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LEPROSY EPIDEMIOLOGY AND THE DECENTRALIZATION OF CONTROL ACTIONS IN BRAZIL

EPIDEMIOLOGIA DA HANSENÍASE E A DESCENTRALIZAÇÃO DAS AÇÕES DE CONTROLE NO BRASIL

LA EPIDEMIOLOGÍA DE LA LEPRA Y LA DESCENTRALIZACIÓN DE LAS ACCIONES DE CONTROL EN BRASIL

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Objective: to analyze the epidemiological situation of leprosy in Brazil and its association with the decentralization of control actions. Method: mixed ecological study with secondary data from the Sistema de Informação de Agravos de Notificação (Brazilian Information System on Notifiable Diseases) of Brazilian municipalities. A negative binomial regression model was used between 2001 and 2015. Results: The analysis of geographic and temporal variations showed heterogeneous behavior of the three epidemiological indicators of leprosy. The significant increase in these was associated with the proportion of cases diagnosed in Primary Health Care ($p<0.001$; $p=0.003$; $p=0.015$); whereas the proportion of population coverage estimated by the Family Health Strategy (FHS) was associated only with the significant reduction in the indicator detection rate among children under fifteen ($p=0.017$). Conclusion: the simultaneous interpretation of the main epidemiological indicators of leprosy in Brazil reinforced the gravity of the situation and evidenced that the satisfactory availability of the FHS is insufficient for the control of the disease.

Descriptors: Leprosy. Public Health Surveillance. Primary Health Care.

Objetivo: analisar a situação epidemiológica da hanseníase no Brasil e sua associação com a descentralização das ações de controle. Método: estudo ecológico misto com dados secundários do Sistema de Informação de Agravos de Notificação dos municípios brasileiros. Utilizou-se modelo de regressão binomial negativo entre 2001 e 2015. Resultados: a análise das variações geográficas e temporais mostrou comportamentos heterogêneos dos três indicadores epidemiológicos de hanseníase. O aumento significativo desses foi associado à proporção de casos diagnosticados na Atenção Primária à Saúde ($p<0,001$; $p=0,003$; $p=0,015$); já a proporção da cobertura populacional estimada por Estratégia Saúde da Família foi associada somente à redução significativa do indicador taxa de detecção entre menores de quinze anos ($p=0,017$). Conclusão: a interpretação simultânea dos principais indicadores epidemiológicos da hanseníase no Brasil reforçou a gravidade da situação e evidenciou que a satisfatória disponibilidade da ESF é insuficiente para o controle da doença.

Descritores: Hanseníase. Vigilância em Saúde Pública. Atenção Primária à Saúde.

Objetivo: analizar la situación epidemiológica de la lepra en Brasil y su asociación con la descentralización de las acciones de control. Método: estudio ecológico misto con datos secundarios del Sistema de Información de

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Agravamientos de Notificación de los municipios brasileños. Se utilizó un modelo de regresión binomial negativa entre 2001 y 2015. Resultados: el análisis de las variaciones geográficas y temporales mostró un comportamiento heterogéneo de los tres indicadores epidemiológicos de la lepra. El aumento significativo se asoció a la proporción de casos diagnosticados en Atención Primaria de Salud (p<0,001, p=0,003, p=0,015), mientras que la proporción de cobertura poblacional estimada por la Estrategia de Salud Familiar (ESF) se asoció únicamente a la reducción significativa de la tasa de detección del indicador entre los menores de quince años (p=0,017). Conclusión: la interpretación simultánea de los principales indicadores epidemiológicos de la lepra en Brasil reforzó la gravedad de la situación y evidenció que la satisfactoria disponibilidad del ESF es insuficiente para el control de la enfermedad.

Descriptores: Lepra. Vigilancia en Salud Pública. Atención Primaria de Salud.

Introduction

Leprosy remains a major public health problem in the world. India, Brazil and Indonesia are the most endemic countries, accounting for more than 80% of registered cases[1]. In these countries, the epidemiological picture is even more diverse. In Brazil, risk clusters are concentrated in the North, Northeast, and Center-West regions, representing an average case detection rate of 59.19 per 100,000 inhabitants[2]. To reverse this situation, strategies have been adopted. Among these, the decentralization of leprosy control actions (LCA) stands out.

The concept of decentralization assumed in the Brazilian Health Reform has a political-administrative characteristic, but the legislation on leprosy control in Brazil assumes decentralization as the care provided by Primary Health Care units (PHC) in the municipal sphere[3]. The decentralization of LCA strengthens the disease control policy, by facilitating access to diagnosis and treatment[4]. The PHC represents the first point of care in the health system, bringing care as close as possible to where people reside and work. However, the decentralization of LCA requires further progress, such as the expansion of PHC coverage and the sustainability of actions by professionals[5].

With the Sustainable Development Goals (SDGs) for 2030, there is a political commitment to strengthening PHC by its expansion and the offer of health actions[6]. However, the lack of measurement of PHC performance in meeting the population's health needs makes it difficult to achieve political commitment for its strengthening[7]. From a global perspective, a study in 123 countries demonstrated that the health services coverage index did not consider the actions for neglected tropical diseases[8]. Leprosy fits into this group and has tended to coexist in socially vulnerable areas for years.

Thus, overcoming social inequalities requires recognizing health as a citizenship right and prioritizing the needs of specific groups, according to vulnerability criteria. In the practical field, this means improving, especially in areas of high endemicity, early diagnosis, timely treatment, contact surveillance, and the active search for symptomatic dermatoneurological.

A systematic literature review was conducted by the authors of this research in 2019, at which time no studies were found that had verified how the most critical areas in terms of the disease burden had behaved from the decentralization process of control actions. For the selection of publications, an online search was conducted in the Virtual Health Library (VHL) Regional Portal, Scopus, and Web of Science. Articles published in Portuguese, English, and Spanish were included.

The search strategy used in the VHL was: (tw:((hanseníase OR "*Doença de Hansen*" OR lepra OR leprosy))) AND (tw:(("*Análise Espacial*" OR "Análise Espaço-Temporal" OR "*Análise por Conglomerados*" OR *conglomerados* OR "*Conglomerados Espaço-Temporais*" OR "*Análisis Espacial*" OR "*Análisis Espacio-Temporal*" OR "*Análisis por Conglomerados*" OR "*Agrupamiento Espacio-Temporal*" OR "Spatial Analysis" OR "Spatio-Temporal Analysis" OR "Cluster Analysis" OR cluster OR "Space-Time

Clustering")))) AND (tw:(("*Atenção Primária à Saúde*" OR "*Atenção Básica à Saúde*" OR *descentralização* OR "*Atención Primaria de Salud*" OR *descentralización* OR "Primary Health Care" OR decentralization))) AND (instance: "regional"); e na Scopus e Web of Science foi: Leprosy AND ("Spatial Analysis" OR "Spatio-Temporal Analysis" OR "Cluster Analysis" OR Cluster OR "Space-Time Clustering") AND ("Primary Health Care" OR Decentralization).

This research aims to analyze the epidemiological situation of leprosy in Brazil and its association with the decentralization of control actions.

Method

This is a mixed ecological study, which combines characteristics of multiple-group and time series studies. In this type of study, the intent is to analyze associations between variables by taking into account their changes over time and across sites. The guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (Strobe) initiative [9] were followed to organize the study from its methodological design.

It was considered as territorial units of analysis the spatial-temporal clusters identified based on the detection rate of new leprosy cases residing in the 5,565 Brazilian municipalities defined by the 2010 demographic census. The methodological approach previously reported was adopted[2], incorporating, however, the time factor. In this sense, the interest fell on the identification of clusters that occurred simultaneously in space and time.

This approach consists of identifying clusters by means of a geographic window that moves with the center of the coordinates in each municipal seat. In the case of space-time clusters, a cylindrical window is used, in which the base represents space and the height represents time (year).

The data comprised the years from 2001 to 2015. The average incubation period of leprosy is 2 to 5 years, but it can be longer. Thus, it is necessary to analyze a longer period, to infer the impact of the service on disease transmission. All data were extracted by the researcher themself in September 2016.

The proportion of estimated population coverage by Family Health Strategy (FHS) (Numerator: number of FHS multiplied by 3,450 inhabitants. Denominator: number of residents in the municipality)[10] and the proportion of new leprosy cases diagnosed in PHC (Numerator: new cases residing in a given place and notified in the PHC of the municipality of residence. Denominator: new cases notified in primary, secondary and tertiary care in the municipality of residence) were constructed to be presented as independent variables and to translate the evaluation of LCA decentralization to PHC.

To compose the group of dependent variables, three indicators arranged in the leprosy control guidelines of the Ministry of Health were selected[11]: Annual detection rate of new leprosy cases per 100,000 inhabitants; annual detection rate of new leprosy cases in the population between zero and 14 years old, per 100,000 inhabitants; rate of new leprosy cases with grade 2 physical disability at the time of diagnosis per 100,000 inhabitants.

The population size and the year of diagnosis of the leprosy cases were used as control variables in the statistical model. The decentralization process in Brazil is very varied and results in great differences in coverage and access to health actions[12]. Population sizes, for example, reflect different demands on local policy in terms of complexity and scale of services[13]. Besides, leprosy epidemiological data are extremely sensitive to the operational capacity of the health services, being able to vary from year to year[14].

The information on leprosy cases was taken from the database of the System of Information on Notifiable Diseases (Sinan), made available by the Ministry of Health through the Electronic System of Citizen Information Service (e-SIC). The number of inhabitants per municipality was obtained from the population census and intercensal estimates (methodology adopted to estimate the number of people in municipalities

between two consecutive demographic censuses) from the database of the Brazilian Institute of Geography and Statistics (IBGE). The estimated population coverage by FHS was taken from the database of the Department of Primary Care of the Secretariat of Health Care Attention of the Ministry of Health. To identify the health facilities where the leprosy cases were diagnosed, the National Registry of Health Establishments (CNES) was consulted, based on the codes of the notifying unit presented in Sinan.

To construct and calculate the indicators, the open access application Tab for Windows (TabWin) (version 3.2) and Microsoft Office Excel software (version 2016) were used. Subsequently, the data were exported to the R software (version 3.5.1) for the analyses.

The mixed effect model[15] was used. Initially, the geographic and temporal variations of the dependent variables per previously identified cluster were verified (random effect). Then, the relationship between the dependent and independent variables was verified, estimating specific parameters of the study population, i.e., the same for all clusters (fixed effect). For modeling the variables, the negative binomial regression model was used[16].

With time centered on 2008, the coefficient $\beta 0$ (intercepto) (intercept) signifies the average expected value for the response variable of interest in the year 2008 for all clusters, while provides how much the $Exp(\alpha j)$ cluster is above or below the overall average of the response variable of interest. The coefficient β_1 provides, on average, the trend of the response variable of interest with each one year added, while $Exp(\beta 1+\mu j)$ provides, on average, the trend for the response variable of interest over time for the j-th cluster. The coefficient β_2 represents the effect of each independent variable on the dependent variable. This model is known as a mixed effect model, because you have the fixed effect ($\beta 0, \beta 1, \beta 2$)) and the random effect ($\alpha_j \; e \; \mu_j$).The notation j stands for j = 1, 2, ..., 15 (cluster).

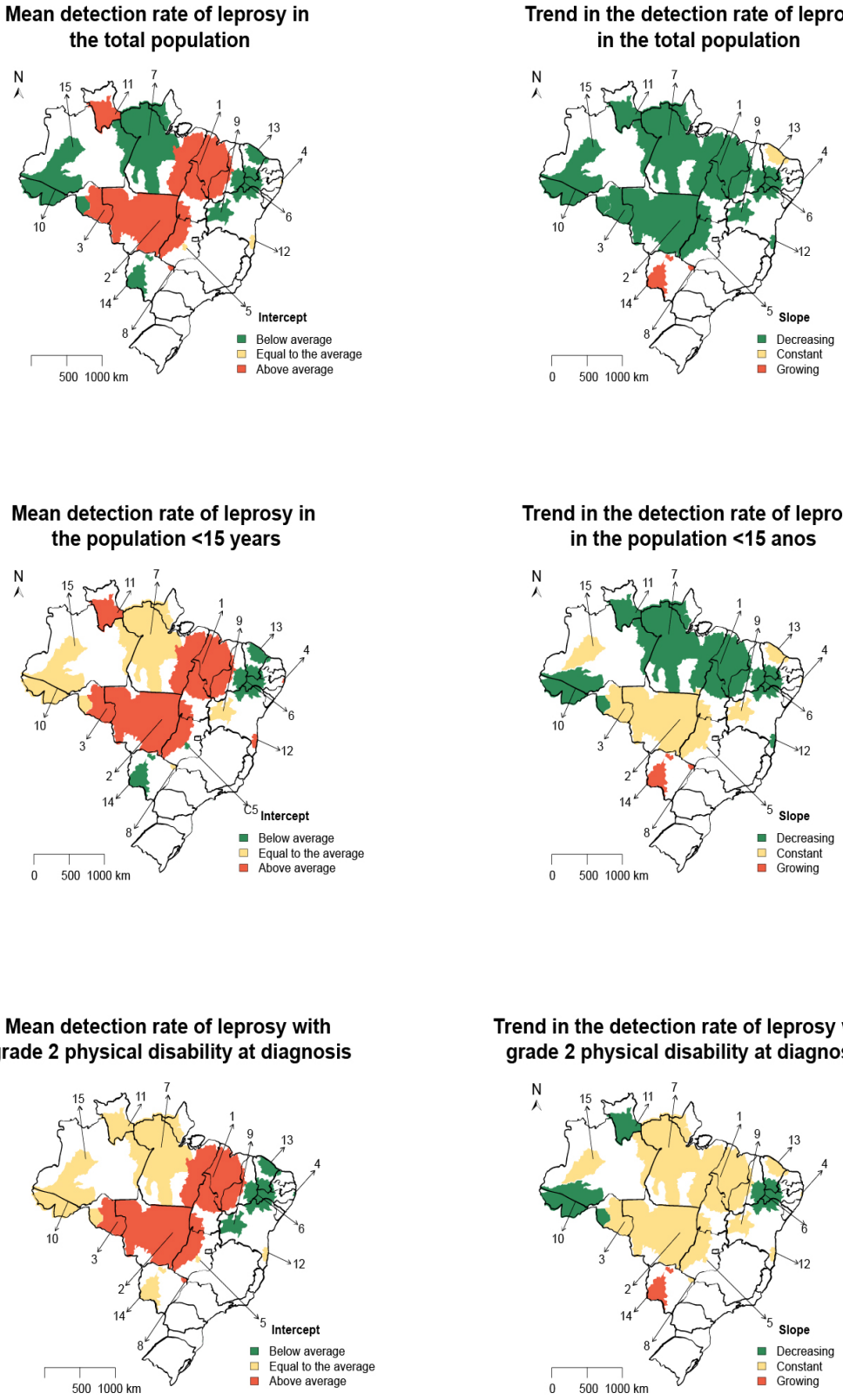
In the adjusted model, the *Backward* method was applied and a 5% significance level was adopted. To verify the presence of multicollinearity among the independent variables, the Variance Inflation Factor (VIF) statistic was used, and variables with VIF greater than ten were removed from the model[17].

This study was conducted in accordance with Resolution 466/2012 of the National Health Council and approved by the Research Ethics Committee (CEP) of the Universidade Federal de Minas Gerais, Opinion No. 2,125,179, dated June 22, 2017.

Results

The fifteen clusters identified comprised 319,581 (52.77%) leprosy cases. The average detection rate in the total population was 58.48 per 100,000 inhabitants, while for the indicators detection rate among people under fifteen years old and rate of grade 2 physical disability at the time of diagnosis, the values were 14.39 per 100,000 and 3.19 per 100,000 inhabitants, respectively. For all indicators analyzed there were clusters that overlapped the averages for the period (Figure 1 and Table 1).

Figure 1 – Average detection rate and trend of leprosy epidemiological indicators per cluster. Brazil – 2001-2015 (N=319,581)



Source: Created by the authors.

Note: Average rates and trends estimated by the mixed-effect model with negative binomial distribution.

Table 1 – Average rate of leprosy epidemiological indicators per cluster. Brazil – 2001-2015. (N=319,581)

Cluster	Rate in the total population		Rate in younger than fifteen years old		Rate of grade 2 physical disability	
	Exponential (αj)	Confidence Interval 95%	Exponential (αj)	Confidence Interval 95%	Exponential (αj)	Confidence Interval 95%
1	1.371	[1.343; 1.400]	1.779	[1.713; 1.848]	1.410	[1.350; 1.473]
2	1.920	[1.867; 1.975]	1.908	[1.797; 2.025]	1.494	[1.399; 1.596]
3	1.601	[1.528; 1.679]	1.395	[1.269; 1.534]	1.492	[1.352; 1.646]
4	0.930	[0.845; 1.024]	1.527	[1.315; 1.773]	0.687	[0.585; 0.807]
5	1.068	[0.969; 1.177]	0.644	[0.526; 0.788]	0.922	[0.763; 1.112]
6	0.786	[0.757; 0.815]	0.770	[0.711; 0.833]	0.796	[0.732; 0.866]
7	0.922	[0.867; 0.980]	0.904	[0.810; 1.009]	1.055	[0.936; 1.188]
8	1.780	[1.304; 2.429]	1.237	[0.725; 2.113]	1.803	[1.156; 2.811]
9	0.861	[0.788; 0.941]	0.848	[0.711; 1.011]	0.526	[0.423; 0.656]
10	0.880	[0.818; 0.946]	1.011	[0.882; 1.158]	0.999	[0.856; 1.166]
11	1.240	[1.087; 1.415]	1.391	[1.090; 1.776]	1.258	[0.965; 1.639]
12	0.959	[0.867; 1.059]	1.621	[1.363; 1.929]	0.904	[0.736; 1.111]
13	0.435	[0.415; 0.457]	0.341	[0.306; 0.379]	0.588	[0.532; 0.651]
14	0.734	[0.667; 0.807]	0.414	[0.324; 0.529]	1.029	[0.846; 1.253]
15	0.644	[0.551; 0.753]	0.915	[0.699; 1.198]	0.916	[0.679; 1.236]

Source: Created by the authors.

Note: 95% Confidence Interval (CI) for the rates for each cluster estimated by the mixed-effect model with negative binomial distribution.

As for the historical series analysis, the presence of clusters with increasing and constant trends draws attention (Figure 1 and Table 2).

Table 2 – Trend of the epidemiological indicators of leprosy by cluster. Brazil – 2001-2015. (N=319,581)

Cluster	Rate in the total population		Rate in younger than fifteen years old		Rate of grade 2 physical disability	
	Exponential ($\beta 1+\mu j$)	Confidence Interval 95%	Exponential ($\beta 1+\mu j$)	Confidence Interval 95%	Exponential ($\beta 1+\mu j$)	Confidence Interval 95%
1	0.948	[0.923; 0.975]	0.958	[0.924; 0.993]	0.975	[0.949; 1.002]
2	0.965	[0.939; 0.992]	0.970	[0.934; 1.008]	1.002	[0.974; 1.032]
3	0.960	[0.932; 0.989]	0.969	[0.929; 1.010]	0.992	[0.959; 1.025]
4	0.963	[0.929; 0.997]	0.988	[0.941; 1.038]	0.966	[0.925; 1.008]
5	0.941	[0.909; 0.974]	0.955	[0.903; 1.011]	0.987	[0.942; 1.034]
6	0.961	[0.934; 0.989]	0.960	[0.922; 0.999]	0.963	[0.933; 0.994]
7	0.945	[0.916; 0.974]	0.952	[0.911; 0.994]	0.997	[0.961; 1.033]
8	1.097	[1.025; 1.174]	1.135	[1.025; 1.257]	1.054	[0.977; 1.137]
9	0.965	[0.933; 0.998]	0.995	[0.943; 1.050]	0.998	[0.948; 1.050]
10	0.913	[0.885; 0.943]	0.922	[0.879; 0.967]	0.948	[0.909; 0.988]
11	0.920	[0.883; 0.958]	0.909	[0.852; 0.970]	0.926	[0.874; 0.982]
12	0.932	[0.899; 0.966]	0.921	[0.873; 0.972]	0.995	[0.947; 1.046]
13	0.981	[0.953; 1.010]	1.007	[0.965; 1.052]	0.980	[0.947; 1.013]
14	1.079	[1.042; 1.117]	1.114	[1.045; 1.187]	1.100	[1.048; 1.153]
15	0.935	[0.895; 0.978]	0.942	[0.880; 1.008]	0.979	[0.920; 1.041]

Source: Created by the authors.

Note: 95% Confidence Interval (CI) for the rates for each cluster estimated by the mixed-effect model with negative binomial distribution.

Concerning the decentralization of control actions, the results evidence that the proportion of population coverage, estimated by the FHS, was statistically significant only for the reduction of the detection rate among younger than 15 years old. As for the proportion of cases diagnosed in PHC, a statistically significant association was observed in all indicators analyzed, with increased rates (Table 3).

Table 3 – Relation between Primary Health Care diagnosis and Family Health Strategy coverage with epidemiological indicators of leprosy in clusters (initial model and final model). Brazil – 2001-2015. (N=319.581) (continued)

Variables	Initial model				
	Regression Coefficient (β)	**Coefficient Standard Error (β)**	**Exponential (β)**	**Confidence Interval 95%**	**P-value**
Leprosy rate in the total population	-7.397	0.108	-	-	<0.001
Cases diagnosed in Primary Health Care/10	0.011	0.002	1.011	[1.007; 1.015]	<0.001
Coverage of the Family Health Strategy/10	-0.003	0.003	0.997	[0.992; 1.002]	0.217
Variance Inflation Factor - Maximum			3.11		
Leprosy rate in the population <15 years old	-8.914	0.154	-	-	<0.001
Cases diagnosed in Primary Health Care/10	0.011	0.004	1.011	[1.004; 1.018]	0.003
Family Health Strategy Coverage/10	-0.012	0.005	0.988	[0.979; 0.998]	0.017
Variance Inflation Factor - Maximum			5.08		
Leprosy rate with grade 2 disabilities	-7.397	0.108	-	-	<0.001
Cases diagnosed in Primary Health Care/10	0.011	0.002	1.011	[1.007; 1.015]	<0.001
Family Health Strategy Coverage/10	-0.003	0.003	0.997	[0.992; 1.002]	0.217
Variance Inflation Factor – Maximum			6.36		

Variables	Final model				
	Regression Coefficient (β)	**Coefficient Standard Error (β)**	**Exponential (β)**	**Confidence Interval 95%**	**P-value**
Leprosy rate in the total population	−7.424	0.105	-	-	<0.001
Cases diagnosed in Primary Health Care/10	0.011	0.002	1.011	[1.007; 1.015]	<0.001
Coverage of the Family Health Strategy/10					
Variance Inflation Factor - Maximum			2.94		
Leprosy rate in the population <15 years old					
Cases diagnosed in Primary Health Care/10	-	-	-	-	-

Table 3 – Relation between Primary Health Care diagnosis and Family Health Strategy coverage with epidemiological indicators of leprosy in clusters (initial model and final model). Brazil – 2001-2015. (N=319.581) (conclusion)

Variables	Final model				
	Regression Coefficient (β)	Coefficient Standard Error (β)	Exponential (β)	Confidence Interval 95%	P-value
Coverage of the Family Health Strategy/10	-	-	-	-	-
Variance Inflation Factor - Maximum			-		
Leprosy rate with grade-2 disabilities	−10.522	0.101	-	-	<0.001
Cases diagnosed in Primary Health Care/10	0.010	0.004	1.010	[1.002; 1.017]	0.015
Coverage of the Family Health Strategy/10					
Variance Inflation Factor - Maximum			1.00		

Source: Created by the authors.

P-value estimated by the mixed-effects model with negative binomial distribution.

Note: Conventional sign used:
- Numeric data equal to zero not resulting from rounding

Discussion

The permanence of hyperendemicity of detection rates in the total population (>40.00/100 thousand inhabitants) and among children under fifteen years of age (≥10.00 /100 thousand inhabitants)[11] suggests failures of health services. When detection is part of the teams' actions, the rate in the total population increases considerably, however, in the following years, it tends to decrease[18]. Furthermore, the data show evidences of the existence of recent disease and active foci of transmission, since the speed of decline in the detection rate among younger than fifteen years old was not greater than the detection rate in the total population in all clusters.

Another aggravating factor is the growing trend or even constant rate of grade 2 physical disability at the time of diagnosis. The degree of physical disability is defined by neurological evaluation of the eyes, hands and feet, and can be classified into 0, 1 and 2, the latter being responsible for greater limitations[11]. This indicator signals the low efficiency of early detection by the health team, which contributes to the hidden endemic situation.

The current global strategy to combat leprosy of the World Health Organization (WHO) emphasizes, among other actions, the promotion of early detection, i.e., before the onset of disabilities, with special emphasis on children[1]. However, what is observed is that the country has not yet achieved one of the key principles of this strategy, since there is occurrence of disabilities in children.

Despite the importance of the operational factor and in order to understand the reasons that lead to the inconclusive agenda in leprosy control in Brazil, the main epidemiological indicators proposed by the National Program for Leprosy Control were analyzed in the light of FHS coverage and case diagnosis in PHC. It was believed that both variables were equally important for disease control, but the results of the present research refute this hypothesis. The expansion of the FHS was associated only with a reduction in the detection rate among people under 15 years old.

In Brazil, the main strategy for the decentralization of LCA to PHC occurs through the FHS, composed of a multiprofessional team. Each FHS is responsible for a defined population within an area. By taking responsibility for the health of the enrolled population, the professionals inserted in the FHS expand the practice of the biomedical model, also promoting the improvement of living conditions through intersectoral actions[19]. The provision of these actions plays an important role in reducing leprosy transmission.

In this sense, it is likely that the decrease in detection among children under fifteen years old is related to the expanded actions of the FHS and not to the ability of professionals to manage cases, since the coverage of the FHS did not impact the detection of cases in the total population. The execution of the sensitivity test in children is more difficult, because many children do not understand the instructions. In addition, in children, the clinical features often present as nonspecific chronic dermatites[20]

The current challenge comprises the performance of actions by health professionals, such as, for example, the diagnosis of leprosy. Although this diagnosis is a medical attribution, its suspicion can be performed by nurses. A recent study pointed out the interest in using nurses to expand the work force capacity in PHC[21]. The longer consultations, the number of assisted returns and the bond are examples that demonstrate the ability of nurses to provide quality care equal to or possibly better than that of medical professionals[21].

Thus, the increase in case detection in the total population associated with the proportion of cases diagnosed in PHC can be a result of the operational situation, i.e., the ability of professionals to identify the clinical signs of leprosy, and not epidemiologically based.

The impact of the proportion of cases diagnosed in PHC on the detection rate in people under fifteen can be explained by the actions of health professionals, particularly by screenings directed at the school environment. A study conducted in Brazil showed that large-scale approaches with schoolchildren living in hyperendemic municipalities contributed to the increase in detection rates, exceeding the official records[22].

The presence of sensitized/trained professionals in performing LCA is also reflected in the rate of grade 2 physical disability at diagnosis. The increase in this indicator can mean that the service is only developing actions on the stock of cases diagnosed lately[23]. However, the occurrence of weaknesses in early detection cannot be ruled out. The diagnosis of leprosy is essentially clinical. It is common to be underdiagnosed, since its signs are confused with those of other relatively harmless skin diseases and the alterations end up being ignored even by specialists[24].

The results of the present research suggest that Brazil should investigate further whether the progress toward expansion of the FHS is really prioritizing the least favored people. By focusing on the management of a disease that primarily affects poor communities, the indicator "proportion of leprosy cases diagnosed in PHC" provided a simple way to assess equity in LCA coverage.

Given these considerations, it is evident that the sustainability of LCA goes beyond the expansion of the FHS. The challenges for the improvement of this point of care are conditioned to complex factors and require greater political-institutional efforts. It is necessary to overcome: insufficient curriculum content about leprosy; the biomedical rationality in the work process; the turnover of professionals; the training that often does not result in confident teams to diagnose or initiate treatment; the centrality of care to the sick individual and not to the family/collective; and the lack of prioritization of leprosy in health policies.

For future studies, it would be appropriate to further detail the organizational factors of the services inserted in the clusters, incorporating the direct approach to professionals and users. These data can strengthen the findings of this research and contribute to the confrontation of specific difficulties.

Finally, it is important to note that the CNES does not take into account the different PHC modalities, which made it impossible to calculate the indicator "proportion of new cases of leprosy diagnosed in the FHS". However, this limitation did not compromise the analysis because, among the teams linked to PHC health facilities, the FHS is responsible for more than 86% of the estimated coverage[10].

Among the limitations of this study, it should be noted that the use of secondary data can often result in inconsistencies and non-completeness. Nevertheless, the indicators calculated based on the national Sinan were confronted with the publications of the Ministry of Health, strengthening the evidence base of the study. Another limitation refers to the change in case definition criteria with grade 2 physical disability, which had an effect on the notifications made in 2007[25]. Thus, data from 2007 were excluded from this study.

Conclusion

It is concluded that the simultaneous interpretation of the main epidemiological indicators of the National Program for Leprosy Control reinforces the gravity of the situation in the country and that, although the availability of the FHS has shown satisfactory results, it alone is insufficient for controlling the disease. The condition identified as fundamental to achieve the parameters proposed by the Ministry of Health is the increase in the offer of leprosy control actions.

It is hoped that the results presented in this study will subsidize policies aimed at improving the quality of PHC and promote the equitable expansion of access to and use of services.

Collaborations:

1 – conception, design, analysis and interpretation of data: Rayssa Nogueira Rodrigues;

2 – writing of the article and relevant critical review of the intellectual content: Rayssa Nogueira Rodrigues, Ricardo Alexandre Arcêncio and Francisco Carlos Félix Lana;

3 – final approval of the version to be published: Rayssa Nogueira Rodrigues, Ricardo Alexandre Arcêncio and Francisco Carlos Félix Lana.

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