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# Trend of the epidemiological and operational situation of leprosy in the state of Minas Gerais (2008 - 2018)

Tendencia de la situación epidemiológica y operacional de la lepra en el estado de Minas Gerais (2008 - 2018)

Tendência da situação epidemiológica e operacional da hanseníase no estado de Minas Gerais (2008 - 2018)

## ABSTRACT

**Objective:** To analyze the trend of the epidemiological and operational situation of leprosy in the state of Minas Gerais, from 2008 to 2018. **Methods:** Ecological study of time series. The annual rate of detection of new leprosy cases and proportion of examined contacts of new leprosy cases were used. The data were extracted from the informatics department of the Brazilian Unified Health System, made available by the Ministry of Health through access to its website. Prais-Winsten generalized linear analysis was used for trend analysis. **Results:** There were 14.991 leprosy cases in the period. The state of Minas Gerais showed a decreasing trend (-6.74) for general detection and an increasing trend (3.38) for the proportion of contacts examined. **Conclusion:** Despite the favorable behavior of the analyzed indicators, the state still maintains average endemicity for the disease and a regular capacity of the services to carry out contact surveillance.

**DESCRIPTORS:** Neglected Diseases; Time Series Studies; Hansen's disease; Measures in Epidemiology.

## RESUMEN

**Objetivo:** Analizar la tendencia de la situación epidemiológica y operativa de la lepra en el estado de Minas Gerais, de 2008 a 2018. **Métodos:** Estudio ecológico de series de tiempo. Se utilizó la tasa anual de detección de nuevos casos de lepra y la proporción de contactos examinados de nuevos casos de lepra. Los datos fueron extraídos del departamento de informática del Sistema Único de Salud de Brasil, puesto a disposición por el Ministerio de Salud a través del acceso a su sitio web. Para el análisis de tendencias se utilizó el análisis lineal generalizado de Prais-Winsten. **Resultados:** Hubo 14.991 casos de lepra en el período. El estado de Minas Gerais mostró una tendencia decreciente (-6,74) para la detección general y una tendencia creciente (3,38) para la proporción de contactos examinados. **Conclusión:** A pesar del comportamiento favorable de los indicadores analizados, el estado aún mantiene una endemicidad promedio de la enfermedad y una capacidad regular de los servicios para realizar vigilancia de contactos.

**DESCRIPTORES:** Enfermedades desatendidas; Estudios de series temporales; Enfermedad de Hansen; Medidas en Epidemiología.

## RESUMO

**Objetivo:** Analisar a tendência da situação epidemiológica e operacional da hanseníase no estado de Minas Gerais, período 2008 a 2018. **Método:** Estudo ecológico de séries temporais. Foram utilizados os indicadores taxa de detecção anual de casos novos de hanseníase e proporção de contatos examinados de casos novos de hanseníase. Os dados foram extraídos do departamento de informática do Sistema Único de Saúde do Brasil, disponibilizadas pelo Ministério da Saúde por meio do acesso a sua página na internet. Utilizou-se análise linear generalizada de Prais-Winsten para análise de tendência. **Resultados:** Foram registrados 14.991 casos de hanseníase no período. O estado de Minas Gerais apresentou tendência decrescente (-6,74) para detecção geral e tendência crescente (3,38) para a proporção de contatos examinados. **Conclusão:** Apesar do comportamento favorável dos indicadores analisados, o estado ainda mantém média endemicidade para a doença e uma regular capacidade dos serviços em realizar a vigilância de contatos.

**DESCRIPTORIOS:** Doenças Negligenciadas; Estudos de Séries Temporais; Hanseníase; Medidas em Epidemiologia.

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**INTRODUCTION**

Leprosy is a chronic infectious disease, whose etiologic agent is *Mycobacterium leprae* (*M. leprae*). This bacillus has the capacity to infect a large number of individuals (high infectivity), however few get sick (low pathogenicity). The disease can affect people of both sexes and any age. However, its progression is slow and the incubation period is prolonged, and may last for years.<sup>(1)</sup>

Even though it is known as one of the oldest diseases of humanity, it still constitutes an important public health problem. According to data from the World Health Organization (WHO), Brazil ranks second in the absolute number of new cases registered in the world and the leader in the Americas.<sup>(2)</sup> Within the country, the picture is even more diverse.

Particularly in relation to the state of Minas Gerais, in 2017, 990 new cases were notified, which corresponds to a detection rate of 4,71 cases per 100 thousand inhabitants<sup>(3)</sup>. Although this value classifies the state in average endemicity and shows signs of maintaining the endemic<sup>(4)</sup>, recent study did not identify risk clusters in Minas Gerais<sup>(5)</sup>. This fact raises debate whether the epidemiological situation in the state refers to low transmissibility or low detection by health professionals, since Minas Gerais is a historically endemic area for the disease.

There are many factors involved in its distribution and spread. In addition to the genetic<sup>(6)</sup> and immunological determinants<sup>(7)</sup>, leprosy is influenced by socioeconomic conditions and health service operational

issues.<sup>(8)</sup> Still, the lack of information generates a lot of prejudice, a fact that impairs its identification and facilitates the contagion of more people.<sup>(9)</sup>

The main Brazilian strategy to reach low endemic levels is based on the organization of a care network with the integration of control actions, which includes, among others, the surveillance of contacts.<sup>(10)</sup> Contacts represent a population at greater risk of illness than the general population due to the greater probability of exposure to the bacillus.<sup>(11)</sup> In addition, in order to monitor and evaluate the effectiveness of the surveillance measures carried out by the health services, the Ministry of Health guides the construction and analysis of the indicator "proportion of examined contacts of new cases of leprosy diagnosed in the years of the cohorts".<sup>(12)</sup>

However, in order to assess the behavior of the indicators, it is necessary to analyze a relatively long period of time, since the epidemiological surveillance of the disease can vary operationally from year to year, but not steadily, for a decade.<sup>(13)</sup> And among the research strategies used in epidemiology and public health, there is the analysis of the temporal distribution of events in the health-disease process, also called trend analysis. This type of study contributes to the understanding of the temporal variations of determinants of health conditions, of risk or protection factors and to the formulation of hypotheses about the causality of various diseases.<sup>(14)</sup>

Thus, considering that leprosy is a public health problem in Brazil and that the absence of clusters in Minas Gerais may

be indicating a weakness in the service, this study aims to analyze the trend in the rate of detection of new cases and the proportion of contacts examined of leprosy cases in the state of Minas Gerais, from 2008 to 2018.

The aim of this study is to guide public policies and guide the reorganization of health services to strengthen their role in controlling this disease. In addition, contributing to the greater dissemination of studies on a disease that is so neglected.

**METHOD**

This is an ecological study of time series that was carried out in the state of Minas Gerais. Composed of 853 municipalities, the state has an estimated total population of 20.997.560 inhabitants, being the second largest in number of inhabitants in Brazil.<sup>(15)</sup>

Information on leprosy cases, from 2008 to 2018, was obtained from the computer department of the Brazilian Unified Health System (SUS) (DATASUS), made available by the Ministry of Health through access to its website. The relatively long period of time was used, since operational variations, which may have occurred, will be diluted in this period, providing conditions for a better approximation of the reality of the endemic.

The Microsoft Office Excel software (2016) was used for data processing, which included the structuring of a database with the following indicators: 1- Annual detection rate of new leprosy cases per 100 thousand inhabitants, 2- Proportion of examined contacts of new leprosy cases

diagnosed in the cohort years. <sup>(16)</sup>

For the trend analysis, the Stata software (version 12) was used, and the Prais-Winsten linear regression model was used, in which the independent variable (x) was the year (2008 to 2018) and the dependent variable (y) the aforementioned indicators. This model is indicated to correct the serial autocorrelation in time series. <sup>(17)</sup>

Initially, the logarithmic transformation of the y-values was performed to reduce the heterogeneity of the variance of the residuals of the regression analysis. <sup>(17)</sup> Subsequently, the Prais-Winsten model was applied.

To identify the annual average percentage change (Annual Percent Change - APC), the values of the coefficient b1 corresponding to each of the indicators were applied to the following formula:  $APC = -1 + 10 [b1] * 100\%$ . Finally, the 95% confidence intervals (CI) of the variation

measures were calculated by applying the following formulas:  $CI_{95\% \text{ minimum}} = -1 + 10 [b1 - t * e] * 100\%$ ; e  $CI_{95\% \text{ maximum}} = -1 + 10 [b1 + t * e] * 100\%$ .

The coefficient b1 (beta) values and (standard deviation) were generated by the statistical analysis program, the t refers to the t-student and corresponds to 10 degrees of freedom (2,145), which indicates the 11 years of analysis (2008-2018), with a 95% confidence level. The results were interpreted as follows: increasing trend, when the annual average rate of change was significantly positive; decreasing, when the rate of change was significantly negative; and stationary, when the null hypothesis is accepted that there is no significant difference between the variation value and zero. <sup>(17)</sup>

The study complied with the provisions of Resolution 466/12 of the National Health Council. <sup>(18)</sup>

## RESULTS

During the study period, 14.991 leprosy cases were reported. The detection rate of new cases in the state of Minas Gerais was 6,82 per 100 thousand inhabitants and the proportion of contacts examined for new cases was 83,76%. It can be seen in Figure 1 that the detection rate in the general population and the proportion of contacts examined showed a decrease and an increase in the values in the period under study, respectively. However, a drop in the proportion of contacts examined between 2009 and 2011 stands out.

Table 1 shows that there was a decreasing trend for the detection rate of new cases and an increasing trend for the proportion of contacts examined.

## DISCUSSION

From the results obtained, it was observed that there was a decrease in the rate of detection of new cases of leprosy in the state during the analyzed interval, which demonstrates that Minas Gerais, in this period, followed the national trend. <sup>(19)</sup> However, Minas Gerais remains with an area of medium endemicity for the disease. <sup>(10)</sup> In addition, when rates are part of the teams' efforts, the number of newly detected patients increases substantially, however, in subsequent years, the numbers tend to decrease. <sup>(20)</sup> Although this statement is plausible, the possibility that this study did not capture this increase cannot be ruled out. The process of decentralizing leprosy control actions to Primary Health Care (PHC) gained prominence after the year 2000, reaching a peak in 2003. <sup>(21)</sup>

It is a fact that the shift from the vertical leprosy care program to a decentralized disease control service has yielded satisfactory results. <sup>(22)</sup> Decentralization allows the service to be closer to the user of the Unified Health System (SUS), positively impacting access to treatment, preventing disabilities and reducing social exclusion. In addition, professionals at this point of care develop individual work, with the

Figura 1 – Taxa de detecção de casos novos e proporção de contatos examinados de casos novos de hanseníase (2008 a 2018)

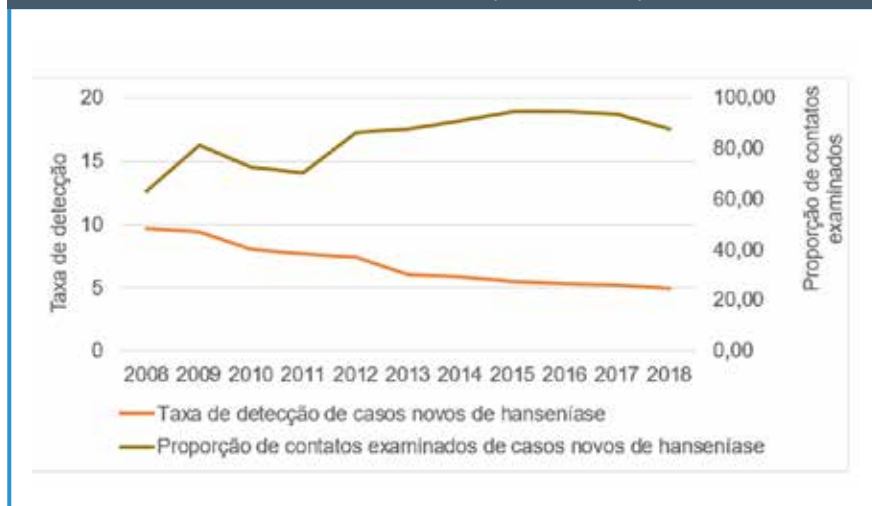


Tabela 1 – Tendência e variação percentual anual das taxas de detecção de casos novos e proporção de contatos examinados de casos novos de Hanseníase (2008 a 2018)

Indicadores	(%)	IC 95%	p	Tendência
Taxa de detecção de casos novos	-6,74	(-8,15; -5,30)	<0,001	Decrescente
Proporção de contatos examinados de casos novos	3,38	(1,73; 5,05)	0,001	Crescente

IC=Intervalo de Confiança

family and with the community, reducing stigma and ignorance about a curable disease with free treatment. <sup>(23)</sup> In a study carried out in Ethiopia, leprosy control actions were decentralized to basic health services, in order to bring the population closer to early diagnosis, timely treatment and case monitoring, positive results have already been evidenced. <sup>(24)</sup> Another study in Orissa, India, showed that greater PHC coverage contributed to the improvement of leprosy epidemiological indicators. <sup>(25)</sup>

Although PHC coverage in Minas Gerais is 86,63%, weaknesses in disease control remain. The growing trend of the proportion of contacts examined could indicate the effectiveness of the service, however, the average found for the analyzed period classifies the state as regular. According to the Ministry of Health, the percentage of contacts examined to be classified as good would have to present a percentage greater than 90%. <sup>(10)</sup>

Among the actions carried out by professionals for the surveillance of contact control, the dermatoneurological examination is mentioned, in order to identify early signs of the disease. <sup>(26)</sup> The Ministry of Health advises to assess annually, for five years, all non-sick contacts, whether family or social. After this period, contacts should be released from surveillance, however, they should be clarified as to

the possibility of the appearance of signs and symptoms suggestive of leprosy in the future.

In addition to the dermatoneurological examination, the Ministry of Health recommended the immunoprophylaxis of contacts with the Bacillus Calmette-Guérin (BCG) vaccine, however, little is known about its implementation. <sup>(27)</sup> More recently, a discussion has started on the effectiveness of chemoprophylaxis with a dose of rifampicin. <sup>(28-29)</sup>

In this sense, the proportion of contacts examined allows us to know not only the coverage of surveillance carried out by health professionals, but also to understand the reasons that lead to the unfinished agenda that the country still faces in controlling the disease.

In addition to expanding PHC coverage, the need for continued professional training cannot be ruled out. According to Starfield<sup>(30)</sup>, the quality of the attention given to the user is directly related to training during graduation, in-service training and, finally, professional experience with the specific problem.

Among the limitations of the present study, it is important to consider that the information used was obtained from secondary data, which can present inconsistency in the quality and quantity of the information. This is due to possible underreporting, errors in filling out notification

forms and data entry in the information system. However, despite this, choosing this type of source reduces operating costs and does not preclude analysis.

## CONCLUSION

Despite the decline in the rate of detection of new cases and the increase in the proportion of contacts examined, it is clear that leprosy is still a significant public health problem today. It is necessary to emphasize that the decrease in the rate of detection of new cases may be a consequence of several factors, including a gap in the health care process. It is of utmost importance to strengthen policies for the promotion, prevention and diagnosis of leprosy, impacting on the improvement of the population's living conditions, reiterating the important role of public health in controlling the endemic disease.

The increase in the proportion of contacts examined is a positive trend for the state, as it assesses the services' capacity to conduct contact surveillance in the year of diagnosis of new cases. However, this data must be analyzed with caution, since the percentage presented in the period is below that expected by the Ministry of Health. Finally, this study reinforces the importance of carrying out new studies as a way to support the development of other strategies for leprosy control. ■

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