Country Profile: Leprosy in Brazil

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Summary  Brazil has high rates of leprosy case detection, especially in the northern and west-central areas of the country. Effective decentralisation of routine treatment for leprosy has gathered pace since the year 2000 and this has improved access for patients, leading to a peak in new case detection in 2003 and a gradual decline thereafter. This is in parallel with specific government programmes aimed at poverty reduction. Disability prevention and surveillance for drug resistance remain important tasks within the leprosy control programme, in which six key referral centres lead the way.

Introduction

Brazil, officially known as the Federal Republic of Brazil, is the largest country in South America with an area of 8.5m km² and a population of 190m in the 2010 census. It is a presidential democracy and runs the gamut from large metropolitan areas such as São Paulo and Rio de Janeiro, to regions with a population density of less than one resident per km². According to data from the United Nations Development Programme, Brazil is ranked 85th on the Human Development Index (HDI) with an Index of 0.73 in 2012. It is composed of 26 states, a federal district and 5,565 municipalities.

Leprosy was introduced to Brazil by colonising Europeans as well as Africans brought over as slaves after 1500. The European colonisation began on the Atlantic Coast and later expanded to the west with the disease spreading in the same direction. In the 19th century, leprosy incidence was highest among native populations in the state of Pará,¹ in the Amazon.
region. In 1913, Oswaldo Cruz, then head of the Brazilian Public Health Division, recognised the high frequency of leprosy all along the Amazon River Basin. In 1975, Agricola reported that the state of Acre, in the Western Amazon region had the highest leprosy prevalence rate. Conversely, states in north-eastern Brazil, which have a semi-arid climate, had the lowest rates at that time. In 2007, the state of Mato Grosso in the Southern Amazon region reported the highest case detection rate (100·27/100,000 inhabitants), and the state of Rio Grande do Sul, the southernmost state, reported the lowest rate (1·74/100,000 inhabitants). These findings suggest that the spatial distribution of leprosy has changed in the past 30 years.

In 1902 leprosy was classified as a disease that required mandatory reporting throughout the nation, but a public policy for its control was only developed after the creation of a National Health Department in 1920. This policy prescribed the following:

“a) mandatory notification; b) creation of a census of leprosy patients (‘lepers’ in the original documentation); c) compulsory isolation of said individuals in their homes, rural colonies, sanatoria, hospitals or institutions; d) surveillance of those living under domiciliary isolation; e) surveillance of suspected cases; f) preventive surveillance of household contacts; g) financial assistance to the isolated leprosy patients or their families; h) prohibition of the undertaking of jobs or professions [. . .] that are dangerous to society by leprosy patients; i) prohibition of entry into the national territory by foreign leprosy patients; j) prohibition of natural breast feeding by female leprosy patients; [. . .]; m) immediate segregation of children born to parents with leprosy; [. . .]; q) popular health education to inform the population of the contagious nature of the disease.” (SILVA ARAÚJO, 1927, p. 198-199)

Several Brazilian states, such as Minas Gerais and São Paulo, mandated the isolation of patients in rural colonies. In 1941 the National Leprosy Service was created with the mandate to coordinate a national plan to combat the disease. Among its responsibilities was the definition of criteria for cases designated for institutional or domiciliary isolation and the monitoring of treatment of non-contagious patients at specific dispensaries.

With the discovery of sulfone drugs in the 1940s, leprosy control began to be carried out in out-patient units or dispensaries in the 1950s.

Materials and Methods

Source of Data

The number of new leprosy cases detected in Brazil from 1980 to 1998 was taken from the special edition of the Ministry of Health Epidemiological Bulletin (MoH, 2006). For the period of 1999 to 2000, these totals came from the tabulation of SINAN (Notifiable Diseases Health Information System) data generated by the SINAN-Windows programme software as provided by the system manager. From 2001-2011, the data were collected from the SINAN database available for internet access in March 2013. For the years 2009, 2010 and 2011, the totals were tabulated per municipality. The data on state and municipal populations were taken from demographic censuses and estimates for non-census years provided by the Brazilian Institute of Geography and Statistics – IBGE, disseminated by the Ministry of Health. The map of Brazil with its municipal divisions was also taken from the IBGE.
STATISTICAL ANALYSIS

The historical series of new leprosy cases detected in Brazil between 1980 and 2011 was adjusted to a parabolic time function (second-degree polynomial). This was done through Poisson regression analysis, with the logarithm as a link function and the population logarithm as an offset variable, utilising the STATISTICA v.11 software package.8

CARTOGRAPHICAL PRESENTATION

The average rate of new case detection per municipality for the period of 2009 to 2011 is presented as a thematic map where the colours vary in intensity according to the linear function of the detection rate.9

QUALITATIVE DATA

Qualitative data were taken from the bibliography listed at the end of the article as well as from direct experience while the authors were involved in the coordination of the National Hansen’s Disease Control Programme.

Results

EPIDEMIOLOGICAL SITUATION

In the period of 2009 to 2011 the average national detection rate was 18·92 new cases per 100,000 population. The distribution of municipal rates per geographic region is presented in the box-plot graph of Figure 1.

Figure 1. Box Plot of NCDR per 100,000 pop. per municipality grouped by region, Brazil, 2009–2011.
The regional statistics are presented in Table 1.

Figure 2 contains a thematic map of Brazil broken down by municipality with the state borders still in place. The colour coding varies from white to dark red in a linear manner relative to the municipal detection rates.

Figure 3 outlines the trends in the new case detection rate from 1980 to 2011 and the predictive values from the adjusted model.

The parameters of the model are presented in Table 2.

**CONTROL PROGRAMME**

Leprosy is a chronic condition and, as such, requires continuous service provision and long-term management. This package includes: the reorganisation of health care networks; inclusion of external services into the public health system; improved communication among all points of service; and the implementation of integral care initiatives that guarantee access

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**Table 1.** Statistics for New Case Detection Rates (NCDR) by municipal values, grouped by region.

<table>
<thead>
<tr>
<th>Region</th>
<th>No.</th>
<th>NCDR Mean</th>
<th>NCDR StdDev</th>
<th>NCDR Min-Mum</th>
<th>NCDR Max-Mum</th>
<th>NCDR Q25</th>
<th>NCDR Median</th>
<th>NCDR Q75</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>449</td>
<td>50.28</td>
<td>45.10</td>
<td>0</td>
<td>259.17</td>
<td>16.66</td>
<td>35.63</td>
<td>74.13</td>
</tr>
<tr>
<td>North-east</td>
<td>1794</td>
<td>18.12</td>
<td>25.78</td>
<td>0</td>
<td>242.15</td>
<td>2.17</td>
<td>8.77</td>
<td>22.96</td>
</tr>
<tr>
<td>South-east</td>
<td>1668</td>
<td>8.41</td>
<td>17.40</td>
<td>0</td>
<td>236.20</td>
<td>0.00</td>
<td>3.13</td>
<td>9.50</td>
</tr>
<tr>
<td>South</td>
<td>1188</td>
<td>5.68</td>
<td>14.81</td>
<td>0</td>
<td>384.96</td>
<td>0.00</td>
<td>0.00</td>
<td>7.32</td>
</tr>
<tr>
<td>Centre-west</td>
<td>466</td>
<td>56.63</td>
<td>54.59</td>
<td>0</td>
<td>319.83</td>
<td>19.60</td>
<td>41.90</td>
<td>74.94</td>
</tr>
<tr>
<td>All Groups</td>
<td>5565</td>
<td>18.37</td>
<td>32.15</td>
<td>0</td>
<td>384.96</td>
<td>0.00</td>
<td>6.22</td>
<td>21.35</td>
</tr>
</tbody>
</table>

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Figure 2. Brazilian municipalities by leprosy NCDR, 2009–2011.
to primary and specialised care as well as out-patient and hospital services, all under the coordination of the primary health care departments.\textsuperscript{10}

In the last 12 years the decentralisation of leprosy control activities has moved forward in Brazil. While the number of patients undergoing treatment shows a 63\% decline – from 79,933 in 2000 to 29,690 in 2011 – the number of health centres with patients under treatment increased from 3,327 to 9,445 in the same period, representing a 284\% expansion.\textsuperscript{10,11}

In 2010, close to 90\% of health centres with patients under treatment for leprosy were at the primary care level, responsible for approximately 74\% of all multi-drug therapy (MDT) cases. Specialised out-patient care accounted for 4\% of the leprosy treatment centres and 14\% of patients, while hospitals make up 6\% of the health units and 12\% of patients. This indicates that there is still a concentration of cases at the secondary and tertiary referral centres.

Therefore, efforts are still necessary to ensure that referral centres are increasingly treating high-priority cases. They should be focusing on difficult cases to diagnose, reaction

\begin{table}[h]
\centering
\caption{Parameters of the adjusted regression model}
\begin{tabular}{lcccccc}
\hline
\hline
Intercept & -9.26294 & 0.004168 & 4939372 & -9.27111 & -9.25477 & 0.0000 \\
t & 0.09770 & 0.000507 & 37106 & 0.09671 & 0.09870 & 0.0000 \\
t2 & -0.00237 & 0.000014 & 29059 & -0.00240 & -0.00235 & 0.0000 \\
\hline
\end{tabular}
\end{table}

\textbf{Figure 3.} NCDS observed and predicted, Brazil, 1980 to 2011.
episodes, neuritis, complications, physical rehabilitation and all the other situations that require care beyond the competencies and resources at primary care.

The main challenge is the constant improvement of access to quality health services at the three levels of care for people affected by leprosy and for treatment of disease sequelae. To achieve this, periodic training sessions and refresher courses are scheduled and carried out by municipal, regional, state and national referral centres.

The reduction of the rate of Grade 2 physical disabilities among new leprosy cases in the general population – in a context where there has been considerable investment in the detection of new cases and improvement of health information systems – reflects favourably upon the improvement of access to health centres, early diagnosis and, consequently, the reduction of hidden cases. Between 2000 and 2011, a 25.6% drop in this coefficient was registered, moving from 15.2 to 11.3 new leprosy cases with Grade 2 disability per 1.000.000 population.10–12

The percentage of new cases with Grade 2 disability varied from 6% in 2001 to 7.1% in 2011, remaining in the ‘average’ national parameter. Over the same period, the average percentage of new cases assessed for disabilities at diagnosis was 86%. The outcomes of this indicator support the processes of planning and organisation of the health care network, so as to offer prevention of disabilities (POD) and rehabilitation services.10,11

The national POD and rehabilitation plan for leprosy covered the period of 2009 to 2012 with the objective of developing effective and efficient integrated care interventions. Professionals with solid experience in POD and rehabilitation were involved in this planning process, using their knowledge of the diverse leprosy services available in Brazil. This plan also received financial support from ILEP to undertake many of the activities.10

The control of leprosy in Brazil depends upon the effective participation of numerous stakeholders in the decision-making and activity implementation processes at the municipal, state and federal government levels. It also requires the involvement of partner organisations, such as universities, professional societies and associations in addition to social movements and user groups that are very active.10

Brazil has six national referral centres with robust clinical and research experience. They are largely responsible for training and upgrading professionals from the other state, regional and municipal referral centres, most of which have vastly different levels of experience and organisation. These are the referral centres that treat cases of leprosy reactions, also often training primary care professionals in reaction management.

The national referral centres are: the National Reference Centre for Sanitary Dermatology and Leprosy at the Clinical Hospital of the Federal University of Uberlândia, Minas Gerais state; the Alfredo da Matta Foundation in Manaus, Amazonas state; the Lauro Souza Lima Institute (ILSL) in Bauru, São Paulo state; the Dona Libânia National Reference Centre for Sanitary Dermatology in Fortaleza, Ceará state; the Oswaldo Cruz Foundation (FIOCRUZ) in Rio de Janeiro and the National Reference Centre for Sanitary Dermatology and Leprosy at the Clinical Hospital of the Ribeirão Preto Medical School, University of São Paulo.10

Leprosy-related research in Brazil is often conducted by the national referral centres, research institutions and universities, generally financed by specific agencies for research advancement. However, the Ministry of Health, through the Health Surveillance Secretariat and the Secretariat for Scientific Technology and Innovation (SCTIE), funds a large part of the research in neglected tropical diseases. Both basic and applied research proposals are financed by the Department for Scientific Technology and Innovation (DECT/SCTIE) in
conjunction with the National Council for Scientific and Technological Development. The international agencies also provide some resources for research in Brazil.

In 2009 the WHO created a sentinel surveillance network for monitoring drug resistance in leprosy, with the support of several national leprosy control programmes and the main international leprosy research institutions. Brazil began its pilot project in 2010, seeking to gradually include it in the National Hansen’s Disease Control Programme of the Ministry of Health, respecting the jurisdiction of each level of government in the Single Health System.\textsuperscript{13}

Each region of the country sends material samples for suspected relapse cases to one of the processing centres: FIOCRUZ (for Rio de Janeiro, Espírito Santo and Ceará states); ILSL (São Paulo, Mato Grosso, Mato Grosso do Sul, Pernambuco, Piauí states); National Reference Centre for Sanitary Dermatology and Leprosy at the Clinical Hospital of the Federal University of Uberlândia, MG (Minas Gerais, Maranhão states); Alfredo da Matta Foundation (Amazonas, Acre, Rondônia states); Marcelo Cândia Reference Centre (Pará, Amapá states).\textsuperscript{13}

The proposal for the surveillance network is to monitor drug resistance using the molecular biology techniques available at the specialised processing centres and validate the results at these referral laboratories. ILSL, as both a national referral centre and PAHO/WHO collaborating centre, receives ongoing support from the São Paulo State Health Secretariat and the Federal Ministry of Health. It also has research projects funded by DECIT/National Research Centre (CNPq), the São Paulo State Research Support Foundation, the Paulista Foundation to Fight Leprosy and the German Leprosy Relief Association.\textsuperscript{13}

The detection of drug resistance is done in two ways, through animal models and genome sequencing, following the “Guidelines for Global Surveillance of Drug Resistance in Leprosy.” These methods seek to detect mutations in slit skin smear samples, compared with biopsy materials from routine experimental inoculations done at the institute.\textsuperscript{13}

Discussion

The analysis of the epidemiological data confirmed previous findings,\textsuperscript{14,15} showing a concentration of the leprosy in the Northern and Centre-western regions and a parabolic detection curve that began a downward trend in the first decade of this century. One hypothesis already raised by the authors in previous publications\textsuperscript{16} to explain the increased detection rates in the last two decades of the 20th century is the expansion of the Single Health System, thereby increasing access of rural populations and small cities to better health services.

The national policy directive to decentralise leprosy treatment has been adequate, but it is important to ensure the continued quality of referral centres and the flow of patients to them in coming decades. For this to happen, it will be necessary to restructure these centres to be better equipped to meet the needs of the health system and the epidemiological situation of leprosy in the future.

Brazil has been developing interventions to fight extreme poverty such as the Family Allowance Programme\textsuperscript{17} that will also undoubtedly contribute to a reduction in leprosy. The binomial programme of control and socioeconomic development with social justice should lead to an important drop in incidence and, possibly, its disappearance in the long term.

Among the leprosy control activities that must be maintained over many years is constant epidemiological monitoring based on the indicators outlined in the report from the 8th WHO
Expert Committee on Leprosy. It is also essential to maintain control activities based on the best scientific evidence available, which is the ethical duty of all health authorities.

References