

Leprosy in Subjects under 15 Years: Epidemiological Analysis in Brazil

ORIGINAL

**Maria Lúcia Neto de Menezes¹, Maria das Neves Figueiroa²,
Estela Maria Leite Meirelles Monteiro³,
Ayane de Araújo Beserra⁴,
Marcia Jasmini Sidartha da Silva Fernandes⁴,
Alef Diogo da Silva Santana⁵**

Abstract

This article analyzes the epidemiological profile of leprosy in the age group from 0 to 14 years, in the municipalities that constitute the VI Brazilian Regional Health Management Office (GERES) in the state of Pernambuco, from 2005 to 2014. This is a study with an exploratory and retrospective design using the Brazilian National Disease Notification System (SINAN). In the decade under analysis, 613 cases of leprosy were registered – 11.2% involving subjects under 15 years of age. There is a downward tendency since 2005, with a marked increase in the year 2012 and a new decrease since 2013. The incidence of cases had a pattern compatible with the high magnitude of this disease in the region, observed in 92.3% of the municipalities analyzed. It is concluded that leprosy persists as a serious public health issue in Brazil, despite the control measure put in place, such as the SANAR Program (for neglected diseases) and action plans in the municipalities with higher incidence of this pathology.

Introduction

Leprosy is an infectious disease, categorized in the group of neglected diseases that are regarded as endemic in populations with poor living conditions, as it contributes to perpetuate inequalities and hinder the growth of developing countries. Some examples of neglected diseases are: dengue, Chagas disease, schistosomiasis, leprosy, leishmaniasis, malaria, and tuberculosis, among others that afflict and threaten the lives of millions of people around the world [1].

- 1 Obstetric nurse. MS in Hebiatrics. Ph. D. student in Child and Adolescent Health at the Federal University of Pernambuco (UFPE). Professor at the University of Pernambuco (UPE). Recife, PE, Brazil.
- 2 Obstetric nurse. Ph.D. in Molecular and Tissue Biology. Professor at the University of Pernambuco (UPE). Recife, PE, Brazil.
- 3 Nurse. Ph.D. in Nursing. Professor at the Federal University of Pernambuco (UFPE). Recife, PE, Brazil.
- 4 Undergraduate student in Nursing at the Arcoverde Higher Education Autarchy (AESA). Arcoverde, PE, Brazil.
- 5 Undergraduate student in Nursing at the University of Pernambuco (UPE). Recife, PE, Brazil.

Contact information:

Maria Lúcia Neto Menezes.

✉ maria.luciamenezes@yahoo.com.br

Keywords

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Although leprosy is curable, the path of this disease in the life of an infected person leads to a number of consequences, which can be physical, social, and psychic, often impacting the function of organs significant for locomotion or affecting their image. Frequently, the psychological and social impact of leprosy turns patients into hostages of their condition, something which can cause problems in their work or in their loving and family relationships, making it difficult to deal with their own body. Thus, the reaction that a patient adopts before changes imposed by this disease in her/his life may influence treatment [2].

Leprosy is categorized into CID Z59-5, i.e. diseases related to extreme poverty. Brazil occupies the 2ⁿ position in terms of absolute number of cases of leprosy reported globally, with a prevalence rate of 1.5 cases/10,000 inhabitants, behind only India. However, Brazil has been successful in disease control in recent years, although some pathologies persist in several regions of the country [3]. According to the 'Portaria' no. 149, enacted on February 3, 2016, by the Ministry of Health, leprosy is a compulsory notification disease throughout the Brazilian territory, requiring mandatory research [4-5].

In 2014, Brazil registered 31,064 cases of leprosy, according to data released by the Ministry of Health. The occurrence of leprosy is irregular in Brazil. Although it is observed in all the Federation's units, this disease has great concentration in the Amazon and in the Northeastern states. The federating unit with the highest prevalence is Mato Grosso, with 9.03 cases/10,000 inhabitants. Next comes Maranhão, with 5.29 cases/10,000 inhabitants. Pará, Tocantins, and Pernambuco also have high rates [5].

Pernambuco occupies the 9th position among the states with the highest leprosy detection rates in Brazil and the 3rd position in the Northeastern region. To each group of 100,000 Pernambuco's inhabitants, 29 are diagnosed with this disease and they may show some type of disability in the future. The

Metropolitan Region of Recife concentrates 62% of the cases of leprosy in the state. Out of the new cases, 24% already have some type of disability due to this disease [3].

Despite the magnitude of leprosy in Brazil and the existence of the SANAR (Program to face for neglected diseases), in the state of Pernambuco, the vulnerability to this pathology in subjects under 15 years still represents a major public health issue, since Pernambuco represents 8.0% of the new cases of leprosy in the general population and 12.0% of the cases in subjects under 15 years [6].

The occurrence in subjects under 15 years indicates early exposure and persistence of transmission of this disease, reflecting active transmission circuits. Children and teenagers belong to vulnerable groups, constituting a significant group to evaluate the magnitude of this disease and maintaining a regular parameter; the general detection rate of this disease shows a downward tendency in 2012, however, the number of cases among subjects under 15 years has small variations, indicating a possibility of hidden endemicity [6].

The cases are distributed in most municipalities of the 12 Brazilian Regional Health Management Offices (GERES), however, 40% of these cases are concentrated in the I GERES. There is, however, intermunicipal variation in the detection rate (from 1.8 to 640.4 cases/100,000 inhabitants), with hyperendemic municipalities for this disease, including within the VI GERES.

Based on national and state epidemiological data, this study was designed to analyze the epidemiological profile of leprosy by surveying cases in subjects under 15 years in the VI GERES, within the period of 2005 to 2014.

This study is justified by the fact that the incidence of leprosy in subjects under 15 years is a relevant indicator of quality of health services available to the population in focus.

Method

This is a study with an exploratory and retrospective design, using data from the Brazilian National Disease Notification System (SINAN), specifically concerning cases of leprosy within the age group from 0 to 14 years and among inhabitants of the VI GERES in Pernambuco: Arcoverde, Buíque, Custódia, Ibimirim, Inajá, Jatobá, Manarí, Pedra, Petrolândia, Sertânia, Tacaratu e Tupanatinga, and Venturosa.

The population of this study consisted of all cases of leprosy in subjects under 15 years notified in the VI GERES, from January 1, 2005, to December 31, 2014. All cases with clinical diagnosis of leprosy notified were included in the sample as a 'new case', within the specified age group, and cases notified within the age group above 15 years and cases of relapse of this disease were excluded from the sample.

The variables analyzed were: municipality of notification, municipality of residence, health center of notification, age, sex, race/skin color, clinical form, operational classification, and mode of entry and mode of detecting the new case.

For analyzing the incidence rate (proportion of new cases in a given population and in a given time interval), we used the number of newly-confirmed cases in children under 15 years and population estimates data, for each municipality with occurrence(s), obtained from demographic censuses between 2005 and 2012 – calculated by 10,000 inhabitants and presented by means of proportion measures.

The results are arranged in absolute and percentage values into tables and graphs, prepared using the softwares *Microsoft Word* and *Microsoft Excel* (versions 2010).

This study was conducted according to the provisions of Resolution no. 466/2012, by the Brazilian National Health Council (CNS), referring to the ethical aspects recommended when conducting research that involves human beings. The project was approved by the Research Ethics Committee

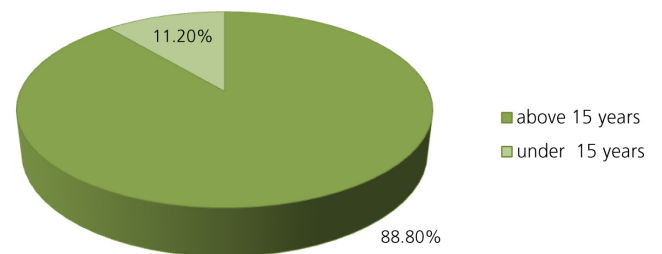
of the University of Pernambuco (REC/UPE), under the Brazilian Certificate of Submission for Ethical Assessment (CAAE) no. 53813716.2.0000.5207 and Protocol no. 1,478,230, issued on April 5, 2016.

Results

Within the study period, from 2005 to 2014, 613 (100%) new cases of leprosy were registered in individuals residing in the VI GERES. Out of them, 69 (11.2%) involving subjects under 15 years (**Figure 1**).

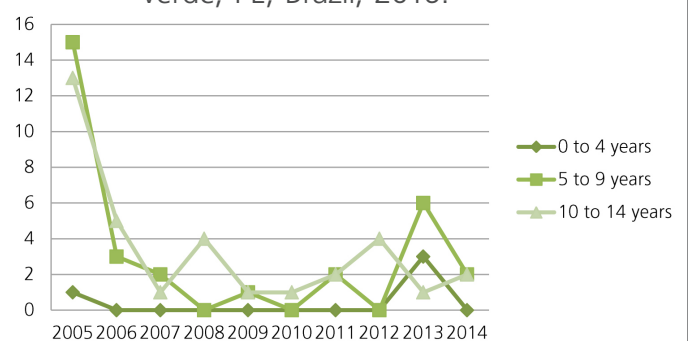
In the decade under study, out of the 69 cases of leprosy recorded in subjects under 15 years, there was a downward tendency line from 2005, with a marked increase in 2012 and a new decrease in 2013, as shown in **Figure 2**.

Figure 1: Percentage of cases of leprosy in the VI GERES according to age group, within the decade from 2005 to 2014. Arcoverde, PE, Brazil, 2016.



Source: Prepared by the authors.

Figure 2: Time series of cases of leprosy in the VI GERES according to age group, within the decade from 2005 to 2014. Arcoverde, PE, Brazil, 2016.



Source: Prepared by the authors.

Table 1. Epidemiological profile of cases of leprosy in the VI GERES, according to sex, age group, operational and clinical classification, within the decade from 2005 to 2014. Arcoverde, PE, Brazil, 2016.

| Variables | N | % |
|----------------------------|----|------|
| Age | | |
| 0 to 4 years | 4 | 5.8 |
| 5 to 9 years | 31 | 49.3 |
| 10 to 14 years | 34 | 44.9 |
| Sex | | |
| Female | 42 | 60.9 |
| Male | 27 | 39.1 |
| Area of residence | | |
| Urban area | 42 | 60.9 |
| Rural area | 14 | 20.3 |
| Periurban area | 4 | 5.8 |
| Unknown | 9 | 13.0 |
| Operational classification | | |
| Multibacillary | 38 | 55.1 |
| Paucibacillary | 31 | 44.9 |
| Clinical form | | |
| Dimorph | 36 | 52.2 |
| Undetermined | 16 | 23.2 |
| Tuberculoid | 13 | 18.8 |
| Virchowian | 2 | 2.9 |
| Not classified | 2 | 2.9 |

Source: Prepared by the authors.

The survey of cases of leprosy in subjects under 15 years (69 = 100%) showed that 60.9% of the cases were diagnosed in the urban area, 20.3% in the rural area, and 5.8% in the perirural area. In this group, there was a predominance of women (42 = 60.9%), and men accounted for 27 cases (39.1%).

Considering the total distribution of cases by age group, there were 4 cases between 0 and 4 years (5.8%), 31 cases between 5 and 9 years (44.9%), and 34 cases in teenagers from 10 to 14 years (49.3%).

According to the operational classification of leprosy, it was shown that the multibacillary form prevailed, with 55.1% of the cases, in comparison to the paucibacillary form, over the years. In the

analysis of clinical forms, together, the dimorph and the indeterminate ones represented 75.4% of the cases (Table 1).

Out of the 69 cases of leprosy analyzed within the decade from 2005 to 2014, the age group from 10 to 14 years prevailed. The year 2005 gathered the highest number of notifications (42.0%).

Considering the mode of detection, spontaneous demand was predominant, registered in 20 (29%) of the new cases of leprosy. Detection through contact examination occurred in 19 (27.5%) of the cases and referral took place in 18 (26.1%) of the cases (Table 2).

Table 2. Profile of cases of leprosy in the VI GERES, according to age group, mode of detection, smear microscopy, disability degree, and therapeutic scheme, within the decade from 2005 to 2014. Arcoverde, PE, Brazil, 2016.

| Variables | N | % |
|-----------------------------|-----|------|
| Mode of detection | | |
| Spontaneous demand | 20 | 29.0 |
| Contact examination | 19 | 27.5 |
| Referral | 18 | 26.1 |
| Unknown | 5 | 7.2 |
| Others | 4 | 5.8 |
| Examination of collectivity | 3 | 4.3 |
| Smear microscopy | | |
| Not performed | 41 | 59.4 |
| Positive | 20 | 29.0 |
| Negative | 7 | 10.2 |
| Unknown | 1 | 1.4 |
| Number of injuries | | |
| 0 to 4 years | 15 | 5.4 |
| 5 to 9 years | 116 | 41.0 |
| 10 to 14 years | 146 | 53.6 |
| Physical disability | | |
| Degree 0 | 66 | 95.7 |
| Degree 1 | 3 | 4.3 |
| Initial therapeutic scheme | | |
| 1-SMB/PCT/6 doses | 29 | 42.0 |
| 2-SMB/PCT/12 doses | 38 | 55.1 |
| Other schemes replaced | 2 | 2.9 |

Source: Prepared by the authors.

Regarding smear microscopy, in most cases, 41 (59.4%), this procedure was not carried out. When performed, smear microscopy was positive in 20 (29%) of the cases and negative in 7 (10.2%) of the cases notified within the decade.

As for the total distribution of cases by age group and the number of cutaneous injuries, the group from 10 to 14 years had the highest number, with 34 cases totaling 146 cutaneous injuries (49.3%).

In terms of the physical disability degree (PDD) in diagnosis, out of the 69 cases analyzed, PDD 0 was predominant, but 3 (4.3%) patients showed PDD 1.

The treatment regimen adopted in most cases was a 12-dose specific multibacillary polychemotherapy (SMB/PCT), observed in 38 cases (55.1%).

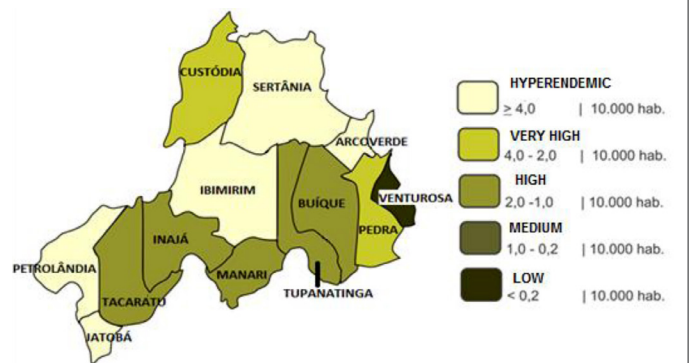
Concerning the spatial distribution of leprosy in subjects under 15 years, out of the 13 municipalities within the VI GERES, 12 municipalities had at least 1 case of this disease within the period from 2005 to 2014. This means that the burden of disease was observed in 92.3% of the municipalities analyzed (Figure 3).

Considering the parameters of the Ministry of Health (above 4.0 cases/10,000 inhabitants), the analysis of general detection rates revealed the persistence of hyperendemics in 5 municipalities: Arcoverde, Ibimirim, Jatobá, Petrolândia, and Sertânia. In turn, the municipalities of Custódia and Pedra stood out with a pattern of 4.0 cases/10,000 inhabitants – 2.0 cases/10,000 inhabitants is already considered a very high index.

The municipalities of Buíque, Inajá, Manari, and Tupanatinga were considered as having high endemicity. Venturosa was the only municipality with low incidence rate – no cases of this disease (Figure 3).

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Figure 3: The leprosy detection rate, within the VI GERES, according to the age group, per 10,000 inhabitants, within the decade from 2005 to 2014. Arcoverde, PE, Brazil, 2016.



Source: Prepared by the authors.

Table 3. Distribution of cases of leprosy in the VI GERES, according to age group, year of notification, and municipality of residence, within the decade from 2005 to 2014. Arcoverde, PE, Brazil, 2016.

| Municipality | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
|--------------|------|------|------|------|------|------|------|------|------|------|-------|
| Petrolândia | 1 | - | 1 | 3 | 1 | - | 3 | 2 | 5 | 1 | 17 |
| Arcoverde | 12 | 1 | - | 1 | - | - | - | - | - | - | 16 |
| Sertânia | 10 | - | - | - | - | - | - | - | 3 | - | 13 |
| Ibimirim | 4 | 5 | 1 | - | - | - | - | - | - | - | 10 |
| Jatobá | 1 | - | - | - | - | 1 | 1 | - | - | 1 | 4 |
| Custódia | - | - | - | - | - | - | - | 2 | 1 | 2 | 3 |
| Petra | - | 1 | - | - | 1 | - | - | - | - | - | 2 |
| Buíque | 1 | 1 | - | - | - | - | - | - | - | - | 2 |
| Tupanatinga | - | - | 1 | - | - | - | - | - | - | - | 1 |
| Tacaratu | - | - | - | - | - | - | - | - | 1 | - | 1 |
| Manari | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Inajá | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Total | 29 | 8 | 3 | 4 | 2 | 1 | 4 | 10 | 2 | 4 | 69 |

Source: Prepared by the authors.

During the period, it was observed that the municipality of Petrolândia stood out when considering the total number of cases. Within the decade from 2004 to 2015, the year 2005 had the highest number of notifications (42%). In the same year, the municipality of Arcoverde had the highest number of registered cases, followed by the municipality of Sertânia (Table 3).

Discussion

In a scenario similar to what occurs in Brazil, leprosy in the countryside of Pernambuco still remains as a serious public health issue, even with the adoption of control measures and the creation of innovative action plans in the municipalities considered as those with the greatest burden of this disease.

This study identified a decline in the incidence of leprosy within the VI GERES between 2005 and 2014, but the incidence rates are still high, with slight differences from one year to the next, and they show difficulty in controlling this disease.

Decline in the leprosy incidence rate has not been enough to meet one of the United Nations Millennium Development Goals: eliminating leprosy by the end of 2015 – i.e. registering a maximum of 1 case per 10,000 inhabitants [7]. Thus, Brazil still remains with two perverse titles: the only country in the world that has not been able to eliminate this disease and the country concentrating the largest number of new cases per year.

The data presented in this study reflect a regional tendency, with an increased number of cases in 2012. According to data from the Ministry of Health, Northeastern Brazil keeps a heterogeneity among its 9 states. In the year 2012, while the states of Rio Grande do Norte and Alagoas had the lowest leprosy detection rates, the states of Maranhão, Piauí, and Pernambuco showed values compatible with hyperendemics [6].

The distribution of cases of leprosy in subjects under 15 years within the VI GERES showed both

hyperendemic and low endemicity municipalities, a pattern compatible with the high magnitude of this disease in the region. The presence of groups of municipalities with higher detection rates than expected indicates the persistence and greater strength of this disease in certain groups of municipalities in the Brazilian regions, or that health services in these regions were rather efficient in detecting cases. On the other hand, agglomeration of municipalities with mean or below-expected detection rates may be indicative of possible failures in health services, such as late diagnosis and underreporting of cases. It is worth mentioning that municipalities with low case detection and those located close to high risk areas should strengthen their surveillance system [8].

The analysis of the spatial configuration of leprosy within the VI GERES revealed a predominance of cases in urban areas. Health inequalities among various population groups in urban settings reflect inherent inequalities in economic, social, and housing conditions.

In relation to sex, a greater predominance was observed among women. Studies show a divergence in the results as for the predominance of leprosy according to sex [9]. Some of them show a prevalence of men, others a prevalence of women. Some authors report that most cases detected in women were diagnosed by spontaneous demand, in turn the cases in men involve greater occurrence of disabilities associated with greater proportion of late diagnosis [10]. Most researchers on the theme point out that leprosy in childhood or adolescence has no predilection for sex, affecting boys and girls alike [11].

Considering the operational classification of leprosy, there was a predominance of multibacillary (MB) forms. This fact denotes a growth of endemics, warning about epidemiological surveillance, because they are regarded as foci of infection and maintenance of the epidemiological chain, besides being seen as contagious forms with disabling po-

tential [12-14]. Corroborating literature data, this study identified multibacillary forms as the most frequent ones [15].

When analyzing the clinical form, there was a predominance of dimorphic leprosy cases, throughout the studied period. This group is characterized by its immunological instability, which causes great variation in clinical manifestations, either in the skin, in the nerves, or in systemic impairment [16]. The high number of dimorphic leprosy cases can contribute to a high rate of disability and perpetuation of transmission [12].

In the adolescent population, dimorphic leprosy can impact patients' self-esteem, since their image may be affected by deformities [4,16]. On the other hand, a gradual increase in the proportion of the dimorphic clinical form may indicate difficulties of classification by clinical form.

The indeterminate form also had a significant number of records. This form is considered the early stage of disease, which can evolve to cure spontaneously or to more severe forms [13]. This is the optimal stage to diagnose and treat leprosy, by cancelling this endemic's transmission chain, avoiding possible physical sequelae.

Considering the distribution by age group, the highest number of cases of leprosy occurred according to increase in age, with a predominance of the age group from 10 to 14 years, throughout the studied period. The notification of cases between 0 and 4 years becomes rarer, due to the body's natural protection and over the bacillus' incubation period. In regions of great endemicity, the child clientele comes in early contact with bacillus' carriers, which can be potentially disabling due to precocity of the event and the emergence of deformities [9, 13, 17].

The year 2005 brought the highest number of notifications; since that year, a tendency to reduce the number of cases until 2013 was noticed, maintaining a regular parameter. The temporal analysis of cases allowed us to observe a small oscillation in the number of cases over the years

studied, especially between 2005 and 2012. Thus, two possibilities may be considered: underreporting of cases and, on the other hand, incorrect diagnosis, resorting to approaches with mistakes to differentiate from other neurological or dermatological diseases [18].

Considering the mode of detection, spontaneous demand was predominant. This finding suggests that active search and contact examination are not occurring as expected [19]. The behavior recommended by the Ministry of Health is these children's contacts must be registered and examined. Active search with contact examination is the most important strategy for detecting leprosy in subjects under 15 years. This form contributes to an early and simple detection of cases, which leads to reduction of hidden cases and disabilities [13].

A relevant aspect is highlighted by the Improved Global Strategy for Further Reducing the Burden of Leprosy proposed by the World Health Organization (WHO) – 2011-2015, whose challenge is preserving the quality of services aimed at leprosy and ensuring that all people affected by leprosy, regardless of where they live, have equal opportunity to be diagnosed and treated by skilled health professionals without unnecessary and costly delays [20]. To achieve this goal, most efforts should be aimed at including treatment for leprosy in general health services. Health professionals at all levels of care should be trained in relation to simple methods for the diagnosis and approach to a patient with leprosy.

Attention was drawn to the high number of cases where smear microscopy has not been performed, a laboratory examination that indicates whether *Mycobacterium leprae* is observed in the injuries in focus. The Ministry of Health advises its use, whenever possible, as a support for disease diagnosis and classification.

Smear microscopy represents a significant resource for patient classification, considering the polychemo therapy (PCT) treatment [21]. Its use

at the beginning of therapy and at the time of discontinuing medication is a priority to aid the clinical procedure.

A correct diagnosis of the clinical form should be based on 5 criteria: injury morphology, smear microscopy, histopathology, immunology (Mitsuda reaction and serology), and clinical evolution. Currently, due to the difficulties to perform laboratory tests in Brazilian primary health care centers (PHCCs), field diagnosis, for treatment purposes, is performed based solely on the criterion for determining the number of injuries. Considering the number of skin injuries as a marker to predict the risk of physical disabilities, the number of skin lesions observed in the cases studied has shown that these children and teenagers are evaluated on a late basis and they are still able to transmit the disease and develop disabilities [20].

There was a prevalence of PDD 0. PDD makes it possible to measure both operational and epidemiological indicators; late detection benefits the persistence of sources of infection [13]. The large number of cases with PDD 0 in all the years studied demonstrates the difficulty to evaluate PDD in subjects under 15 years and such an event can affect the evaluation of intervention programs for endemics [22].

PDD is an indicator to indirectly assess the effectiveness of early detection and appropriate treatment of endemic episodes, as well as to identify the existence of loss of sensitivity and deformities due to neural lesion [12, 17]. Disabilities are acknowledged to be primarily responsible for the stigma of this disease and, in the case of children, they can impair both social interaction and growth [19].

A significant number of cases not assessed for PDD found in all the years studied represent a failure in notification by epidemiological surveillance. This condition allows us to consider there is a hidden prevalence of disease that can lead to complications in individuals, as well as it contributes to the endemics' transmission chain [23].

The early therapeutic regimen for treating leprosy was performed through the association of drugs according to the classification of disease and according to the Ministry of Health, and PCT with 12 monthly doses is the most adopted scheme [1]. Treatment for leprosy with PCT has been a continuing success. Neither the issue of relapse nor drug resistance have been major issues and the schemes are well tolerated [20].

Considering the leprosy detection rates in subjects under 15 years, the persistence of hyperendemics was observed, according to parameters proposed by the Ministry of Health, in most of the municipalities; Arcoverde and Petrolândia stand out, although there is a decline within the period from 2006 to 2012, demonstrating a possible hidden endemics, which draws attention to the health services.

The high number of cases of leprosy in subjects under 15 years indicates the need for intensifying measures for prevention and control of this disease, specific for this age group. However, it is worth providing early diagnosis of leprosy, preventing its transmission and consequent physical disability.

Conclusions

Leprosy still remains as a serious public health issue in Brazil and in the state of Pernambuco, even after the adoption of control measures, such as the SANAR Program and the action plans instituted in the municipalities regarded as having the greatest burden of this pathology.

Although leprosy numbers show a declining tendency within the decade studied, epidemiological indicators still demonstrate that the problem is far from being solved.

There is a need to increase discussions about specific guidelines for municipalities with worse indicators and to emphasize the quality of services offered as key components for effective prevention and control programs.

The quality of programs and services should be

based on adequate professional training at all levels, regular technical supervision, and monitoring of indicators. It is known that the reduced prevalence of leprosy depends on the health services' capacity to diagnose cases in the early phase of this disease and carry out timely treatment, aiming at cure and elimination of sources of infection.

References

1. Brasil. Doenças negligenciadas: estratégias do Ministério da Saúde. Rev Saúde Pública [internet]. 2010 [cited 2017 Jun 13]; 44(1):200-2. Available from: <http://www.scielo.br/pdf/rsp/v44n1/23.pdf>
2. Costa VD, Cedaro JJ. Hanseníase: estigmas e sofrimento no decorrer dos tempos. In: Schindwein VLDC, organizer. Interfaces da psicologia com a educação, a saúde e o trabalho: leituras. Porto Velho: Ed. UFRO; 2014. p. 129-38.
3. Pernambuco (State). Programa de Enfrentamento das Doenças Negligenciadas no Estado de Pernambuco: 2011-2014. Recife: Secretaria Estadual de Saúde; 2013.
4. Brasil. Portaria n. 149, de 3 de fevereiro de 2016. Brasília (DF): Ministério da Saúde; 2016.
5. Brasil. Indicadores epidemiológicos e operacionais de hanseníase: Brasil 2000-2014 [internet]. 2015 [cited 2017 Jun 13]. Available from: <http://portalarquivos.saude.gov.br/images/pdf/2015/outubro/29/S--rie-Hist--rica-Hansen--ase-2000---2014.pdf>
6. Brasil. 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 das Geohelmintíases: Plano de Ação 2011-2015. Brasília (DF): Ministério da Saúde; 2013.
7. Dominguez B. Hanseníase: problema persistente. Radis: Comunicação em Saúde. 2015; (150):24-6.
8. Monteiro LD, Martins-Melo FR, Brito AL, Alencar CH, Heukelbach J. Padrões espaciais da hanseníase em um estado hiperendêmico no Norte do Brasil, 2001-2012. Rev Saúde Pública [internet]. 2015 [cited 2017 Jun 13]; 49(84):[8 pages]. Available from: http://www.scielo.org/pdf/rsp/v49/pt_0034-8910-rsp-S0034-89102015049005866.pdf
9. Moura LTR, Fernandes TRMO, Bastos LDM, Luna ICF, Machado LB. Hanseníase em menores de 15 anos na cidade de Juazeiro-BA. Hansen Int [internet]. 2012 [cited 2017 Jun 13]; 1(37):45-50. Available from: <http://www.ilsl.br/revista/imageBank/v37n1a05.pdf>
10. Lana FC, Lanza FM, Velásquez-Meléndez G, Branco AC, Teixeira S, Malaquias LCC. Distribuição da hanseníase segundo sexo no município de Governador Valadares, Minas Gerais, Brasil. Hansen Int. 2003; 28(2):131-7.
11. Souza CDF, Rodriguis M. Magnitude, tendência e espacialização da hanseníase em menores de 15 anos no estado da Bahia, com enfoque em áreas de risco: um estudo ecológico. Hygeia [internet]. 2015 [cited 2017 Jun 13]; 11(20):201-12. Available from: <http://www.seer.ufu.br/index.php/hygeia/article/view/28914/16907>
12. Oliveira JCF, Leão AMM, Britto FVS. Análise do perfil epidemiológico da hanseníase em Maricá, Rio de Janeiro: uma contribuição da enfermagem. Rev Enferm UERJ [internet]. 2014 [cited 2017 Jun 13]; 6(22):815-21. Available from: <http://www.facenf.uerj.br/v22n6/v22n6a15.pdf>
13. Luna ICF, Moura LTR, Vieira MCA. Perfil clínico-epidemiológico da hanseníase em menores de 15 anos no município de Juazeiro-BA. Rev Bras Promoç Saúde [internet]. 2013 [cited 2017 Jun 13]; 26(2):208-15. Available from: <http://periodicos.unifor.br/RBPS/article/view/2906/pdf>
14. Souza VB, Silva MRF, Silva LMS, Torres RAM, Gomes KWL, Fernandes MC, et al. Perfil epidemiológico dos casos de hanseníase de um centro de saúde da família. Rev Bras Promoç Saúde [internet]. 2013 [cited 2017 Jun 13]; 26(1):110-6. Available from: <http://periodicos.unifor.br/RBPS/article/view/2641/pdf>
15. Ferreira IN, Alvarez RRA. Hanseníase em menores de quinze anos no município de Paracatu, MG (1994 a 2001). Rev Bras Epidemiol [internet]. 2005 [cited 2017 Jun 13]; 8(1):41-49. Available from: <http://www.scielo.br/pdf/rbepid/v8n1/06.pdf>
16. Araujo MG. Hanseníase no Brasil. Rev Soc Bras Med Trop [internet]. 2003 [cited 2017 Jun 13]; 36(3):373-82. Available from: <http://www.scielo.br/pdf/rsbmt/v36n3/16339.pdf>
17. Souza MWG, Silva DC, Carneiro LR, Almino MLBF, Costa ALF. Epidemiological profile of leprosy in the Brazilian state of Piauí between 2003 and 2008. An Bras Dermatol [internet]. 2012 [cited 2017 Jun 13]; 87(3):389-95. Available from: <http://www.scielo.br/pdf/abd/v87n3/v87n3a06.pdf>
18. Alencar CHM, Barbosa JC, Ramos Jr AN, Alencar MJF, Pontes RJS, Castro CGJ, et al. Hanseníase no município de Fortaleza, CE, Brasil: aspectos epidemiológicos e operacionais em menores de 15 anos (1995-2006). Rev Bras Enferm [internet]. 2008 [cited 2017 Jun 13]; 61(Spec):694-700. Available from: <http://www.scielo.br/pdf/reben/v61nspe/a07v61esp.pdf>
19. Imbiriba EB, Hurtado-Guerrero JC, Garnelo L, Levino A, Cunha MG, Pedrosa V. Perfil epidemiológico da hanseníase em menores de quinze anos de idade, 1998-2005. Rev Saúde Pública [internet]. 2008 [cited 2017 Jun 13]; 42(6):1021-6. Available from: <https://www.arca.fiocruz.br/bitstream/icict/1924/1/Epidemiological%20profi%20le%20of%20leprosy.pdf>

20. Organização Mundial da Saúde. Estratégia global aprimorada para redução adicional da carga da hanseníase: 2011-2015: diretrizes operacionais. Brasília (DF): OMS; 2010.
21. Brasil. Guia de procedimentos técnicos: baciloscopia em hanseníase. Brasília (DF): Ministério da Saúde; 2010.
22. Franco MCA, Xavier MB, Franco ACA, Jucá Neto FOM, Menezes BQ, Macedo GMM. Perfil de casos e fatores de risco para hanseníase, em menores de quinze anos, em município hiperendêmico da região norte do Brasil. Rev Para Med [internet]. 2014 [cited 2017 Jun 13]; 4(28):29-38. Available from: <http://docplayer.com.br/35880791-Perfil-de-casos-e-fatores-de-risco-para-hanseníase-em-menores-de-quinze-anos-em-município-hiperendêmico-da-região-norte-do-brasil-1.html>
23. Moraes PB, Guzzo L, Sylvio A, Fraga LAO. Perfil epidemiológico da hanseníase num município superendêmico do interior do Sudeste brasileiro. Hansen Int [internet]. 2012 [cited 2017 Jun 13]; 37(2):61-8. Available from: <file:///D:/v37n2a08.pdf>

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