



## Article/Artigo

# Leprosy in Buriticupu, State of Maranhão: active search in the general population

Hanseníase no município de Buriticupu, Estado do Maranhão: busca ativa na população geral

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### ABSTRACT

**Introduction:** This study was developed to evaluate the situation of leprosy in the general population of the municipality of Buriticupu, State of Maranhão, Brazil. **Methods:** We used the method of active search to identify new cases from 2008 to 2010. Bacilloscopy of intradermal scrapings was performed in all patients with skin lesions compatible with leprosy, and histopathological examination in those who had doubts on the definition of the clinical form. **Results:** The study included 19,104 individuals, with 42 patients diagnosed with leprosy after clinical examination, representing a detection rate of 219.84 per 100,000 inhabitants. The predominant clinical presentation was tuberculoid with 24 (57.1%) cases, followed by borderline with 11, indeterminate with four, and lepromatous with three cases. The study also allowed the identification of 81 patients with a history of leprosy and other skin diseases, such as pityriasis versicolor, dermatophytosis, scabies, vitiligo, and skin carcinoma. The binomial test showed that the proportion of cases in the headquarters was significantly higher than that in the villages ( $p = 0.04$ ), and the generalized exact test showed that there was no association between age and clinical form ( $p = 0.438$ ) and between age and gender ( $p = 0.083$ ). **Conclusions:** The elevated detection rate defines the city as hyperendemic for leprosy; the active search for cases, as well as the organization of health services, is an important method for disease control.

**Keywords:** Leprosy. Detection. Active search. State of Maranhão.

### RESUMO

**Introdução:** O estudo foi desenvolvido com o objetivo de avaliar a situação da hanseníase na população geral do município de Buriticupu, Estado do Maranhão, Brasil. **Métodos:** Foi empregado o método de busca ativa na identificação de casos novos, de 2008 a 2010. Baciloscopia de raspado intradérmico foi feita em todos os pacientes com lesões de pele compatíveis com hanseníase e exame histopatológico, naqueles em que havia dúvidas na definição da forma clínica. **Resultados:** Participaram do estudo 19.104 indivíduos, sendo que o exame clínico definiu o diagnóstico de hanseníase em 42 pacientes, o que representa um coeficiente de detecção de 219,84/100.000 habitantes. A forma clínica predominante foi a tuberculóide com 24 (57,1%) casos, seguindo-se da dimorfa, com 11, da indeterminada, com 4 e da virchowiana com 3 casos. O estudo permitiu, ainda, a identificação de 81 pacientes com passado de hanseníase, além de outras doenças da pele, tais como pitíriase versicolor, dermatofitose, escabiose, vitiligo e carcinoma de pele. O teste binomial mostrou que a proporção de casos na sede foi significativamente maior que a dos povoados,  $p = 0,04$  e o teste exato generalizado que não há associação entre faixa etária e forma clínica ( $p = 0,438$ ), bem como entre faixa etária e sexo ( $p = 0,083$ ). **Conclusões:** O elevado coeficiente de detecção define o município como hiperendêmico para a hanseníase; a busca ativa de casos é um método importante, bem como a organização dos serviços de saúde, para o controle da doença.

**Palavras-chaves:** Hanseníase. Detecção. Busca ativa. Estado do Maranhão.

### INTRODUCTION

At the beginning of the decade of the 1990s, the World Health Organization (WHO) established the goal of reducing the prevalence of leprosy to less than one case per 10,000 individuals by the year 2000. At the end of 2000, 107 countries among 122 considered endemic for the disease in 1985 have reached elimination. Leprosy was a health problem in only 15 countries (prevalence rate  $> 1$  per 10,000), including Brazil<sup>1</sup>.

After more than 20 years, the National Leprosy Control Program (PNCH) in Brazil, following a new global goal of control of the WHO, takes over efforts to control the disease and replaces the point prevalence indicator with the detection rate of new cases per 100,000 inhabitants<sup>2,3</sup>. The measure is more realistic to Brazil, where the disease remains a high-magnitude problem for public health in this second decade of the 21<sup>st</sup> century. The detection rate decreased from 29.37 per 100,000 inhabitants in 2003 to 20.52 per 100,000 inhabitants in 2008<sup>3</sup>. Despite this progress, Brazil, along with other fifteen countries, accounted for 93% of total global cases of leprosy in 2009<sup>4</sup>.

The disease is not homogeneous over the vast territory of Brazil, with regions showing distinct tendencies in prevalence and control. Despite the tendency towards stabilization, the detection rates of new cases remained elevated in the North, Midwest, and Northeast<sup>3</sup>.

Data from the Ministry of Health and from a study done in the area showed high detection rates and subsequent high detection among children under 15 years in the State of Maranhão<sup>2,5</sup>.

By far, leprosy is a concern among sectors of the Federal University of Maranhão. In the City of Buriticupu the detection rate was 23.6 new cases per 10,000 inhabitants in the year 2000 and 27.4 per 10,000 in 2001<sup>6,7</sup>, thus motivating the development of the current research.

Since the great progress made in 1981 with the introduction of multidrug therapy, leprosy-endemic

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countries have been working with the possibility of eliminating the disease<sup>8</sup>, the evolutionary characteristic of which is the association between skin lesions and neurological disorders. To Scollard et al.<sup>9</sup>, it is as if there were associated diseases in the same patient, i.e., one that causes a chronic infection and the other a peripheral neuropathy, which generates physical disabilities.

In our view, the goal proposed by the WHO for effective disease control in the world has launched a challenge to leprosy-endemic countries with regard to the organization of local health services and their mobilization power, and their ability to face the difficulties inherent in leprosy: the social segment that is commonly affected, the long incubation period of the disease, the high number of cases, the existing discrimination, and the sequels that some patients can develop.

This was the vision that our group had in proposing partnerships with the Departments of Health, Education, and Social Services of the Municipality to put into practice the project *Integrated Control of Leprosy in the Municipality of Buriticupu - State of Maranhão, Brazil*, with the aim of strengthening the local actions of diagnosis, treatment, and control of cure to achieve the goal of elimination by 2010, as proposed.

## METHODS

The project *Integrated Control of Leprosy in the Municipality of Buriticupu* was implemented with the following phases: Implementation or Phase I, developed from 2004 to 2005 in order to determine the detection rate in children under 15 years; Consolidation or Phase II, from 2006 to 2007, to identify leprosy in adults; Consolidation or Phase III, from 2008 to 2010, to detect leprosy in the general population; and Maintenance or Phase IV, to be developed from 2011 to 2014, which will seek to strengthen health surveillance and the decentralization of diagnosis and treatment, contributing to the elimination of leprosy in the municipality of Buriticupu as provided in the National Leprosy Control Program.

The studies of Phases I and II were published in the *Journal of the Brazilian Society of Tropical Medicine*<sup>6,7</sup>. This study was developed to determine the detection rate of leprosy in the general population, identify the clinical forms, examine the contacts, and treat the diagnosed cases.

### Study area

The municipality of Buriticupu is located in the pre-Amazonian area of Maranhão, between latitudes 4°S and 5°S and longitudes 45°30' and 47° west of Greenwich. Its territory extends over 2,719km<sup>2</sup>, and its 61,480 inhabitants live in 9,608 residences. The beard consists of formations of plates, separated by tracks in drains and trenches, situated at an altitude of 200m above sea level, guarding the borders with the Cities of Bom Jardim Alto Alegre do Pindaré, Santa Luzia, Arame, Amarante do Maranhão, and Bom Jesus das Selvas. The economy relies on commerce and is rather diversified, especially among agricultural and timber products, such as rice, corn, flour, and livestock. The network of municipal health services includes a hospital with 50 beds and 10 ambulatory units where 10 teams from the Family Health Strategy (FHS) work.

## Case detection

In this phase from 2008 to 2010, the method of active search for cases was used, conducted with the same actors that worked in the previous stages (schoolteachers, nurses, health workers, and members of the FHS), who received further training in order to perform screening of individuals with any skin changes from the general population residing in areas around the school and the health units in the town and villages (rural areas). Then, for a definitive diagnosis, the research team performed a clinical examination on those screened individuals, with the data recorded on specific forms.

The diagnosis of leprosy was defined based on the existence of changes in the pigmentation and/or texture of the skin, coupled with the loss of sensitivity to clinical examination. Bacilloscopy of intradermal scrapings was done in suspected cases before proceeding to the coloring of the material using the Ziehl-Nielsen stain. The counting of bacilli followed the formula established by Ridley and Jopling<sup>10</sup>.

Some of the patients, especially those who had raised doubts on the clinical classification and those who reported contact with borderline or lepromatous cases, underwent a skin biopsy taken from the inside edge of the lesion using a 6mm-diameter punch after asepsis and local anesthesia. The biopsy specimen was placed in a 10% formaldehyde solution until laboratory processing. Regarding the treatment, the Madrid classification and the WHO operational classification were considered<sup>8</sup>, and the recommendations of the Ministry of Health were followed<sup>11,12</sup>. Response to treatment and control of cure were evaluated in regular clinical examinations.

The contacts of the new cases were examined, adopting the same procedures outlined for diagnosis. Those that were unaffected were referred for BCG (*Bacillus Calmette-Guérin*) vaccination.

To calculate the detection rate, the population of the municipality was considered. To compare the proportion of cases of leprosy in the villages and in the municipal seat, a binomial test was applied. To evaluate the association between age and clinical forms and between age and gender, the generalized exact test was used.

## RESULTS

Patients residing in the town were mobilized by public municipal schoolteachers and primary health care professionals. Residents in the villages were mobilized by local health agents and examined in the health units and schools in the municipality of Buriticupu. The studied population totaled 19,104, of whom 1,890 (9.9%) were screened by teachers and nurses. Among these, the research team conducted clinical examinations in 670 patients (378 in the town and 292 in the villages) who attended a doctor's appointment. Forty-two leprosy cases were diagnosed, representing a general detection rate of 219.85 per 100,000 individuals. Specifically, the detection rate was 91.76 per 100,000 in 2008, 81.69 per 100,000 in 2009, and 107.30 per 100,000 in 2010.

The distribution of cases showed that of the 42 leprosy patients, 29 (69%) live in the town and 13 (31%) in the villages (rural area). By submitting to the binomial test for proportions those who

**TABLE 1 - Origin of cases of leprosy and other skin morbidities in the general population of the municipality of Buriticupu, State of Maranhão, Brazil, from 2008 to 2010.**

Researched area	Studied population	Clinical exam	History of				Skin			Other conditions	
			Leprosy	leprosy	Pityriasis	Dermatophytosis	Onychomycosis	Vitiligo	cancer		Scabies
<b>Town</b>											
Centro	2,123	144	1	1	25	2	-	-	-	-	115
Terra Bela	7,289	126	20	22	8	4	-	2	-	-	70
Açude/Primavera	805	9	1	-	1	-	-	-	-	-	7
Colégio Agrícola	344	11	2	2	1	-	-	-	-	-	6
Caeminha	2,838	22	2	10	1	1	-	-	-	-	8
Vila Isaías	2,360	55	2	-	11	-	1	-	-	-	41
Vila Primo	1,604	11	1	1	1	1	-	1	-	-	6
<b>Subtotal</b>	<b>17,363</b>	<b>378</b>	<b>29</b>	<b>36</b>	<b>48</b>	<b>8</b>	<b>1</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>253</b>
<b>Villages</b>											
II Núcleo	631	130	4	23	9	7	-	4	1	1	81
Burutizinho	200	16	2	7	1	-	-	-	-	-	6
Presa de Porco	160	20	3	2	1	3	-	2	-	-	9
Pau Ferrado	251	39	2	6	-	1	-	-	-	-	30
Vila Pindaré	130	19	-	2	1	3	-	2	-	-	11
Povoado 1 da vicinal 4	369	68	2	5	19	6	1	2	-	2	31
Subtotal	1,741	292	13	45	31	20	1	10	1	3	168
<b>Total</b>	<b>19,104</b>	<b>670</b>	<b>42</b>	<b>81</b>	<b>79</b>	<b>28</b>	<b>2</b>	<b>13</b>	<b>1</b>	<b>3</b>	<b>421</b>

Binomial test to compare the proportion of leprosy cases in the villages and in town:  $p = 0.04$ .

underwent clinical examination at the headquarters and in the villages and those who had leprosy, it was found that the proportion of cases in the town was significantly higher than that in the villages ( $p = 0.04$ ) (Table 1).

Tuberculoid and borderline clinical forms were predominant (Table 2). Grouping the patients into young (<19 years old), adult (20-59 years old), and elderly (60 years or older), and applying the generalized exact test showed no association between age and clinical form ( $p = 0.438$ ) as well as between age and sex ( $p = 0.083$ ).

Histopathological examination was performed on 11 patients. Among them were two patients who relapsed into a clinical form compatible with the borderline form (subsequently confirmed histologically) but who, between 2003 and 2004, were treated with schema for paucibacillary leprosy (indeterminate form).

The histopathological findings commonly found in the epidermis were hyperkeratosis, acanthosis, corneous pseudocysts, reduction of Malpighian body, regional keratosis, and pigmentation of basal layer. The dermal mononuclear infiltrates were characterized by the presence of histiocytes and giantocytes, associated with lymphocytes and plasmocytes in granulomatous arrangements, and perivascular, periadnexal, and perineural dissociation of the erector pili muscle. Bacilloscopy was performed in all patients and was positive in 8 (19%) cases (3 lepromatous and 5 borderline forms). The bacilloscopic index ranged from 1 to 3.5. All patients received specific treatment and were followed up by the research team.

The study also allowed the diagnosis of 79 cases of pityriasis versicolor, 28 of dermatophytosis, 13 of vitiligo, 3 of scabies, 2 of onychomycosis, and 1 of carcinoma. Various conditions, such as scars, moles, excoriations, rashes, and nonspecific and prurient depigmentation, were observed in 421 persons (Table 1).

## DISCUSSION

The decision to continue to engage the education sector at this stage of the study was in line with our experience in the studies of Phases I and II of the project and due to the perception that the social scope of this sector is greater than that of the health sector and that its involvement in combating leprosy is a fundamental condition for sustained control of the disease.

From 2008 to 2010, the municipal health service recorded 170 cases of leprosy, including the 42 (24.7%) identified in the active search (Table 2). A ratio of 1 man to 1.2 women was found in the study of the active search, repeating the finding in previous

**TABLE 2 - Distribution of leprosy cases by age, gender, and clinical presentation in the general population of the municipality of Buriticupu, State of Maranhão, Brazil, from 2008 to 2010.**

Age group (years)	Gender		Clinical forms				Total
	Male	Female	I	T	B	L	
<15	5	6	2	5	2	2	11
15 - 19	2	1	-	3	-	-	3
20 - 29	5	3	1	5	2	-	8
30 - 39	1	3	1	2	1	-	4
40 - 49	1	4	-	1	4	-	5
50 - 59	1	4	-	4	1	-	5
≥60	4	2	-	4	1	1	6
<b>Total</b>	<b>19</b>	<b>23</b>	<b>4</b>	<b>24</b>	<b>11</b>	<b>3</b>	<b>42</b>

I: indeterminate; T: tuberculoid; B: borderline; L: lepromatous.

Generalized exact test to evaluate the association between age and clinical presentation ( $p = 0.438$ ). Generalized exact test to evaluate the association between age and gender ( $p = 0.083$ ).

phases of the data study<sup>6,7</sup>; this is unlike the relationship found in those diagnosed through spontaneous demand and is presumably explained by women being more careful and more keen to attend to appeals that relate to their health and family. This finding, repeatedly rated by our group, shows that the active search for cases, despite having been shown to be the primary instrument for early diagnosis, does not discount the importance of good organization of services and its role in encouraging and stimulating the family to seek clarification of their skin problems. We highlight the broad mobilization achieved by schools within their scope and in their surrounding area, which led to their being responsible for finding 26.4% of the patients younger than 15 years. Moreover, this action made possible the mobilization of different sectors of society that were informed about the disease and its determinants. Another important observation was the involvement of professionals from the health sector in identifying suspected cases, which was demonstrated by the increased detection of cases in those areas where the FHS was more active. These two elements together served as stimulators of the spontaneous demand for health services that followed the work of active search.

The comparison of the high detection rate of the disease (133.7 per 100,000) found among lower age groups in the study of Phase I with the results of Phase III (57.57 per 100,000) shows a regression of disease in this segment. The indicator, however, remains high. The results point to truths with which we agree, that the shift in the incidence of leprosy to less than 15 years presents poor surveillance and control failure of the disease<sup>13</sup>, or disagree, such as those announced by Barbieri and Marques<sup>14</sup> in their statements that there are more multibacillary children in endemic areas than in areas of low endemicity. In a situation of early diagnosis, paucibacillary forms predominate in this segment, including the largest number of single lesions in the indeterminate form<sup>5</sup>.

The current phase of the study, developed in the general population, shows the trend of the disease in the municipality of Buriticupu: the proportion of 4.6 paucibacillary to one multibacillary case first found in studies of Phase II<sup>7</sup> changed to 2 paucibacillary to one multibacillary case. In both phases, the predominance of the tuberculoid form with an earlier evolution expresses the force of the endemic that affects individuals more resistant to infection. The finding that 66.6% of all diagnosed cases are paucibacillary reinforces the importance of early diagnosis and treatment considering that a delay in diagnosis predisposes the patient to disabilities.

It is noteworthy that there are 81 people with a history of leprosy among the contacts. As in the study in schoolchildren<sup>6</sup> and adults<sup>7</sup>, this fact can be explained by overcrowding, since a parallel study found that 70% of residences had only three rooms, each inhabited by more than five people<sup>15</sup>. This observation is consistent with another study, according to which leprosy affects mainly those in low-income and low sociocultural levels of the population, who live in clusters, allowing larger transmission of the bacillus<sup>16</sup>.

The good therapeutic response presented by paucibacillary patients confirms the effectiveness of polychemotherapy and the recognized importance of early diagnosis afforded by active search since we encounter the presence of leprosy reactions outlined for several multibacillary patients. On the other hand, the experience of several sectors involved in the dynamics of leprosy control spread, in practice, knowledge about the disease and its transmission mechanisms in society. Besides, training of health professionals, and

discussion about a nosology that represents a challenge to the sector, reinforce the commitment of achieving the control and to keep it sustainable by the following years.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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