

**LEPROSY IN MATO GROSSO DO SUL:
A SPATIAL, SOCIOECONOMIC AND IMPACT VIEW OF THE COVID-19
PANDEMIC**

**HANSENÍASE NO MATO GROSSO DO SUL:
UM OLHAR ESPACIAL, SOCIOECONÔMICO E DO IMPACTO DA PANDEMIA DE
COVID-19**

**LEPRA EN MATO GROSSO DO SUL:
UN ANÁLISIS, SOCIOECONÓMICO E IMPACTO DE LA PANDEMIA DEL COVID-19**

“Healing is a matter of time, but it is sometimes also a matter of opportunity.”
Hippocrates

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Abstract: This paper analyzes leprosy indicators in the state of Mato Grosso do Sul (MS), Brazil, emphasizing the socioeconomic and spatial elements, and compare the pre and post-Covid-19 pandemic periods. This study hypothesizes that leprosy substantially influences the socioeconomic aspects and that the pandemic period has impacted the notifications of the disease. The analyses demonstrated an overall decline in leprosy notifications in the comparison before and after the Covid-19 pandemic. The proportion of new cases of leprosy classified as stage II of physical disability at the time of diagnosis got worse. The disease presents a strong socioeconomic relationship, given both the disease’s biological favoring in vulnerable environments and the negative impact that it can cause on the economic scope of the affected ones, such as labor limitations, prejudice, and disabilities, resulting in negative socioeconomic feedback.

Keywords: Leprosy; Health and Development; Health Geography.

Resumo: Este trabalho teve como objetivo analisar indicadores sobre a hanseníase no estado de Mato Grosso do Sul (MS), sobretudo com ênfase nos elementos socioeconômicos e espaciais, e comparar o período pré e pós-pandemia de Covid-19. A hipótese deste trabalho é de que a hanseníase tem influência importante nos aspectos socioeconômicos e que o período

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pandêmico pode ter impactado nas notificações da doença. Após as análises foi possível verificar uma queda generalizada nas notificações de casos de hanseníase na comparação entre o período anterior e posterior a pandemia de Covid-19. Ocorreu uma piora na proporção de casos novos de hanseníase classificada como grau II de incapacidade física no momento do diagnóstico. A doença apresenta grande relação socioeconômica, por um lado por conta do favorecimento biológico da doença em ambientes de vulnerabilidade, por outro pelo impacto negativo que a doença pode resultar na vida econômica dos acometidos, como dificuldades laborais, de emprego, preconceito e incapacidades, acarretando uma retroalimentação socioeconômica negativa.

Palavras-chave: Hanseníase; Saúde e Desenvolvimento; Geografia da Saúde.

Resumen: Este trabajo tiene como objetivo analizar indicadores sobre la lepra en el estado de Mato Grosso do Sul (MS), especialmente con énfasis en elementos socioeconómicos y espaciales, y comparar el período anterior y posterior a la pandemia de Covid-19. La hipótesis de este trabajo es que la lepra tiene una influencia importante en los aspectos socioeconómicos y que el período de pandemia pudo haber impactado las notificaciones de la enfermedad. Después del análisis, fue posible verificar una caída generalizada en las notificaciones de casos de lepra en la comparación entre el período anterior y posterior a la pandemia de Covid-19. Hubo un empeoramiento en la proporción de nuevos casos de lepra clasificados como grado II de discapacidad física en el momento del diagnóstico. La enfermedad tiene una gran relación socioeconómica, por un lado por el favorecimiento biológico de la enfermedad en entornos vulnerables, por otro lado por el impacto negativo que la enfermedad puede tener en la vida económica de los afectados, como dificultades para el trabajo, el empleo, los prejuicios y las discapacidades, lo que provoca una retroalimentación socioeconómica negativa.

Palabras clave: Lepra; Salud y Desarrollo; Geografía de la Salud.

Introduction

Leprosy is one of the most antique diseases that affect humanity and although there are available treatments and a cure, it remains a substantial public health issue in some regions of the world (Eidt, 2004). Brazil occupies second place in the world ranking of leprosy cases and is responsible for about 92,4% of all Americas' registered cases (Brasil, 2023).

According to the Health Ministry, the country regions with the highest coefficients of detection are the North, Northeast, and Central-West regions. Mato Grosso do Sul was considered with average endemicity in 2021, with a 9.30/100 thousand habitants detection rate (Brasil, 2023). However, this data must be cautiously observed, given that due to the Covid-19 pandemic, many injuries may have had reduced rates of notification, hence, it is challenging to specify if the data reflects the region's reality. Knowing diseases data, especially those considered health issues, such as leprosy, is essential to guide control and monitoring strategies.

Based on this assumption, this study aims to analyze leprosy indicators in the state of Mato Grosso do Sul (MS), Brazil, available on the Leprosy Indicators platform of the Department of HIV/AIDS, Tuberculosis, Viral Hepatitis and Sexually Transmitted Infections –

DATHI/Ministry of Health (Brasil, 2022a), particularly with emphasis on the socioeconomic and spatial elements in addition to comparing the periods before and after the Covid-19 pandemic. The method is based on descriptive statistics and stylized facts. The results will be presented with graphs, tables, and maps. This study hypothesizes that leprosy substantially influences the socioeconomic aspects of affected ones and society and that the pandemic period has negatively impacted the notifications of the disease.

Finally, a contribution is expected to the formulation and improvement of public policies and their respective management instruments. Hence, this paper is divided into three sections, in addition to this introduction. The following section presents the historical and biological aspects of leprosy. Then, the socioeconomic elements of Health Geography on leprosy in MS will be analyzed. Lastly, the final considerations are addressed.

The historical and biological aspects of leprosy

According to Baialardi (2007), leprosy is an infectious disease of chronic evolution, caused by the *Mycobacterium leprae* and, in some cases, by the *Mycobacterium lepromatosis*. Transmission occurs through intimate and prolonged contact of a susceptible person with a sick one, who is not being treated. By eliminating the bacilli in the air through speech, coughing, and sneezing, it penetrates the body through the respiratory tract and installs preferentially in the skin and peripheral nerves. Therefore, the manifestation occurs mainly through dermatological signs and symptoms (Ploemacher *et al.*, 2020).

Due to its clinical manifestations and disabling potential, leprosy remains a target of discrimination and social exclusion, which may trigger repercussions at the psychological level of the affected ones and their social context (Marahatta *et al.*, 2018). Such aspects were built throughout history, since before the discovery of the treatment and the cure, the affected population was subjected to situations of atrocity and prejudice, for instance, being excluded from social and familiar interaction, being associated with sin, being restricted from work, etc. It is possible to identify some of these experiences in biblical records, especially in Leviticus.

For many years, the only known treatment for leprosy was “chaulmoogra” oil, whose effectiveness was questionable, as when it seemed to have some action, the disease tended to regress spontaneously (Opromolla, 1997). Only from the 1950s, with Sulfone usage, the treatment improved, and gradually, actions were implemented against prejudice regarding the disease. In the 1970s, Brazil initiated a campaign to change the disease’s name, which was called “*Lepra*”, to “*hanseníase*” (Brasil, 2008).

The multidrug treatment (MDT), commonly composed of Dapsone (sulfone) combined with Rifampicin and Clofazimine, started at the beginning of 1981, and is used worldwide (Goulart *et al.*, 2002). It is vital to point out that treatment is a right adding up to being provided for free by the Unified Health System (SUS) in Brazil. From the moment that the treatment is initiated, the leprosy affected person ceases to transmit the disease, contributing to its transmission control, evolution, as well as reduction of social exclusion.

Socioeconomic and health geography elements of leprosy in MS

The aim of Health Geography, according to Alievi and Pinese (2013), is to analyze health elements in populations, their evolution, mapping, and traceability, contributing to the rationalization and development of health policies to face various harms.

Through the analysis of Brazil's Health Geography, Alievi and Pinese (2013) point out that although its concept's origin reassembles to antique Greece, in Brazil it is recent. Also, the authors highlight that the development of further studies and new dialogues are substantial to the strengthening of the subject, primarily because of the existence of endemic diseases and epidemics which develop among the engendered dynamic flows, through globalization. A pertinent question to Health Geography, Peiter (2005) points out, is precisely in the multidisciplinary characteristic.

Faria and Bortolozzi (2009) analyzed Milton Santos' contributions to the health geography subject in Brazil. According to the authors, a substantial point is that the adoption of concepts of space and territory by Milton Santos allowed shifting the focus, once on the disease, to the social determinants of health conditions. Hence, the spatial cut was observed, and territorial profiles were formed to draw attention to access elements to health services, exposure to risk factors, spatial and social exclusions, as well as various elements that are beyond the restricted aspect of the disease. Therefore, for the authors, a large contribution lies in this effort of Health Geography to the country against health challenges.

Under this perspective, leprosy is a disease with a strong socioeconomic relationship, given both the disease's biological favoring in vulnerable environments and the negative impact that it can cause on the economic scope of the affected ones. Leano *et al.* (2019) developed an integrative review encompassing 2000 to 2016 in the following databases: Lilacs, Medline, Scopus SciELO's online library. They aimed to bring up studies about socioeconomic factors related to leprosy. The authors point out that the social context substantially influences the

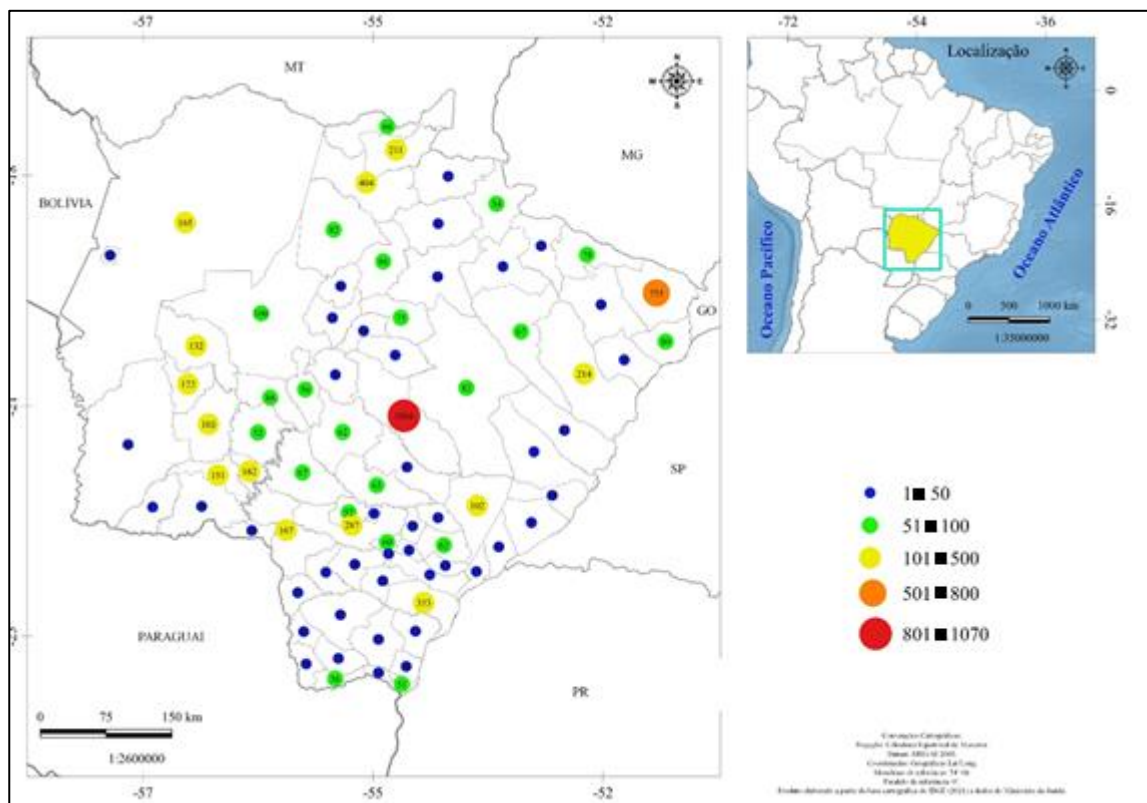
disease and that the opportunities for exposure to illness are a result of a set of factors that are not individual but from collectivity characteristics.

In this regard, Da Fonseca Azevedo Araújo and Lana (2020) analyzed leprosy relations with the covering of the family health strategy and socioeconomic conditions. The authors observed the context of the state of Paraíba, in Brazil, from 2001 to 2016. They concluded that the advance of social indicators and the implementation of health services resulted in the improvement of leprosy epidemiologic indicators, although situations of vulnerability persist and contribute to disease endurance.

Tencatt Abrita and Abrita (2018) analyzed psychological and socioeconomic characteristics related to leprosy. The authors point out that besides the socioeconomic vulnerability conditions that increase disease proliferation, the person that faces the disease frequently deals with social, labor, and psychological difficulties because usually, even in active age, the individual loses the labor strength, requiring financial aid from social programs. Although this social protection guarantees the minimum dignity to the patients, it generates substantive budget impacts, as frequently it is inferior to the previous income.

Another point of this discussion is the disabilities caused by the disease, which can negatively affect labor possibilities and diminish productivity, besides stigmas and prejudices that can reduce opportunities for professional growth. Initially, it is pertinent to analyze the new cases of leprosy in Mato Grosso do Sul (MS), from 2010 to 2021. Map (1) contributes to this analysis.

Map 1 - New cases of leprosy in Mato Grosso do Sul (MS) from 2010 to 2021.



Source: Prepared by the authors based on IBGE (2021) and Brasil (2022a) data.

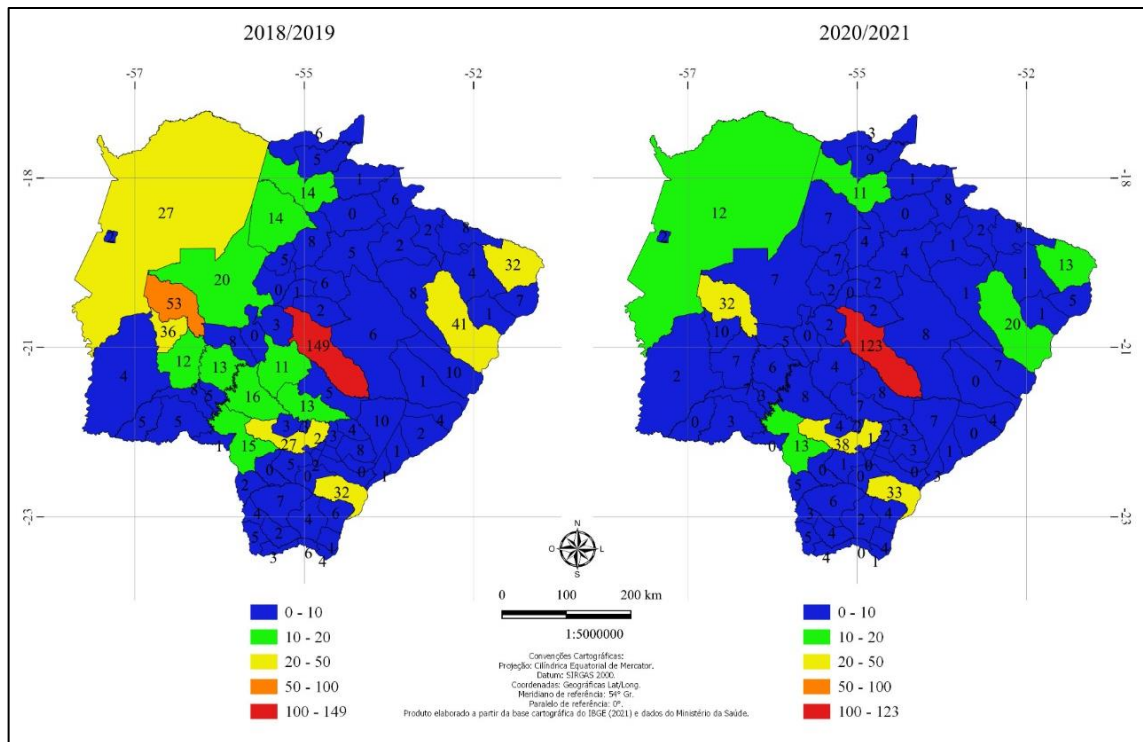
The new cases of leprosy in MS demonstrate that the highest concentration is in the Campo Grande municipality, the state capital. This can be justified by the population density of this region and the existence of a reference system for disease assistance. The municipality has an estimated population of 916,001 by 2021 (IBGE, 2022), while the whole state has an estimated population of 2,839,188.

The Paranaíba municipality presents a substantial concentration of new cases, principally considering the population density of the region. From 2010 to 2021, there were 755 new cases in the region, i.e., a number close to the capital's (1068) that has a much larger population. Some other highlights are the Naviraí and Coxim municipalities. Some studies point out the possibility of sub-notification during the Covid-19 pandemic³.

To investigate this situation in MS for leprosy, Map (2) was developed and presents the new cases of leprosy by municipalities from 2018-19 compared to the 2020-21 period.

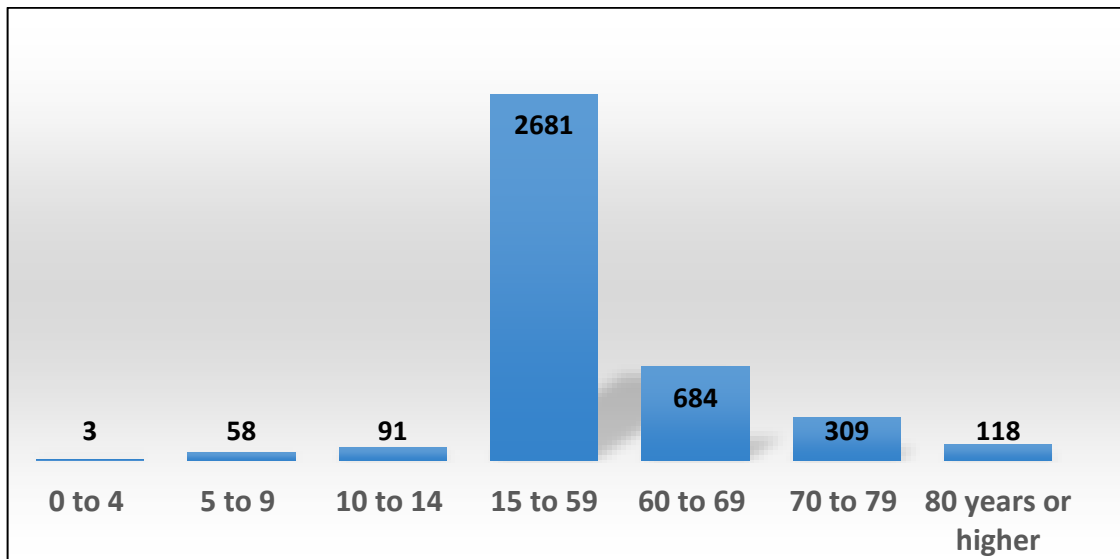
³ For instance, Oliveira et al (2022), Sousa et al (2022), and Santos et al (2022).

Map 2 – New cases of leprosy by municipalities from 2018-19 compared to the 2020-21 period.



Source: Prepared by the authors based on IBGE (2021) and Brasil (2022a) data.

A reduction of cases in all municipalities of the state is evident in Map (2), this can indicate that there was sub-notification during the pandemic period. It is essential that, in the following years, the number of new cases is verified to certify if these numbers converge to the pre-pandemic period, or if the disease cases are reduced. The following Graph (1) also analyzes the socioeconomic aspects of the disease in MS, demonstrating the total of new cases of leprosy by age group from 2014 to 2021 in the state.

Graph 1 - New cases of leprosy by age group from 2014 to 2021 in MS.

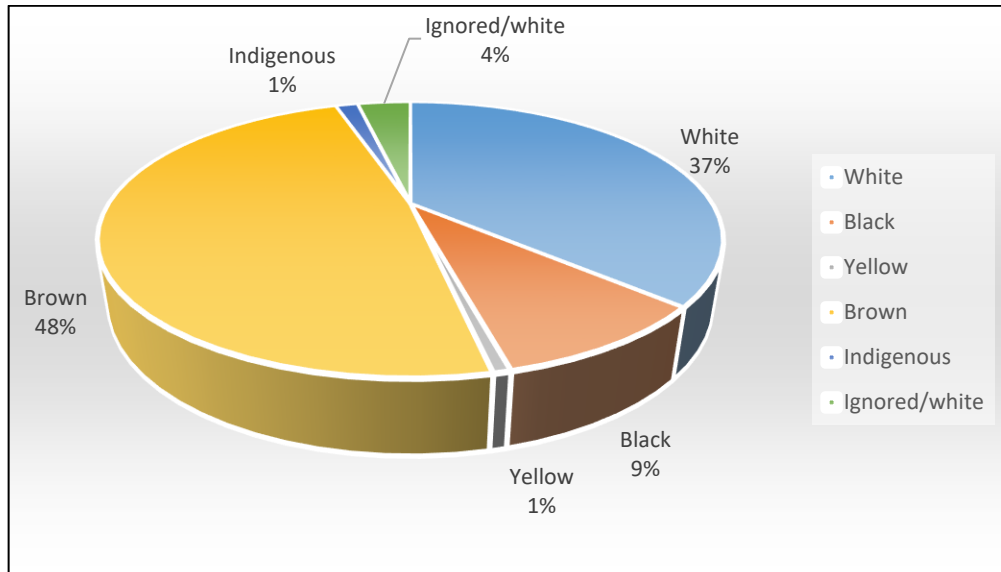
Source: Prepared by the authors based on IBGE (2021) and Brasil (2022a) data.

Predominantly, new cases concentrate on the age group of working age. For instance, 68% of new cases are in the age group from 15 to 59 years and this can be pointed out as the reference for working age⁴. Other countries consider the working age beginning from 10 years and with recent pension restructurings and economic struggles in Brazil, it is not unusual for people to continue working even before their sixties.

In this case, the total of this population would be 87%, i.e., a large part of new diagnosis cases of leprosy impact labor in the working age. This is substantial because the disease has a significant potential of compromising or affecting labor, it affects both the labor market and the patient who loses physical capacities. Graph (2) shows data on the proportion of new cases of leprosy by race/color in MS, from 2014 to 2021.

⁴ Oliveira and Rossi (2019) deepen this theme by analyzing the population aging, the older segment, and the basic activities of daily life as an indicator of autonomous and active old age in Brazil.

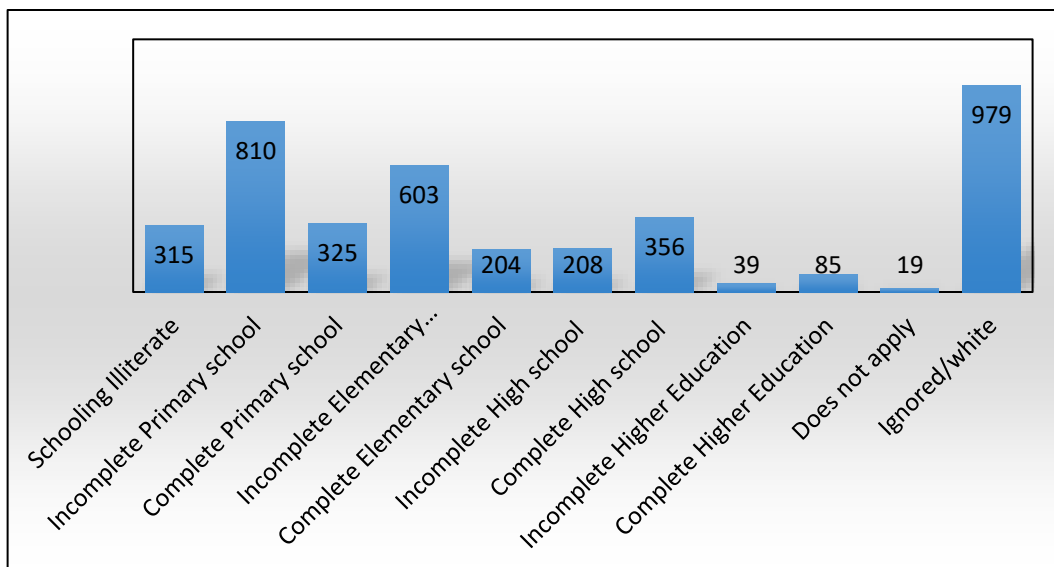
Graph 2 - New cases of leprosy by race/color in MS, from 2014 to 2021.



Source: Prepared by the authors based on IBGE (2021) and Brasil (2022a) data.

According to the data, new cases are predominantly declared by browns (48%), followed by white (37%). In sequence, the most predominant is black, with 9%. The indigenous, who represent approximately 3% of Mato Grosso do Sul’s population, composed 1% of new cases, this may be evidence of sub-notification of this population. Another relevant element regarding socioeconomic aspects is educational level. Graph (3) presents new cases based on educational level.

Graph 3 - New cases of leprosy based on the educational level in MS.

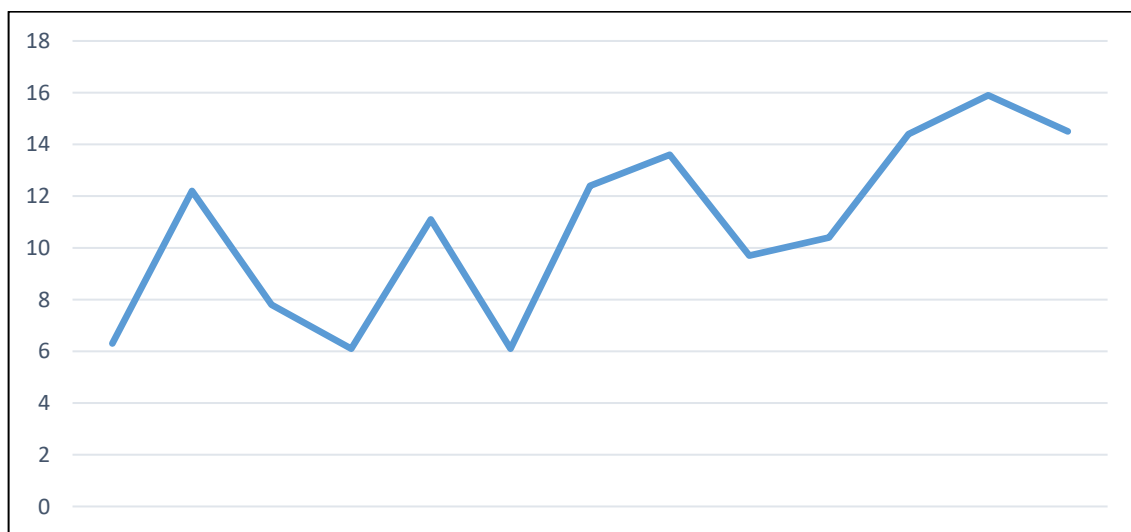


Source: Prepared by the authors based on IBGE (2021) and Brasil (2022a) data.

It is evident in the results of the educational level that the population is predominantly in the “incomplete primary school”, and “incomplete elementary school” levels and a small fraction have “complete higher education”. These results evidence this population’s vulnerability regarding educational level, which negatively impacts labor opportunities.

From this perspective, there is a double vulnerability for this population, i.e., struggle to access education, adding up to leprosy diagnosis and treatment. If this person is not detached from labor, there will be more struggles due to a low educational level. Hence, the relevance of policies that target these people. For instance, according to Brasil (2022b), the unemployment rate of the 4th quarter of 2021 was 6.7% for people with higher education and 18.4% for people with incomplete high school. The disabilities caused by the disease aggravate the situation. Graph (4) addresses this issue.

Graph 4 – The proportion of new cases of leprosy classified as stage II of physical disability from 2009 to 2021 in MS.



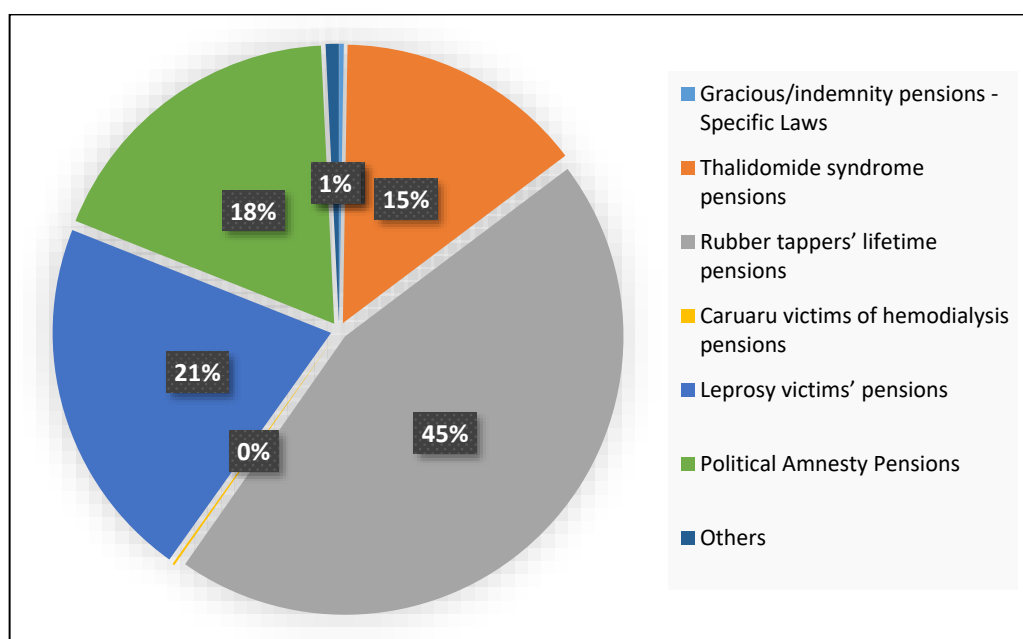
Source: Prepared by the authors based on IBGE (2021) and Brasil (2022a) data.

Graph (4) presents a temporal evolution from 2009 to 2021 of the proportion of new cases of leprosy classified as stage II of physical disability in the diagnosis moment. This proportion has a positive trajectory, from 6.3 at the beginning of the historical series, to 14.5. In this case, people are being diagnosed with a certain physical disability level. This may provide evidence of many gaps in the prevention and diagnosis of leprosy, reflecting on socioeconomic aspects.

The fact that physical disabilities are more present in diagnosis demonstrates that it is occurring belatedly. Due to its disabling level, people who live with the disease for a longer period, without treatment, can face difficulties in social interaction, locomotion, labor, and productivity and this can demand readaptation and treatments to enable fullness in personal and professional activities. This situation can aggravate social costs, and labor struggles, demand greater investments in health and rehabilitation, and above all, exert a negative impact on the quality of life of these people and their families⁵.

Data from Mato Grosso do Sul were not available, however, the Brazilian reality can be observed and provide evidence to the regional scenario. Hence, Graph (5) demonstrates some expenditures of the National Institute of Social Security (INSS).

Graph 5 – Monthly expenditures of INSS, according to the main lines - 2020 considering special pensions in Brazil.



Source: INSS, Accounting Coordination, SIAFI. 2020.

Graph (5) presents the monthly expenditures of INSS, according to the main lines - 2020 considering special pensions in Brazil. The data shows that leprosy victims' pensions are the second larger category of this line, with 21%. Hence, late diagnosis, disabilities, and negligence result in many costs to society.

⁵ These difficulties can be pointed out in works such as Melo (2020) and Hanashiro, Correia, and Sugawara (2018).

First, the larger impact is on the personal and familiar lives of these people, due to psychological, biological, and social aspects, stigma, prejudice, and the labor market. Second, there is social cost through expenditure increase and health services demand for treatment, rehabilitation, and disabilities care, also there are social expenses with pensions and a decrease in the labor force in the active age.

Final considerations

This paper analyzes leprosy indicators in the state of Mato Grosso do Sul (MS), Brazil, particularly with emphasis on the socioeconomic and spatial elements, and on a comparison of the pre and post-Covid-19 pandemic. This study hypothesizes that leprosy substantially influences the socioeconomic aspects and that the pandemic period has impacted the notifications of the disease.

After the analyses, three elements are pointed out:

- I. There was a generalized decrease in the notifications of leprosy cases between 2018-2019 compared to 2020-2021, indicating a possible sub-notification of cases after the Covid-19 emergency.
- II. The proportion of new cases of leprosy classified as stage II of physical disability at the time of diagnosis got worse. In this case, people are being diagnosed with a substantial physical disability. This may provide evidence of many gaps in prevention and diagnosis with significant influence on socioeconomic aspects.
- III. The disease presents a strong socioeconomic relation, both due to the biological favoring of the disease in vulnerable environments and to the negative impact that the disease can cause on the economic scope of patients such as labor struggles, prejudice, and disabilities, resulting in negative socioeconomic feedback.

Therefore, public policies must be broad and encompass health and socioeconomic issues, aiming to mitigate this perverse situation to which a substantial part of Brazilian society is exposed to. Some guiding elements should pervade these policies such as i) leprosy awareness and information programs; ii) early diagnosis and prevention programs for disease-related disabilities; iii) policies that aim to provide education access, and training for this

population in order to better prepare them for the labor market; and iv) biopsychosocial follow-up policies with a humanization view.

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