso	1,2	0,0	3,76	3,15
Vilhena	3,22	3,4	4,64	5,64

Source: SINAN / MS, 2015.

Classification of case detection rates per 10,000 inhabitants: **low** (<0.2); **average** (0.2-0.9); **high** (1.0-1.9); **very high** (2.0 to 3.9); **hyperendemic situation** (≥4,0)

In 2011, 27 (twenty seven) municipalities are presented hyperendemic, implying say that more than 50% of the municipalities of Rondonia are presented in hyperendemic situation. This independent hyperendemic situation of social, demographic, economic, urban, urban or rural, environmental characteristics, among others, the example of Ariquemes municipalities with an incidence rate of 4.0; Ji Parana at a rate of 8.6; Pimenta Bueno with

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6.17 rate; Ouro Preto do Oeste with 13.79 rate; Rolim de Moura with a rate of 11.78 and Vilhena with 5.64 rate per 10,000 inhabitants. All with the highest rates of urbanization and concentration of population in urban areas and all situated in the range of federal highway BR 364, with the exception of Rolim de Moura. The municipalities of San Felipe D'Oeste with an incidence rate of 16.84 per 10,000 inhabitants; Novo Horizonte do Oeste with 16.85; Nova Brasilândia D'Oeste with 16.59; Mirante da Serra 12.7; Alta Floresta D'Oeste with 9.0; Buritis 4.9; Cacaulândia to 6.9; Cacoal to 8.48; Cherry with 10.0; Chupinguaia to 9.39; Cujubim to 6.0; Espigão D'Oeste with 5.86; Machadinho D'Oeste with 4.72; Ministro Andreazza with 4.86; Monte Negro with 10.56; Parecis to 8.16; President Medici with 4.0; Santa Luzia D'Oeste with 6.91; São Francisco do Guaporé with 4.28; São Miguel do Guaporé with 10.96 and Teixeirópolis with 6.2 per 10,000 inhabitants with different characteristics spread across all areas and state geographic regions. Chupinguaia to 9.39; Cujubim to 6.0; Espigão D'Oeste with 5.86; Machadinho D'Oeste with 4.72; Ministro Andreazza with 4.86; Monte Negro with 10.56; Parecis to 8.16; Presidente Médici with 4.0; Santa Luzia D'Oeste with 6.91; São Francisco do Guaporé with 4.28; São Miguel do Guaporé with 10.96 and Teixeirópolis with 6.2 per 10,000 inhabitants with different characteristics spread across all areas and state geographic regions. Chupinguaia to 9.39; Cujubim to 6.0; Espigão D'Oeste with 5.86; Machadinho D'Oeste with 4.72; Ministro Andreazza with 4.86; Monte Negro with 10.56; Parexcs to 8.16; Presidente Médici with 4.0; Santa Luzia D'Oeste with 6.91; São Francisco do Guaporé with 4.28; São Miguel do Guaporé with 10.96 and Teixeirópolis with 6.2 per 10,000 inhabitants with different characteristics spread across all areas and state geographic regions.

In 2012 incidence rates remains highly endemic in 28 (twenty-eight) of the 52 municipalities of Rondonia. Ariquemes, with an incidence rate of 10 thousand 4.85; Ji-Parana, 8.2; Jaru, 4.24; Ouro Preto do Oeste, 8.5; Pimenta Bueno, 4.98; Rolim de Moura, 10.36 and Vilhena, 4.64 configure on the most urbanized municipalities and higher population number, while the municipalities of Alto Alegre dos Parecis, 10.9; Buritis, 4.49; Cacaulândia, 6.17; Chestnut, 4.15; Cherry, 9.0; Chupinguaia, 5.52; Corumbiara, 8.35; Costa Marques, 6.37; Cujubim, 6.5; Jaru, 4.24; Machadinho D'Oeste, 8.33; Mirante da Serra, 11.68; Monte Negro, 27.24; Nova Brasilândia D'Oeste, 6.53; New Union, 4.0; Novo Horizonte do Oeste, 6.0; Parecis, 4.0; Pimenteiras do Oeste, 5.38; Primavera de Rondonia, 14.67; Guaporé San Francisco, 6.0; Teixeirópolis, 12,

In 2013 the number of municipalities with charges hyperendemic decreases to 17 (seventeen). Municipalities Jaru, with an incidence rate of 4.49 for 10 thousand; Ji-Parana to 5.94; Ouro Preto do Oeste, with 4.48 and Rolim de Moura, with 7.58 are the ones with urban characteristics. Alta Floresta D'Oeste with an incidence of **8.93** ; Alto Alegre dos Parecis, with 19.52; Chupinguaia with 5.0; Spike Western, with 4.4; Minister Andreazza with 7.34; Mirante da Serra, with 5.6; Monte Negro, 5.79; New Brasilândia D'Oeste, 12.6; Nova Mamoré, with 5.7; Novo Horizonte do Oeste, with 22.82; São Miguel do Guaporé, with 13.52; Seringueiras with 6.39 and Urupá, with 4.44 municipalities are hiperendemic rates.

In 2014 the number of municipalities with hyperendemic rates to grow back to 22 (twenty-two). Ariquemes, with an incidence rate of 5.15 per 10,000 inhabitants; Cacoal, with 6.8; Ji-Parana to 4.95; Ouro Preto do Oeste, with 6.24 and Pimenta Bueno, with 4.0 are hieperendemics municipalities in leprosy considered the most populous and urbanized. Alta Floresta D'Oeste, with 6.23 fee for 10 people; Alto Alegre dos Parecis, with 15.84; Alto Paraiso, 11.0; Castenheiras with 8.2; Cerejeiras with 7.2; Colorado do Oeste, with 4.7; Espigão D'Oeste, with 6.55; Machadinho D'Oeste with 7.14; Mirante da Serra, with 7.24; Monte Negro, with 7.63; Nova Brasilândia D'Oeste, with 6.0; New Horizon West, with 8.65; Parecis, with 5.36; Primavera de Rondonia, with 16.91; Santa Luzia D'Oeste, with 8.0; São Francisco do Guaporé, with 4.82 and São Miguel do Guaporé, with 8.4 being the hyperendemic municipalities distributed geographically throughout the territory of the State of Rondonia.

The municipalities with the highest leprosy incidence rates during the study period corresponding to the years 2011 to 2014 are: Alta Floresta D'Oeste with 6.97 incidence rate per 10,000 inhabitants; Alto Alegre dos Parecis with 12.54 rate; Ariquemes with 4.33 rate; Cacaulândia with 4.06 rate; Cacoal with 5.08 rate; Cerejeiras with 7.24 rate; Chupinguaia with 4.97 rate; Espigão D'Oeste with a rate of 4.45; Ji-Parana with 6.92 rate; Machadinho D'Oeste 5.79 rate; Ministro Andreazza with 4.29 rate; Mirante da Serra with 9.30 rate; Monte Negro with a rate of 12.0; Nova Brasilândia D'Oeste with 10.43 rate; Novo Horizonte do Oeste with 13.58 rate; Ouro Preto do Oeste with 8.25 rate; Parecis with 5.29 rate; Pimenta Bueno with 4.73 rate; Primavera de Rondonia with 9.31 rate; Rolim de Moura with 8.37 rate; Santa Luzia D'Oeste with 5.74 rate; São Felipe D'Oeste with 6.26 rate; São Francisco do Guaporé with a rate of 4.3; São Miguel do Guaporé with 9.13 rate; Teixeirópolis with a rate of 5.67 and 4.22 with Vilhena rate.

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Among the reported cases, it was found that most of them, 1728 (57.7%) occurred in males and 1269 (42.3%) in female persons (Table 5). The distribution of new cases followed a certain similarity in each period with respect to gender, no significant differences (X2 = 3.0900, p = 0.0787).

Table.5: Distribution of new cases of leprosy in the years 2011 to 2014 by gender / sex

Year	Male	%	Female	%	Total
2011	484	58,5	343	41,5	827
2012	462	59,3	317	40,7	779
2013	420	59,0	291	41,0	711
2014	362	53,2	318	46,8	680
Total	1728	**57,7**	1269	**42,3**	2997

Source: SINAN / MS, 2015.

As for the color classification considerations (inferring ethnicity) specified by the Health's Ministry of Brazil, the analys is of people who contracted leprosy revealed that there was a higher prevalence in brown color with 1600 new cases (54.2%), followed by white with 1015 (34.4%) of cases. So also in other color categories showed statistically significant differences (x2 = 61.6750 p = 0.000).

Table.6: Characterization of people reported with new cases of leprosy in the period studied, according to the color

Year	White	Black	Yellow	Brown	Indigenous	Total
2011	288	92	4	425	2	811
2012	274	88	2	405	1	770
2013	240	58	12	388	3	701
2014	213	67	5	382	1	668
Total	1015 (34,4%)	305	23	1600 (54,2%)	7	**2950**

Source: SINAN / MS, 2015.

With regard to the area of residence, most in 2042 (68.2%) of leprosy reported individuals living in urban areas, especially those who reported residing in the more urbanized cities. In the distribution by place of residence differences were significant in relation to areas of subspaces residences (x2 = 21.6104; p = 0.0000).

Table.7: Place of residence and distribution of people reported with new cases of leprosy in the years 2011 -2014.

Year	Unknown	Urban	Rural	Peri	Total
2011	15	580	231	1	827
2012	14	549	213	3	779
2013	17	456	227	11	711
2014	12	457	208	3	680
Total	58 (1,9%)	2042 **(68,2%)**	879 (29,3)	18 (0,6)	2997

Source: SINAN / MS, 2015.

It was found that age of the subjects reported leprosy, ranged from less <15 years greater than 80 years old. The new cases were more prevalent in the age group of 20 to 59 years, 2220 (74%) of cases. Among the new cases that arouse attention, are the <15 years with 6.27%. However, the distribution of new cases with respect to age showed significant differences for the years studied.

Table.8: Age range and distribution of people reported with new cases of leprosy in the years 2011 -2014.

Year	< 15 years old	20 a 59 years old	60 years old or more	Total
2011	43	644	140	827
2012	46	596	137	779
2013	59	501	151	711
2014	40	479	161	680
Total	188 (6,27%)	2220 (74%)	589	2997

Source: SINAN / MS, 2015.

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As for the operational classification of the disease, there was the wide prevalence of Multibacillary way with 1924 new cases during the study period representing 64.2% of the total cases in all municipalities of Rondonia. Leprosy Multibacillary does not appear different when related between the municipalities. There is also no difference in the distribution of paucibacillary between the municipalities of Rondonia.

Table.9: Confirmed cases Leprosy by the Operational Classification of Disease in the years 2011 to 2014

Year	Paucibacillary	Multibacillary	Total
2011	321	505	826
2012	284	495	779
2013	254	457	711
2014	213	467	680
Total	1072(35,8%)	1924**(64,2%)**	2996

Source: SINAN / MS, 2015.

The clinical form notified met distribution of 4 forms, with the prevalence Diforma representing nearly 50% of cases, followed by tuberculoid with 21% Undefined 15.9% and Virchowian 13.3%. It does not appear different as their distribution by municipalities.

Table.10: - Reported cases by Form Clinic in the years 2011-2014.

Year	Indeterminate	Tuberculoid	Dimorphic	Virchowian	Unclassified	Total
2011	138	186	391	97	9	821
2012	115	172	366	108	7	768
2013	108	154	361	81	3	707
2014	111	113	333	111	10	678
Total	472 (15,9)	625 (21%)	1451 **(48,8%)**	397 (13,3)	29	2974

Source: SINAN, 2015.

The treatment scheme was adopted PCT/MB/12 doses 56.6% of cases, followed PCT/PB/less than 12 doses. But two situations arouses much attention, the considerable number adoption of patients who underwent the treatment regimen with more than 24 doses and the record in 2014 when 31.2% of patients did not undergo the treatment (128 cases no dose).

Table.11: Treatment scheme: PCT / PB / 6 doses; PCT / MB / 12 doses; Other Leprosy Treatment Schemes

Year	No Dose	Less than 12 doses	12 Doses	13 to 23 Doses	Doses greater than 24	Total
2011		307	489	29		825
2012	18	28	362	24 + 4 (24 doses)	17	456
2013	25	40	350	26	27	468
2014	128 (31,2%)	86	21	66	109	410
Total	171	461 (21,3)	1222 (56,6%)	145	153	2159

Source: SINAN, 2015.

Of the 2534 new cases that underwent treatment prevailed healing with 2062 cases (81.4%). 3% abandoned treatment and 1.2% died.

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Table.12: Leprosy treatment Output Mode in the years 2011-2014.

Year	Not filled	Cure	Transferred to the same municipality	Transferred to another municipality	Transferred to another State	Transferred to another country	Death	Abandonment	Total
2011	43	703	14	19	13	0	5	30	827
2012	26	666	8	18	15	0	14	32	779
2013	136	619	10	23	16	1	9	15	829
2014	0	74	3	15	4	0	3	0	99
Total	205	2062 (81,4%)	35	75	48	1	31	77	2534

Source: SINAN, 2015.

3.1 DISCUSSION

Leprosy detection rates, the overall population of the municipalities of the State of Rondonia, point to a hyperendemicity situation. The high coefficients in the four years examined, a pattern consistent with maintaining stability of hyperendemic level.

According Meima *et al*[14] the global trend detection of new leprosy cases between 1985 and 2000 showed no decline and points out that trends in transmission and incidence of leprosy are still not completely clear, requiring further research.

In India in the 1984-2002 period, although there has been substantial decline in prevalence, the detection rate remained constant during this period[15]. This study reports that the seven countries with the highest detection rates in three time periods, the detection rate remained stable or increased and, although this may be explained by the improved operating performance, when considering together the detection rate cases, the proportion of new cases treated with Multidrug/Multibacillary and the high rate among children, these data are indicative that leprosy continues to be transmitted in the community.

Richardus and Habbema[16] report that in the past 25 years, the case detection has been determined in many countries by operational factors and mentions the fall of 75% in detecting new cases occurred in India from 2000 to 2006 and 24% occurred in Brazil from 2004 to 2005.

Reports that such falls, sudden, have biological credibility considering the long period of incubation leprosy as well as the absence preventive intervention such as vaccination in the decade that preceded the sudden drop.

Mathematical models developed for studies of transmission and control of leprosy were used to analyze the impact of the current strategy for the elimination of leprosy on its incidence and project future incidence considering various scenarios. The annual incidence prediction of decline ranged from 2% to 12%, concluding that the elimination strategy reduces transmission, but in a slow[16] .

Penna and Penna[17] show a downward trend in the detection rate for Brazil is only predicted after 2010, attributing the fall occurred on operational factors such as a possible decline in the diagnostic coverage, or likely change in the notification process and registration of cases.

The aggregate data from all municipalities of Rondonia, Brazil, show relative stability of detection rates in the last four years. There is evidence that leprosy does not always play in smaller geographical units or in spaces smaller epidemiological heterogeneity, due to the many variables involved in the health-disease, it is scattered with greater or lesser extent throughout the territory of the state.

Magalhães[18], when analyzing the evolution of leprosy in different regions of Brazil, found growth trends of endemic ranging, for example, an increase of 9% in the Northeast and 0.7% in the South. In Brazil in 2002, while the case detection rate was 2.62/10,000 inhab, in the northern region this rate was 7.73/10,000 inhab. and in the South region was 0.75/10,000 inhab. which shows an uneven inter-regional development, intra-regional and interstate endemic in the country and suggests the existence of geographical contexts of different vulnerability to the social production of leprosy.

To corroborate the existence of producers geographical contexts of the disease, cite the study by Rodrigues *et al*[19] in São Paulo, which points to the decline of endemic disease, but allows you to view regions with different magnitudes of the disease, with detection rates higher in the more northern regions of the state.

A study conducted in the city of Sobral, Ceará, Brazil, showed that the new case detection rate increased in the 1997-2003 period, rising by over 100% in the last three years of the study[20].

During the study period in the State of Rondonia, the 2972 (two thousand nine hundred seventy-two) new cases

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of leprosy have tended to decline, without, however, show significant differences, ranking as hyperendemic area with detection rate / average incidence of 4.50 per 10,000 inhabitants. Leprosy is present in virtually 100% of the municipalities of Rondonia.

Leprosy is considered one of the public health problems in different regions of the world. In the state of Rondonia - Brazil, it is one of the major endemic problems related to health. Recognize the different aspects related to the disease can aid in characterizing different areas of the region, contributing to the changes related to the welfare of the population.

Among the reported cases, it was found that most of them, 1728 (57.7%) occurred in males and gender in 1269 (42.3%) in female people. In Mato Grosso, Brazil, from 1996 to 2007, higher detection rates for males were observed in all regional groups. Magalhães and Rojas[21] found higher rates for males in all the states of the North and Midwest. Increase in detection rates for males was observed in the endemic declining situation[22]. Leprosy notification data in Portugal[23] showed a peak incidence for males aged 25 to 29 years. A study conducted in Fernandópolis[24]to characterize the contacts of leprosy profile who became ill reported a percentage of 59.7% of cases among men.

The Barro study (2005) showed that for males increased incidence occurred in the age group 35-44 years, while for females this increase was in the range 45-54 years. Another study in Coari in Amazonas state, Brazil, showed percentage of 70.8% of cases for males[25].

Study by Queiroz[26] in relation to the distribution of cases by sex is observed that the detection rates for males are shown higher in all regional state of Mato Grosso. In the state, the evolution of the detection rate for both sexes plays that observed for the set of data. However, the first to the last period, reducing the detection rate among men was lower (1.4%) than in women (6.7%).

For the detection by age, Mato Grosso, it is noted that the coefficients are higher in older age groups, especially in the ages 15 to 44 and 45 years and older, observing increase in these two age groups and reducing the intermediate period during the last period[26].

Considered trend indicator of the leprosy endemic the detection rate in children under 15 years has shown a slight decrease.

In the study by Magalhães and Rojas[21] in Mato Grosso, the analysis shows that by age stratum under 15 years detection coefficients are within hyperendemicity parameter, and only in group I showed reduced. Considered a trend indicator of endemic disease, which reflects early exposure to *M. leprae*, this indicator had a wide variation in the first period in the various regional. The 2007 data published by WHO in its latest annual report also show the same variation in this age group in the various regions of the world and between regions within the same continent. In Africa, for example, proportions were found 2.89% in Togo to 37.96% in Comoros. In the Americas 0.32% proportions in Argentina to 14.02 in the Dominican Republic[27].

Variations of this indicator in several Brazilian regions were also observed by Magalhães and Rojas[21] (2005) , which reported increases of 335% in the Northeast to negative in the South and North. The authors also report that in the Midwest state of Mato Grosso stands out among the other states with an increase of 421% in the detection of cases of children under 15 years.

Studies show that in the endemic declining situation, the age of new cases detected shifts to older age groups [2].

For Queiroz[26] the highest coefficients are concentrated in the older age groups, the detection of leprosy in the state of Mato Grosso, remained stable among the population 45 years or more. In the same study the rise of the coefficients among children under 15 years points to a worsening of the epidemiological situation in the period.

As for the distribution by race / color, it was observed that there was a predominance over the whole period and in all municipalities for the mulatto (54.2%) except for the municipalities of the southern region of the state where prevails the white population.

However, there were no significant differences when compared to the municipalities as ethnic/predominant color. Maybe justifies this frequency considering that for the state of Rondonia predominant brown color.

Name *et al*[28] for analysis of the University Hospital data BSB observed that the patients reported, 57% were brown, white and 27% black 13.2%, East Indian corresponded to 2% of the cases. Given these diverging in relation to white and brown observed in studies and in the IBGE (2000). Thus, one of the factors that may be related is on the migratory process of the population or disabled in the settings for skin color observed by the people, for the color record is defined by the declarant of the concept itself, and may thus have influenced the data from this survey.

For Queiroz[26] leprosy can occur in all races (OPS, 1983). In a recently published study, Santos *et al* [29] found in 76.7% proportion of non - whites (brown and black) and Thomas *et al*[30]. (2003) found a rate of 82.1% among non - whites. Both figures suggest that, even in populations they evaluated the detection rate among non - whites should be greater than among whites.

According to Queiroz[26] there is still a poor record of race/color variable. In their study only 1% of leprosy cases records had information "Race / Color," and in the second period only 58%.

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The distribution of the detection rate by race / color showed that the detection rate among non - whites is higher in all groups except in places influenced by the composition of the population. The distribution of leprosy by race / color depends on the regional peculiarities in the formation and or mixing of the population[26].

In the study Queiroz[26], virtually the entire period predominated multibacillary (64.2%). In the report published by WHO [27] (WHO, 2008) a wide variation is reported between countries regarding the proportion of multibacillary and paucibacillary among new cases detected. In the region of Africa was found a proportion of cases with multibacillary 40.7% in Comoros, and 92.9% in Ethiopia. In the Americas, the proportion was 53.5% in Brazil, 78.7% in Paraguay.

In Brazil, a study by Sanchez *et al* [31] in Prudentópolis-PR predominated multibacillar forms, the same in the fields of study *et al* [20] , the city of Sobral-CE. Vásques to[25], in a study in Coari-AM showed that the 10 - year period the multibacillary amounted, and last year they came to represent 75% of cases[25].

One possibility to be detecting a higher proportion of paucibacillary cases could be the type of information, communication and health education to the community is addressed. Signs and symptoms of paucibacillary forms are more easily assimilated by the community. Also during the campaigning for the detection of cases, paucibacillary cases may be more easily detected.

Cunha *et al*[32] reported an increase in paucibacillary forms in the Duque de Caxias municipality three times after having been relevant role in patient care which were: an increase in the number of doctors in attendance, decentralization of treatment for other health units and after decentralization for PSF units starting local campaigns.

A gradual increase in the proportion may indicate clinical form Borderline difficulties classification by clinical form or even because the regimen for dimorphic forms and virchowianas is longer. In this case physicians may be more likely to conduct which in case of doubt it takes a longer duration of therapeutic regimen[33].

Although there was an increase in the proportion of dimorphic forms the state in regional group I and Rondonópolis can still observe a predominance of tuberculoid forms. This form would be a trend indicator of the disease.

Magalhães and Rojas [21] reiterate that in some areas in Mato Grosso, Brazil, high detection paucibacillary, the endemic is expanding.

The increase in frequency of tuberculoid forms detection, especially in the Midwest and Northeast Brazil has been reported by Motta and Zuniga[34], who completed pointing strong possibility of increase in the transmission of leprosy in Brazil, warning of a major concern situation to the Public Health authorities of Brazil.

The degree of disability II at the time of diagnosis can be used to estimate the effectiveness of the measures for early detection[35]. Cases with disabilities account for loss in the workforce in endemic regions and makes them sick individuals unable to support themselves and their family. Moreover deformities are closely associated with the stigma related to the disease.

Kerr-Pontes *et al*[36] showed that in the state of Ceará, leprosy is associated with a high level of poverty and rapid, uncontrolled urbanization.

Magalhães and Rojas[21] also indicate that the focal distribution of leprosy, the association with unfavorable living conditions, mainly socioeconomic, and the relationship between poverty and leprosy, confirm the role of social deterioration in the production of this disease. They emphasize, however, that although the relationship between poverty and the disease is not questionable, does not mean that everywhere under these conditions are endemic, with, according to the authors, the need for micro environments favorable to the existence and survival of the pathogen, as well as other factors favorable to its transmission.

In relation to clinical forms of leprosy, there was a gradual increase in the proportions of dimorphic forms in all population strata in Mato Grosso and, albeit with some fluctuations, a reduction in the proportion of tuberculoid forms, except for regional Rondonópolis, where the reverse was observed[26].

In Mato Grosso, there is a stabilization of indeterminate forms the three periods, a gradual reduction in the proportion of tuberculoid and virchowianas and 64% increase in dimorphic proportions throughout the period[26] . In regional Rondonópolis prevailed Indeterminate and Tuberculoid forms, but in the last period there was a slight reduction in the latter, also noting it is an increase of over 100% in dimorphic proportions throughout the period.

The patient Multibacillary is the main source of infection as it has a high bacterial load in the dermis and mucous membranes and can eliminate bacilli in the external environment. It is assumed that leprosy is transmitted by the respiratory tract which needs further studies.

However, there is no conclusive evidence that the transmission is exclusively by respiratory tract, can occur through the skin when there are ulcerated or traumatic skin lesions. The properties of an ecological study does not enable individual risk check, but enable the analysis of the risk of variability in ecological terms. This type of study is of fundamental importance for the understanding of the social and environmental determinants of the health-disease, in which the socioeconomic status of the

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population groups have an important role in explaining health conditions.

The clinical Dimorphic Forms accounted for nearly 50% of cases, followed by Tuberculoid Form with 21% Indefined Form 15.9% and 13.3% Virchowian or Lepromatous Form.

A gradual increase in the proportion may indicate clinical form Borderline difficulties classification by clinical form or even because the regimen for dimorphic forms and virchowianas is longer. In this case physicians may be more likely to conduct which in case of doubt it takes a longer duration of therapeutic regimen[33].

Although he maintained throughout the period prevalence of borderline forms in the state, one can observe a predominance of tuberculoid forms. This form would be a trend indicator of the disease.

The increase in the frequency of detection of tuberculoid forms, especially in the Midwest and Northeast has already been reported by Motta and Zuniga[34], who completed pointing strong possibility of increase in the transmission of leprosy in Brazil, warning of a major concern situation for Public Health authorities.

IV. FINAL CONSIDERATIONS

During the study period were reported 2,972 new cases of leprosy, with an average detection rate of 4.50, hyperendemic situation. Predominant male with 57.7%, brown ethnicity with 54.2%, in the urban area 68.2% and in the age group 20 to 59 years with 74%. As for operational classification of the disease was predominant Multibacillary with 64.2%. There were 48.2% of the dimorphic form, tuberculoid 21%, 15.9% Undefined and 13.3% virchowian. Prevailed treatment PQT/MB/12 doses to 56.6%, with the output mode of treatment with 81.4% cure and only 3% of withdrawal. In 2014, the 52 districts of Rondonia, 42% have hyperendemic detection rates, very high 27% to about 10% high. The production and distribution of leprosy not follow a spatial pattern in Rondonia, reflecting social and different environmental conditions, *Mycobacterium leprae* and identifying critical subespacialidades the territory.

Throughout the period studied leprosy remained hyperendemic and still no signs of exhaustion cases, whether it be analyzed by reference to the whole of the State of Rondonia population.

The identification of the leprosy carrier profile enables the creation of policies in health, more planned and targeted manner to the risk group. In this sense, they are essential to information campaigns about the disease and its early symptoms are promoted. Also important is the disclosure about the care facilities, since the carrier of this disease should go to health facilities to receive the dose of medication supervised.

REFERENCES

[1] Magalhães, M.C.C; Rojas, L.I. (2007, jun.) Diferenciação territorial da hanseníase no Brasil. In. Epidemiologia e Serviços de Saúde, v.16 n.2 Brasília.

[2] Meima A, Irgens LM, Oortmarssen GJ, Richardus JH, Habbema JD. (2002). Disappearance of leprosy from Norway: an exploration of critical factors using an epidemiological modelling approach. International Journal of Epidemiology; 31:991-1000.

[3] WHO. World Health Organization. (19820. Study group chemotherapy of leprosy for control programs. Geneva. WHO Technical Report Series 675.

[4] Iñiguez RL, Gil SR, Rodriguez FC, Pacin MA. (1993). Diferenciación geográfica en la trasmisión de la lepra en Cuba. Centro de Estudios de Ciencias Naturales, Universidad de la Habana, Ciudad de la Habana. Informe final del proyecto SGP: 91-99.

[5] Pichenhayn J. (1995). Geografía histórica de Jachal. San Juan (Argentina): Universidad Nacional de San Juan.

[6] Kazda J, Irgens LM, Kolk AM. (1990). Acid fast bacilli found in sphangnum vegetation of coastal Norway containing*Mycobacterium leprae*-specific phenolic glycolipid-I. International Journal of Leprosy;58:353-357.

[7] Kazda J, Ganapati R, Revankai C. (1986). Isolation of environment derived *Mycobacterium leprae* from soil in Bombay. Leprosy Review;579(3):201-208.

[8] Fine PEM, Stern JA, Ponnighaus JM et al. (1997). Household and dwelling contact as risk factors for leprosy in the Northern Malawi. American Journal of Epidemiology;146:91-102.

[9] Guinto RS, Rodrigues JN. (1941). A field study of leprosy in Talisay, Cebu. International Journal of Leprosy;9:149-166.

[10] Opromola DVA. (2000) Noções de Hansenologia. Bauru: Centro de Estudos Dr. Reynaldo Quagliato.

[11] Cunha, A. Z. S. Hanseníase: A história de um problema de saúde pública. (2001). Ciência e Saúde Coletiva vol.7 nº.2 São Paulo.

[12] BRASIL. Ministério da Saúde. (2002.103). Relatório da II Reunião da aliança Global para eliminação da hanseníase.

[13] BRASIL. Ministério da Saúde. (2008). Vigilância em Saúde. Caderno de Atenção básica n. 21, 2.edição, Brasília. 196 p.

[14] Meima, A, Richardus JH, Habbema, JD. (2004). Trends in leprosy case detection worldwide since 1985. Leprosy Review 2004b; 75: 19-33.

[15] Lockwood, DNJ, Suneetha S. (2005). Leprosy: too complex a disease for a simple elimination

https://dx.doi.org/10.22161/ijaers.5.7.23 *ISSN: 2349-6495(P) | 2456-1908(O)*

paradigm. Bulletin of the World Health Organization; 83(3): 230-235.

[16] Richardus, JH, Habbema, JD. (2007). The impact f leprosy control on the transmission of *M. leprae*: is elimination being attained? Leprosy Review; 78: 330-337.

[17] Penna, ML, Penna, GO. (2007). Trend of case detection and leprosy elimination in Brasil. Trop Méd Int Health; 12: 647-650.

[18] Magalhães, MCC. (2007) Geografia de la lepra en Brasil [tese de doutorado]. Havana: Universidad de la Habana.

[19] Rodrigues, M. L. O.; Silva, S. A.; Neto, J. C. A.; Andrade, A. L. S. S.; Martelli, C. M. T. & Zicker, F., 1992/2008 (2008). Protective effect of intradermal BCG against leprosy: A case control study in central Brazil. *International Journal of Leprosy and Other Mycobacterial Diseases*, 60:335-339.

[20] Campos, S. S. L.; Ramos JR, A. N.; Kerr-Pontes, L. R. S.; Heukelbach, J. (2005). Epidemiologia da hanseníase no município de Sobral, estado do Ceará-Brasil, no período de 1997 a 2003. Hansenol. int. (Online) [online]. vol.30, n.2, p. 167-173.

[21] Magalhães, MCC, Rojas, LI. (2005). Evolución de la endemia de la lepra en Brasil. Revista Brasileira de Epidemiologia; 8(4): 342-355.

[22] Irgens, LM, Skjaerven R. (1985). Secular trends in age at onset, sex ratio, and type index in leprosy observed during declining incidence rates. Am. J. Epidemiol 1985; 122:695-705.

[23] Irgens, LM, Melo CF, Lechat MF. (1990). Leprosy in Portugal 1946-80: epidemiologic patterns observed during declining incidence rates. Lepr. Rev. 1990; 61:32-49.

[24] Pinto Neto, JM, Villa, TCS. (1990). Características epidemiológicas dos comunicantes de hanseníase que desenvolveram a doença, notificados no Centro de Saúde de Fernandópolis (1993 a 1997). Hansen Int. 24(2): 129-136.

[25] Vásquez, FG, Parente, RCP, Pedrosa VL. (2008). Hanseníase em Coari: aspectos epidemiológicos da doença na região do médio Solimões no estado do Amazonas. Caderno de Saúde Coletiva, ;16(2): 193-204.

[26] Queiroz, M. L. (2009). A Hanseníase no Estado de Mato Grosso. Universidade Federal de Mato Grosso. Instituto de Saúde Coletiva. Dissertação de Mestrado em Saúde Coletiva. Cuiabá.

[27] WHO. World Health Organization. (2008, jun.12). Leprosy elimination. Leprosy Today. Disponível em: who. int/lep/en.

[28] Name, R.Q. et al. (2005, may-jun). Estudo clínico, epidemiológico e terapêutico de 402 pacientes com leishmaniose tegumentar americana atendidos no Hospital Universitário de Brasília, DF, Brasil. Anais Brasileiros de Dermatologia, Rio de Janeiro, v. 80, n. 3.

[29] Santos, A. S, Castro, D. S, Falqueto, A. (2008). Fatores de risco para transmissão da Hanseníase. Escola Superior de Ciências da Santa Casa de Misericórdia. Vitória, ES.

[30] Aquino, DMC, Caldas AJM, Silva AAM, Costa JML. (2003). Perfil dos pacientes com hanseníase em área hiperendêmica da Amazônia do Maranhão, Brasil. Revista da Sociedade Brasileira de Medicina Tropical; 36: 57-64.

[31] Sanches, LAT, Pittner E, Sanches HF, Monteiro MC. (2007). Detecção de casos novos de hanseníase no município de Prudentópolis, PR: uma análise de 1998 a 2005. Revista da Sociedade Brasileira de Medicina Tropical, 40(5): 541-545.

[32] Cunha, M. D.; Cavaliere, F. A. M.; Hercules, F. M.; Duraes, S. M. B.; Oliveira, M. L. W. D. R.; Matos, H. J. (2007). Os indicadores da hanseníase e as estratégias de eliminação da doença, em município endêmico do Estado do Rio de Janeiro, Brasil. Cadernos de Saúde Pública. Rio de Janeiro; 23(5):1187-1197.

[33] Martelli, C. M. T.; Andrade, A. L. S. S.; Grossi, M. A. F; Leboeuf, M. A. A.; Lombardi, C. & Zicker, F., (1995). Changes in leprosy clinical pattern after multidrug therapy implementation. *International Journal of Leprosy*, 63:95-97.

[34] Motta, CP, Zuniga, M. (1990). Time Trends of Hansen´s Disease in Brasil. International Journal of Leprosy and Other Mycobacterial Diseases; 58(3): 453-461.

[35] BRASIL. Ministério da Saúde, Vigilância em Saúde. (2008). Relatório: Situação epidemiológica da hanseníase no Brasil, 12 p.

[36] Kerr-Pontes, LRS, Montenegro ACD, Barreto MLB, Werneck GL, Feldmeier H. (2004). Inequality and leprosy in Northeast Brazil: an ecological study. International Journal of Epidemiology; 33(2): 262-269.