



Hospitalization for Hansen's disease and its sequelae: a descriptive study *Internação por hanseníase e suas sequelas: um estudo descritivo* *Hospitalización por lepra y sus secuelas: un estudio descriptivo*

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ABSTRACT

Objective: To describe the records of admissions to the Unified Health System (Sistema Único de Saúde) for Hansen's disease and Hansen's disease sequelae in the state of Minas Gerais from 2008 to 2019. **Methods:** A descriptive observational study was carried out in the state of Minas Gerais, Brazil, from 1 January 2008 to 31 December 2019. Data were collected from the Hospital Admission System of the Unified Health System. The study population comprised all records of hospitalization for Hansen's disease (A30) and sequelae from Hansen's disease (B29) from people living in the state. Hospitalization rates (per 100,000 inhabitants) and in-hospital lethality were calculated. Data analysis was performed using descriptive statistics on Microsoft Excel® and Epi Info 7.2™. **Results:** Minas Gerais recorded 3,172 admissions, with an annual mean hospitalization and in-hospital lethality rates of 1.3 and 1.7%, respectively. The highest hospitalization rates were recorded between 2011 and 2013. With regard to in-hospital lethality, the most significant values were observed in 2008 and 2010. The health macro-region of the Eastern portion of the South had the highest rate of hospitalization. As for the profile, 68% (n=1855) were male, 47.4% (n=1294) were Black people, and 18.2% (n=500) were aged between 50 and 59 years. **Conclusion:** The study showed that the records of hospitalization for Hansen's disease and its sequelae in Minas Gerais follow the epidemiological pattern of the occurrence of the disease. There was a need to strengthen primary health care for diagnostic, treatment and prevention actions.

Descriptors: Hospitalization; Hansen's disease; Descriptive Epidemiology; Health Information System.

RESUMO

Objetivo: Descrever os registros de internação no Sistema Único de Saúde por hanseníase e sequelas de hanseníase no estado de Minas Gerais no período de 2008 a 2019. **Métodos:** Estudo descritivo e observacional realizado em Minas Gerais, Brasil, no período de 1 de janeiro de 2008 a 31 de dezembro de 2019. A coleta dos dados se deu a partir de informações do Sistema de Internação Hospitalar do Sistema Único de Saúde. A população compreendeu todos os registros de hospitalização por hanseníase (A30) e sequelas de hanseníase (B29) de pessoas residentes no estado. Foram calculadas as taxas de internação (por 100 mil habitantes) e letalidade hospitalar. Procedeu-se a análise dos dados por estatística descritiva utilizando os softwares Microsoft Excel® e Epi Info 7.2™. **Resultados:** Minas Gerais registrou 3.172 internações, com taxa média anual de internação e de letalidade hospitalar de 1,3 e 1,7%, respectivamente. Entre 2011 e 2013, foram registradas as maiores taxas de internação. Já para a letalidade hospitalar, em 2008 e 2010 apresentaram-se os valores mais expressivos. A macrorregião de saúde Leste do



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Sul apresentou a maior taxa de internação. Quanto ao perfil, 68% (n=1855) eram pessoas do sexo masculino, 47,4% (n=1294) da cor/raça parda e 18,2% (n=500) com idade entre 50 e 59 anos. **Conclusão:** O estudo mostrou que os registros de internação por hanseníase e suas sequelas em Minas Gerais seguem o padrão epidemiológico da ocorrência da doença. Verificou-se a necessidade do fortalecimento da atenção primária à saúde para ações de diagnóstico, tratamento e prevenção.

Descritores: Hospitalização; Hanseníase; Epidemiologia Descritiva; Sistema de Informação em Saúde.

RESUMEN

Objetivo: Describir los registros de hospitalización en el Sistema Único de Salud por lepra y sus secuelas en el estado de Minas Gerais entre el período de 2008 y 2019. **Métodos:** Estudio descriptivo y observacional realizado en Minas Gerais, Brasil, en el período entre 1 de enero de 2008 y 31 diciembre de 2019. La recogida de datos se dio a partir de informaciones del Sistema de Hospitalización del Sistema Único de Salud. La población ha sido de todos los registros de hospitalización por lepra (A30) y sus secuelas (B29) en personas que viven en el estado. Se ha calculado las tasas de hospitalización (por 100 mil habitantes) y letalidad hospitalaria. El análisis de los datos se dio por la estadística descriptiva utilizándose los softwares Microsoft Excel® y el Epi Info 7.2™. **Resultados:** Minas Gerais registró 3.172 hospitalizaciones con la tasa media anual de hospitalización y de letalidad hospitalaria del 1,3% y el 1,7%, respectivamente. Entre 2011 y 2013 se ha registrado las mayores tasas de hospitalización. Para la letalidad hospitalaria entre 2008 y 2010 se presentaron los valores más expresivos. La macro región de salud Leste del Sur presentó la mayor tasa de hospitalización. Respecto al perfil de los participantes, el 68% (n=1855) eran personas del sexo masculino, el 47,4% (n=1294) del color/raza parda y el 18,2% (n=500) con edad entre 50 y 59 años. **Conclusión:** El estudio mostró que los registros de hospitalización por la lepra y sus secuelas en Minas Gerais siguen el patrón epidemiológico de la ocurrencia de la enfermedad. Se verificó la necesidad del fortalecimiento de la atención primaria de salud para las acciones de diagnóstico, tratamiento y prevención.

Descritores: Hospitalización; Lepra; Epidemiología Descritiva; Sistemas de Información en Salud.

INTRODUCTION

As defined by the Ministry of Health, Hansen's disease is a chronic, infectious disease whose etiological agent is the *Mycobacterium leprae*. The transmission of the bacillus occurs in the upper airways through close and prolonged contact with an individual infected with the multibacillary form and without treatment. However, mycobacterial infection per se, although indispensable, is not sufficient for the progression of the pathology, since approximately 90% of the population is naturally immune to this microorganism⁽¹⁾.

Hansen's disease manifests itself mainly through dermatological signs and symptoms, which traditionally result in functional damage and severe physical deformities when left untreated. It should be noted that in the natural history of the disease there is the possibility of limitations of physical injuries through the process of exacerbation of the immunocellular response, with high resistance to infection by the PB Hansen's disease bacillus⁽²⁾. The delay in the diagnosis and treatment of the disease can result in (self) discrimination of the person with Hansen's disease due to physical deformities, since, even today, the disease is considered, by common sense, a contagious, mutilating and incurable disease^(1,3,4).

The adoption of measures to prevent and control leprosy are essential activities to be carried out in health centers as a way of promoting health and preventing injuries. Such measures include early detection and treatment of people with Hansen's disease, clinical examination, guidance to contacts of new cases of Hansen's disease and individuals residing in areas with high endemicity, health education activities, guidance on the signs and symptoms of the disease, self-care practices, epidemiological surveillance, training of health professionals, among others⁽¹⁾.

The availability of treatment with multidrug therapy (MDT) is capable of providing discharge due to cure in most cases of the disease in a relatively short time⁽³⁾. The introduction of this therapy in the 1980s led to significant epidemiological changes in the natural history of the disease, with a reduction in the worldwide prevalence from more than 5 million cases in the 1980s to less than 200,000 cases in 2016^(3,5). However, the situation of the disease worldwide is still worrying, since, according to the World Health Organization, in 2018, the number of new cases of leprosy per 100,000 inhabitants was 208,613, with the American continent ranking second, only behind Southwest Asia⁽⁶⁾.

In the last ten years, although the number of new cases has been static or in slow decline, an increase of 4,043 new cases was observed in 2016, a year in which three countries reported more than 10,000 new cases of Hansen's disease⁽³⁾.

As for the state of Minas Gerais, the State Health Department reported about 1,300 new cases annually in the period from 2009 to 2016. Of the total number of municipalities in the state, 45 municipalities are considered hyperendemic. In 2016, the incidence rate was 5.27 new cases/100,000 inhabitants, corresponding to 1,106 new cases, of which 5.1% occurred in children under 15 years of age, thus signaling active infection and recent transmission foci. Of the cases reported in that year, 13.9% had deformities at diagnosis, suggesting a high hidden prevalence of late investigation⁽⁷⁾.

Thus, Hansen's disease is an important public health problem, not only because of its high incidence rate in Brazil and its high disabling potential, but, above all, because it is a neglected disease⁽³⁾. Although its treatment is mostly carried out on an outpatient basis and free of charge, the disease is linked to a huge burden of prejudice, which intensifies the situation of vulnerability of ill people⁽¹⁾.

Studying the record of admissions is important, as it translates different needs in the care of people with Hansen's disease. Situations in the course of treatment and post-discharge, such as adverse reaction to MDT medications (such as methaemoglobinemia, pharmacordermias, hemolysis, among others), need for clinical and laboratory investigation, and the management of reactions, which may indicate a delayed approach, with worsening of the usual clinical course, severe systemic alterations or the need for treatment with pulse therapy or surgical rehabilitation, should be considered as a motivation for hospitalization^(1,3,8).

The aim of this study is to describe the hospitalization records in the Unified Health System (*Sistema Único de Saúde – SUS*) for Hansen's disease and Hansen's disease sequelae in the state of Minas Gerais in the period from 2008 to 2019.

METHODS

This is a quantitative descriptive and observational study using secondary data in the public domain available on the website of the Informatics Department of the Unified Health System (Datasus). Data from the Hospital Admission System of the SUS (*Sistema de Internação Hospitalar – SIH/SUS*) were used. The data covers the public and private health centers of high complexity of the SUS⁽⁹⁾. The population of this study included all hospitalization records for Hansen's disease and its sequelae, whose codes in the International Classification of Diseases (ICD 10th Edition) are A30 and B29, respectively⁽¹⁰⁾. The study locations were the municipalities of residence of the hospitalized individuals in the state of Minas Gerais, Brazil, and the study period was January 1, 2008 to December 31, 2019.

Minas Gerais is located in the Southeast region of the country and presented, according to estimates by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística – IBGE*), for 2018, a population of 21,040,662 inhabitants in an area of 586,520,732 km², being the second most populous federated unit in the country⁽¹¹⁾. Its Human Development Index (HDI) is 0.731, which is considered high (2010)⁽¹²⁾. It is divided into 13 health macro-regions (*Macrorregiões de saúde – MRS*), defined since 2003 in assistance territories through the Health Regionalization Master Plan, which was developed in order to reduce existing regional inequalities in the state, and provide an improvement in the quality of the health services provided⁽¹³⁾.

The variables selected for this study were year of hospitalization, health macro-region, age range, race/color, gender, clinical evolution to hospital death, mean hospital stay (days), nature of hospitalization (urgency and emergency), hospitalization regime (public and private), health care settings that carried out hospitalizations, mean cost of hospitalization (in Reais – R\$) and absolute cost of admissions (in Reais – R\$).

In-hospital lethality (proportion between the number of deaths and the number of admissions multiplied by 100) and hospitalization rate (ratio between the number of admissions and the population residing in Minas Gerais multiplied by 100,000) were calculated. The population data used in this study refer to IBGE population estimates, available on the Datasus website⁽⁹⁾.

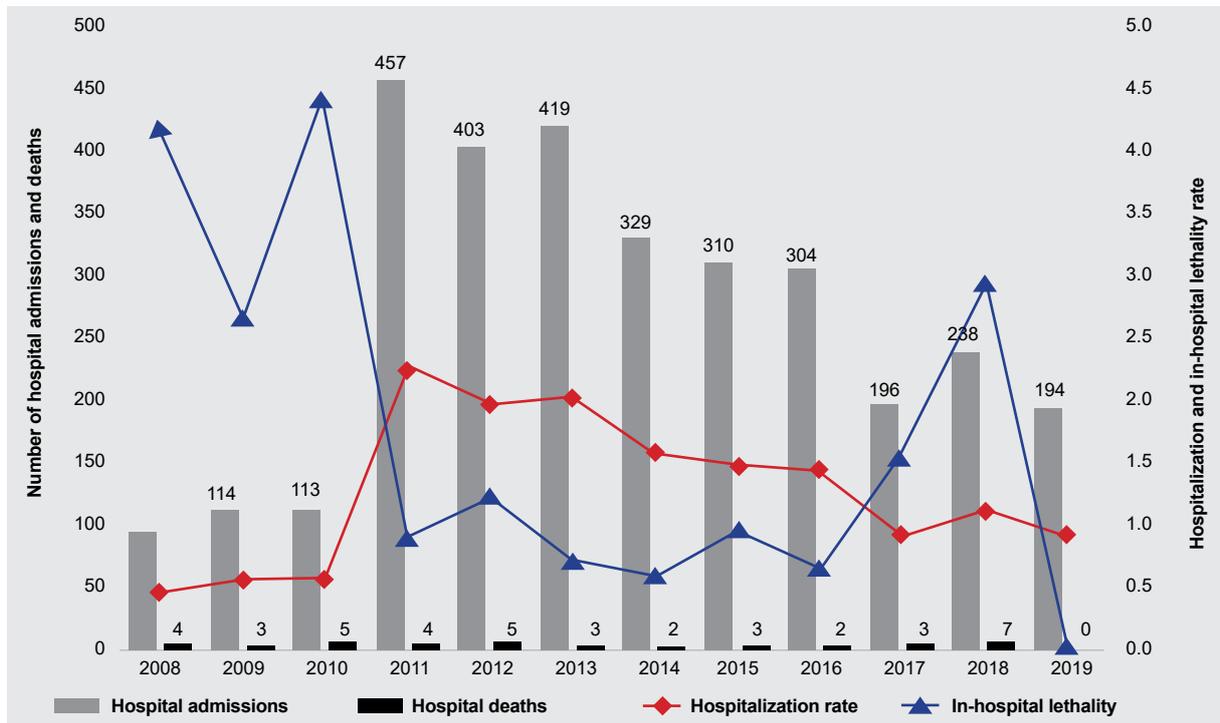
Descriptive statistical techniques were used for data analysis, such as frequency, rate, ratio and proportion analysis. Data were analyzed using Microsoft Excel® and Epi Info 7.2™.

This study did not need to be appraised by the Research Ethics Committee (REC) since it is a study of secondary non-nominal data in the public domain (according to CNS Resolution No. 510/16). However, an attempt was made to strictly respect the international ethical standards involving research with human beings and Resolution No. 466/2012 of the Ministry of Health.

RESULTS

During the study period, 3,172 hospitalizations for Hansen's disease and Hansen's disease sequelae were recorded in hospital services linked to the SUS in Minas Gerais. The mean annual hospital admission and lethality

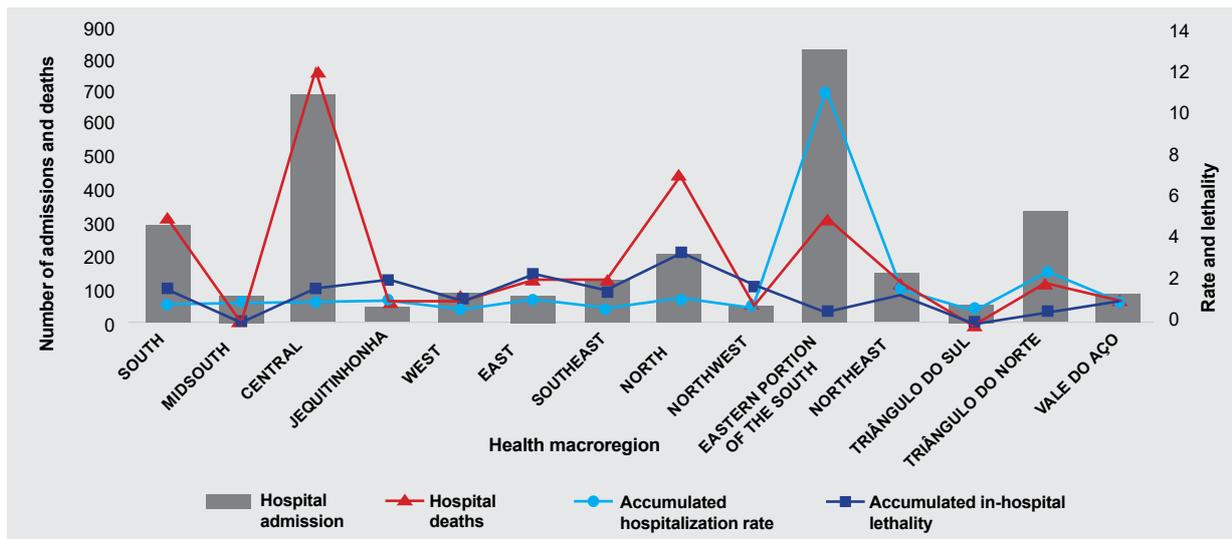
rates were 1.3 admissions (per 100,000 inhabitants) and 1.7%, respectively. The highest hospitalization rates were registered in the period from 2011 to 2013. As for in-hospital lethality, the years 2008 and 2010 showed the most expressive values (Figure 1).



Source: Hospital Information System, Minas Gerais

Figure 1 - Distribution of hospital admission records, hospital deaths, admission rate (per 100 thousand inhabitants) and hospital lethality (%) from Hansen’s disease and Hansen’s disease sequelae, Minas Gerais 2008-2019.

Among the state’s health macro-regions, the Eastern portion of the South MRS stands out due to its high record of hospitalizations for Hansen’s disease and Hansen’s disease sequelae (831), and for having the highest accumulated hospitalization rate (11.0 per 100,000 inhabitants). The North MRS, on the other hand, had the highest in-hospital lethality for the study period (3.3%) (Figure 2).



Source: Hospital Information System, Minas Gerais

Figure 2 - Distribution of hospital admission records, hospital deaths, accumulated admission rate (per 100 thousand inhabitants) and hospital lethality (%) from Hansen’s disease and Hansen’s disease sequelae by Health Macroregion, Minas Gerais 2008-2019.

The distribution of hospitalizations according to sociodemographic variables reveals that there are important differences regarding gender, with males being more affected by severe manifestations of the disease and its

sequelae, and requiring hospitalization. Thus, 67.9% (2,158) of admissions occurred among men. In addition, most admissions (54.7%, 1,736) are of Black people (*pardos* and Black). With regard to age range, the most affected ages were young people and adults, with 64.8% (2,056) of admissions involving people between 20 and 59 years old. Children under 15 years represented 4.1% (130) (Table I).

The ratio of admissions between the sexes was 2.1 male admissions for every female admission, being more evident in the age range of 20-29 years, in Black individuals and in ICD A30 (Hansen's disease) (Table I). For the indigenous race/color, the ratio between the sexes was 5, but there were only 6 hospitalization records for this category.

Table I - Distribution of records of hospitalization for Hansen's disease and Hansen's disease sequelae according to sociodemographic variables, Minas Gerais, 2008-2019.

Characteristic	Sex				Male/ Female Ratio	Total	
	Male		Female			n	(%)
	n	(%)	n	(%)			
	2,158	68.0	1,022	32.2	2.1	3,172	100
Age range							
Below 1 year	0	0.0	2	0.2	0.0	2	0.1
1-4 years	9	0.4	11	1.1	0.8	20	0.6
5-9 years	30	1.4	10	1.0	3.0	40	1.3
10-14 years	48	2.2	20	2.0	2.4	68	2.1
15-19 years	110	5.1	32	3.1	3.4	142	4.5
20-29 years	312	14.5	87	8.5	3.6	399	12.5
30-39 years	343	15.9	170	16.6	2.0	513	16.1
40-49 years	382	17.7	184	18.0	2.1	566	17.8
50-59 years	377	17.5	206	20.2	1.8	583	18.3
60-69 years	307	14.2	145	14.2	2.1	452	14.2
70-79 years	176	8.2	95	9.3	1.9	271	8.5
80 years and older	64	3.0	60	5.9	1.1	124	3.9
Skin color							
White	544	25.2	256	25.0	2.1	800	25.2
Black	178	8.2	74	7.2	2.4	252	7.9
<i>Parda</i>	1015	47.0	472	46.2	2.2	1487	46.8
Yellow	28	1.3	17	1.7	1.6	45	1.4
Indigenous	5	0.2	1	0.1	5.0	6	0.2
Not informed	388	18.0	202	19.8	1.9	590	18.6
Morbidity (ICD-10)							
Hansen's disease	1891	87.6	883	86.4	2.1	2774	87.2
Hansen's disease sequelae	267	12.4	139	13.6	1.9	406	12.8

Source: Hospital Information System, Minas Gerais

As for the nature of the service, 73.1% of admissions (2,327) were urgent, with a mean hospital stay of 6.8 days (126.7% longer than elective services). Similarly, the lethality in the urgency services was 1.6%, while in the elective services it was 0.4% (364.3% higher) (Table II). Regarding the care regime, 53.3% (1,691) were hospitalized in the private sector, but the mean stay in hospital was 2.3 times higher in the public regime compared to the private regime. In-hospital lethality between the two regimens was similar. The mean cost, in minimum wages, of hospitalizations during the study period was 0.59 for the public sector and 0.63 for the private sector (Table II).

Two hundred and thirty health settings carried out the admissions, but ten were responsible for 52.1% (1653) of the admissions. Only one setting, located in the Eastern portion of the South Macroregion, in the municipality of Ponte Nova, was responsible for 20.8% (659) of admissions. It should be noted that the settings responsible for most hospitalizations for Hansen's disease and its sequelae were mostly located in the Central, Eastern portion of the South and Triangulo do Norte Health Macroregions.

Table II - Distribuição dos registros de internação por hanseníase e sequelas da hanseníase segundo caráter de atendimento e regime de atendimento, Minas Gerais, 2008-2019. Distribution of records of hospitalization for Hansen's disease and Hansen's disease sequelae according to nature of hospitalization and care regimen, Minas Gerais, 2008-2019.

Variable	Number of cases n (%)	Number of deaths n (%)	Mean stay (days)	Mean cost of hospitalization (MW)
Nature of hospitalization				
Elective	853 (26.9)	3 (7.3)	3	0.62
Urgency	2.319 (73.1)	38 (92.7)	6.8	0.54
Care regimen				
Public	469 (18.8)	7 (17.1)	10.6	0.59
Private	1.691 (53.3)	22 (53.7)	4.6	0.63
Not informed	1.012 (31.9)	12 (29.3)	5.4	0.63

MW: minimum wage; Source: Hospital Information System, Minas Gerais

DISCUSSION

In the studied period, the increase in the number of hospitalizations and the rate of hospital admissions for Hansen's disease and its consequences in hospital services linked to the SUS in Minas Gerais suggests a worrying scenario, as it is a disease with essentially outpatient diagnosis and treatment. Hospitalization is indicated in cases of reactional states, complications, serious side effects to medications or presence of physical deformities that require surgical intervention. These factors usually result from late diagnosis or incorrect treatment, which can be avoided with the prioritization, by health services, of health education actions that provide users with information about prevention, treatment and self-care measures^(14,15).

The calculated in-hospital lethality was low and there was a decline during the study period, which is in accordance with the literature, since mortality from Hansen's disease is of low magnitude and hospitalizations generally progress to discharge despite the morbid nature of the disease^(14,16). The main causes of death result from adverse reactions to drugs used in multidrug therapy and complications such as Hansen's disease reactions. In addition, the few cases reported as death from Hansen's disease may be due to flaws in the process of selecting the underlying cause of death⁽¹⁷⁾, as this is initially dependent on the information provided by the physician when filling out the death certificate and also of the epidemiological process of investigation of death⁽¹⁸⁾.

According to a study⁽¹⁹⁾, deaths from Hansen's disease may be related to treatment dropout, which is usually motivated by the patient's unfavorable socioeconomic conditions and the long duration of therapy, which in some cases can reach 18 months. Thus, a strategy to reduce the number of deaths may be to make patients and the population in general aware of the importance of continuing treatment for the appropriate time. It is also important to expand the role of the Family Health Strategy (*Estratégia Saúde da Família – ESF*), in which the role of community health workers is essential to minimize the abandonment of multidrug therapy⁽¹⁹⁾. As with tuberculosis between 1995 and 2012, when the introduction of the Directly Observed Treatment Short-Course (DOTS) strategy in Brazil resulted in a continuous and growing evolution in cure rates and a decrease in the incidence of tuberculosis in the country, something similar could be done with Hansen's disease⁽²⁰⁾.

The Brazilian population has heterogeneous socioeconomic conditions and inequality in access to health, so the pattern of illness and death from Hansen's disease reflects these diversities^(14,17). The document presented by the Minas Gerais State Department of Health titled "The Problem-solving capacity of Micro and Macro-Regional Hospital Care in the Management of SUS/MG – 2003/2009" shows that the Eastern portion of the South MRS exhibited a drop in the problem-solving capacity of hospital care and in the list of macro-regional level procedures during the period described, thus presenting critical problem-solving capacity, below 39%, and/or atypical study situations in 2009⁽²¹⁾, which justifies the findings of this study, which point to the Eastern portion of the South MRS as the location where the highest rate of hospitalization for the disease was recorded.

The second highest number of hospitalizations for Hansen's disease, as well as its sequelae, was identified in Central MRS and is related to the scope of this macro-region including Belo Horizonte, which concentrates reference hospitals⁽²²⁾. The results found are similar to those of other studies, in which case distribution and the highest detection

rates were found in areas with higher occupation, socioeconomic inequality, poor health and living conditions, high demographic densities and economic issues in large centers, such as capitals and Metropolitan Regions^(23,24). As a way to outline health planning and promotion actions in regions with high cases of Hansen's disease, it is important that health centers pay attention to epidemiological surveillance and health indicators as instruments for accessing information on the distribution and magnitude of the disease in different geographic areas⁽¹⁵⁾.

The highest proportion of hospitalizations was detected among males, corroborating the existing literature⁽²⁵⁻²⁷⁾. According to the World Health Organization, although the disease affects both sexes, during adulthood, it is more frequent in males, reaching a ratio of two to one⁽³⁾. This is possibly associated with the historical situation related to the migratory and bohemian nature of jobseeking, which is often unhealthy, and the low demand for public health services, in addition to the low level of self-care and less access to information among this population group^(26,28,29).

Other studies indicate that the development of several infectious diseases, including Hansen's disease, is more associated with physiological than behavioral risk factors. This suggests that the lower proportion of Hansen's disease cases among adult females is attributed to greater natural resistance due to hormonal factors^(30,31). This is an interesting aspect, as the proportion of Hansen's disease by sex is reported to be very similar in children, but, in adulthood, this figure changes, as previously mentioned^(5,31).

As in the present study, the predominance of admissions among Black (Black and *pardos*) people is reported in some studies carried out in other states, such as Mato Grosso and Alagoas^(32,33). Other studies relate this finding to the historical context of this population in Brazil, as a reflection of the colonization process, the dynamics of territorial occupation, miscegenation and the ethnic composition of Brazilian states, which are mostly made up of Black people. This population group faces inequality in many aspects of social life, including health^(26,34,35).

Another notorious fact is the occurrence of hospitalizations for Hansen's disease and its sequelae in the age range between 50 and 59 years, which can be explained by the increased susceptibility and vulnerability of older adults to infectious diseases⁽³⁶⁾ due to the decreased function of neutrophils and monocytes, phagocytic function, antigen presentation, among other factors⁽³¹⁾.

Also in relation to age, it was identified that, in Minas Gerais, in the period between 2001 and 2016, there was a decrease in the Hansen's disease detection rate for those under 15 years of age, with a mean annual detection rate of 2.09 cases per 100,000 inhabitants. Such information is in agreement with what was verified in the present study, since only 4.1% of the total number of admissions represented this age range. According to WHO, cases of the disease in this age range reflect "hotspots of active infection and recent transmission", that is, they portray the persistence of the bacillus, as well as the failure of actions to detect and control the disease⁽³⁷⁾.

Although the results show that hospitalizations for Hansen's disease and its sequelae are more expressive in terms of urgency, considering the period between 2008 and 2017, studies claim that late detection is linked to the greater number of spontaneous demands of the patient himself. Thus, the data suggest that active tracing is little implemented in the health services of Minas Gerais, and this is an essential tool to avoid severe forms of the disease, as it timely identifies new cases and traces more quickly people who have abandoned the treatment, thus contributing to the reduction of disabilities, social exclusion and stigma⁽³⁸⁾.

Regarding the care regime, most hospitalizations were carried out in the private sector, which is controversial to other studies^(17,26) which demonstrate a relationship between Hansen's disease and the socioeconomic status of the affected population, which is often unfavorable. Therefore, the highest number of hospitalizations under the public regime would be expected, since the SUS may correspond to the only point of access to health care for the socioeconomically disadvantaged population⁽¹⁴⁾.

The mean cost of hospitalizations for Hansen's disease (0.7 minimum wages) is a complex parameter for discussion due to the lack of studies that analyze the cost of this disease and its complications. However, compared to the mean cost of hospitalization in 2014 for visceral leishmaniasis (0.6 minimum wages), which is also a neglected and incident disease in Brazil, the cost of hospitalization for Hansen's disease and its complications is within the expected. It should be noted that this cost could be minimized with reinforcement for early detection and timely treatment of the disease through the establishment of health promotion actions, since this disease has a high prevalence in populations with low socioeconomic status and with difficult access to health care, social and sanitary services⁽¹⁴⁾.

It is clear that hospitalization for Hansen's disease and its sequelae deserves to be further studied, as it reflects the complexity of care for Hansen's disease, the need to implement a comprehensive and integrated care network, as well as the weaknesses in health promotion and disease prevention actions. Further research on the reality of each health macro-region is recommended, as hospital admission and lethality rates are heterogeneous. Equally important are investments in continuing education of health professionals at the three levels of care, so that they

can timely diagnose and treat Hansen's disease reactions and adverse reactions from multidrug therapy, as well as refer to the demand for rehabilitation, as they are also causes of hospitalization.

This study has some limitations, such as the scarcity of articles in the literature that investigate the profile of hospitalizations for Hansen's disease and its sequelae, as well as the use of secondary data from the SIH/SUS, which can provide disadvantages, such as information bias. On the other hand, the use of these data provides new ways of analyzing the health situation in addition to enabling low-cost population-based studies to be carried out⁽³⁹⁾.

CONCLUSION

The study showed that the records of hospitalization for Hansen's disease and its sequelae in Minas Gerais follow the epidemiological pattern of the occurrence of the disease in the population, with males, individuals aged between 50 and 59 years, and *pardos* being the most affected. Most of the admissions in the state were carried out on an urgent basis and in the private sector, with Eastern portion of the South MRS being the one with the highest number of admissions.

Thus, given the findings of this study, there is a need to strengthen primary health care for the effectiveness of actions aimed at early diagnosis and timely treatment, as well as prevention and educational measures in order to minimize complications arising from late detection and lack of adherence to the Hansen's disease treatment.

CONFLICTS OF INTEREST

There are no conflicts of interest.

CONTRIBUTIONS

Juliana Barros Siman and **Waneska Alexandra Alves** contributed to the study conception and design; analysis and interpretation of data; and revision of the manuscript. **Rayane Evelin Brito Marques**, **Laís Ciribelli Yamaguchi** and **Daniela Pimenta de Castro Fernandes** contributed to the acquisition of data and writing of the manuscript. **Katiuscia Cardoso Rodrigues** contributed to the critical review of the manuscript. **Milena de Oliveira Simões** contributed to the study conception and design.

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REFERENCES

1. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde, Coordenação- Geral de Desenvolvimento da Epidemiologia em Serviços. Guia de vigilância em saúde [Internet]. Brasília: Ministério da Saúde; 2017 [accessed on 2020 June 23]. Available from: <http://www.saude.gov.br/images/pdf/2017/outubro/06/Volume-Unico-2017.pdf>
2. Ministério da Saúde (BR). Hanseníase [Internet]. Brasília: Ministério da Saúde; [data desconhecida] [accessed on 2020 June 23]. Available from: [http://www.saude.gov.br/saude-de-a-z/hanseniaze/11294-descricao-da-doenca#:~:text=A%20hansen%C3%ADase%20%C3%A9%20uma%20doen%C3%A7a,poucos%20adoecem%20\(baixa%20patogenicidade](http://www.saude.gov.br/saude-de-a-z/hanseniaze/11294-descricao-da-doenca#:~:text=A%20hansen%C3%ADase%20%C3%A9%20uma%20doen%C3%A7a,poucos%20adoecem%20(baixa%20patogenicidade)
3. World Health Organization. Global leprosy strategy 2016–2020: accelerating towards a leprosy-free world [Internet]. New Delhi: World Health Organization; 2017 [accessed on 2020 June 23]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/250119/9789290225256-Eng.pdf;jsessionid=4BC96C701B037E027705AD296B27734C?sequence=5>
4. Nunes JM, Oliveira EM, Vieira NFC. Hanseníase: conhecimentos e mudanças na vida das pessoas acometidas. *Ciênc Saúde Colet*. 2011;16(1):1311-8.
5. Cruz RCS, Bühere-Sékula S, Penna MLF, Penna GO, Talhari S. Hanseníase: situação atual, aspectos clínicos e laboratoriais, histórico de tratamento e perspectiva da terapia multidrogas uniforme para todos os pacientes. *An Bras Dermatol*. 2017;92(6):761-73.

6. World Health Organization. Global Health Observatory data repository [Internet]. Geneva: World Health Organization; 2018 [accessed on 2020 June 23]. Available from: https://apps.who.int/neglected_diseases/ntddata/leprosy/leprosy.html
7. Secretaria de Estado de Saúde de Minas Gerais (BR). Hanseníase tem cura e tratamento gratuito ofertado pelo SUS [Internet]. Belo Horizonte: Secretaria de Estado de Saúde de Minas Gerais; 2018 [accessed on 2018 Jan 23]. Available from: <https://www.saude.mg.gov.br/component/gmg/story/10211-hanseniasse-tem-cura-e-tratamento-gratuito-ofertado-pelo-sus>
8. Dornelles EA, Leonel TF, Nery IF. Hanseníase: avanços e desafios [Internet]. Brasília: Nesprom; 2014 [accessed on 2020 June 23]. Available from: <http://www.morhan.org.br/views/upload/hanseniasseavancoes.pdf>
9. Ministério da Saúde (BR), Departamento de Informática do SUS. Sistema de Informação Hospitalar (SIH) [Internet]. Brasília: Ministério da Saúde; 2018 [accessed on 2020 Apr 24]. Available from: <http://datasus.saude.gov.br/>
10. Organização Mundial da Saúde. Classificação estatística internacional de doenças e problemas relacionados à saúde - Décima Revisão. 8ª ed. São Paulo: Edusp; 2008.
11. Instituto Brasileiro de Geografia e Estatística. Estados: Minas Gerais - Censo 2010 [Internet]. Rio de Janeiro: IBGE [accessed on 2020 June 9]. Available from: <https://cidades.ibge.gov.br/brasil/mg/panorama>
12. Programa das Nações Unidas para o Desenvolvimento; Instituto de Pesquisa Econômica Aplicada; Fundação João Pinheiro. Atlas do Desenvolvimento Humano no Brasil [Internet]. Brasil: IPEA, PNUD, FJP [accessed on 2020 June 2]. Available from: http://www.atlasbrasil.org.br/2013/pt/perfil_uf/minas-gerais
13. Malachias I, Leles FAG, Pinto MAS. Plano Diretor de Regionalização da Saúde de Minas Gerais [Internet]. Belo Horizonte: Secretaria de Estado de Saúde de Minas Gerais; 2010 [accessed on 2020 June 23]. Available from: <https://www.saude.mg.gov.br/images/documentos/Livro%20Plano%20Diretor%20de%20Regionalizacao%20-%20ultima%20versao.pdf>
14. Borges MGL, Lopes GL, Nascimento GARL, Xavier MB. O cuidado hospitalar na hanseníase: um perfil do estado do Pará de 2008 a 2014. *Hansen Int.* 2015;40(1):25-32.
15. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde, Departamento de Vigilância das Doenças Transmissíveis. Diretrizes para vigilância, atenção e eliminação da hanseníase como problema de saúde pública: manual técnico-operacional [Internet]. Brasília: Ministério da Saúde; 2016 [accessed on 2020 June 23]. Available from: <http://portalarquivos2.saude.gov.br/images/pdf/2016/fevereiro/04/diretrizes-eliminacao-hanseniasse-4fev16-web.pdf>
16. Pinho RDB. Controle da hanseníase na atenção básica em saúde no Brasil: análise de fatores de estrutura e processo de trabalho [dissertation]. São Luís: Universidade Federal do Maranhão; 2017 [accessed on 2019 Apr 20]. Available from: <https://tedebc.ufma.br/jspui/handle/tede/tede/1237>
17. Rocha MCN, Lima RB, Stevens A, Gutierrez MMU, Garcia LP. Óbitos registrados com causa básica hanseníase no Brasil: uso do relacionamento de bases de dados para melhoria da informação. *Ciênc Saúde Colet.* 2015;20(4):1017-26.
18. Laurenti R, Jorge MHPM, Gotlieb SLD. Informação em mortalidade: o uso das regras internacionais para a seleção da causa básica. *Rev Bras Epidemiol.* 2009;12(2):195-203.
19. Cunha AC, Pereira RL, Almeida RMF. Características associadas ao abandono de tratamento da hanseníase: revisão integrativa [trabalho de conclusão de curso]. Porto Velho: Centro Universitário São Lucas; 2017.
20. Silva LMC, Surniche CA, Sicsú AN, Mitano F, Nogueira JA, Santos CB, et al. Elaboração e validação semântica de um instrumento de avaliação da transferência do tratamento diretamente observado como política de controle da tuberculose. *Rev Panam Salud Publica.* 2015;38(2):129-35.
21. Secretaria de Estado da Saúde de Minas Gerais (BR). A resolubilidade da assistência hospitalar micro e macrorregional na gestão do SUS-MG – 2003/2009 [Internet]. Belo Horizonte: Secretaria de Estado da Saúde de Minas Gerais; 2010 [accessed on 2020 Feb 10]. Available from: <https://saude.mg.gov.br/sus/page/400-a-resolubilidade-na-assistencia-hospitalar-sesmg>

22. Secretaria de Estado da Saúde de Minas Gerais (BR), Coordenadoria Estadual de Controle da Hanseníase. Plano de Enfrentamento da Hanseníase em Minas Gerais: 2019-2022 [Internet]. Belo Horizonte: UFMG, 2019 [accessed on 2020 June 15]. Available from: https://saude.mg.gov.br/images/noticias_e_eventos/000_2019/jun-jul-ago/Plano%20Estadual%20versao%20definitiva%20julho%202019_02-07.pdf
23. Gracie R, Peixoto JNB, Soares FBR, Hacker MAVB. Análise da distribuição geográfica dos casos de hanseníase. *Ciênc Saúde Colet*. 2017;22(5):1695-704.
24. Silva CLM, Fonseca SC, Kawa H, Palmer DOQ. Distribuição espacial da hanseníase no Brasil: uma revisão da literatura. *Rev Soc Bras Med Trop*. 2017;50(4):439-49.
25. Nazario AP, Ferreira J, Schuler-Faccini L, Fiegenbaum M, Artigalás O, Vianna FSL. Hanseníase no sul do Brasil: perfil epidemiológico de vinte anos. *Rev Soc Bras Med Trop*. 2017;50(2):251-5.
26. Barbosa DRM, Almeida MG, Santos AG. Características epidemiológicas e espaciais da hanseníase no Estado do Maranhão, Brasil, 2001-2012. *Medicina (Ribeirão Preto)* [Internet]. 2014 [accessed on 2020 Jan 10]; 47(4): 347-356. Available from: <http://www.periodicos.usp.br/rmrp/article/view/89579>
27. Vieira GD, Aragoso I, Carvalho RMB, Sousa CM. Hanseníase em Rondônia: incidência e características dos casos notificados, 2001 a 2012. *Epidemiol Serv Saúde*. 2014;23(2):269-75.
28. Ferreira SMB, Ignotti E, Gamba MA. Características clínico-laboratoriais no retratamento por recidiva em hanseníase. *Rev. Bras. epidemiol*. 2012; 15(3): 573-581.
29. Melo JP, Moraes MM, Santos NR, Santos TS. Perfil epidemiológico dos casos de Hanseníase de uma unidade de saúde. *Rev Saúde Colet*. 2017;7(1): 29-34.
30. Souza EA, Boigny RN, Ferreira AF, Alencar CH, Oliveira MLW, Ramos NA Júnior. Vulnerabilidade programática no controle da hanseníase: padrões na perspectiva de gênero no Estado da Bahia, Brasil. *Cad Saúde Pública*. 2018;34(1):00196216.
31. Nobre ML, Illarramendi X, Dupnik KM, Hacker MA, Nery JAC, Jerônimo SMB, et al. Multibacillary leprosy by population groups in Brazil: lessons from an observational study. *PLoS Negl Trop Dis*. 2017;11(2):0005364.
32. Santos DAS, Spessatto LB, Melo LS, Olinda RA, Lisboa HCF, Silva MS. Prevalência de casos de hanseníase. *Rev Enferm UFPE on line* [Internet]. 2017 out [accessed on 2020 June 20];11(10):4045-55. Available from: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/11324/13016>
33. Araújo RMS, Tavares CM, Silva JMOO, Alves RS, Santos WB, Rodrigues PLS. Análise do perfil epidemiológico da hanseníase. *Rev Enferm UFPE on line* [Internet]. 2017 set [accessed on 2020 Feb 12];11(9):3632-41. Available from: <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/234513>
34. Martins RJ, Carloni MEOG, Moimaz SAS, Garbin CAS, Garbin AJI. Sociodemographic and epidemiological profile of leprosy patients in an endemic region in Brazil. *Rev Soc Bras Med Trop*. 2016;49(6):777-80.
35. Ministério da Saúde (BR). Boletim epidemiológico: caracterização da situação epidemiológica da hanseníase e diferenças por sexo, Brasil, 2012-2016 [Internet]. Brasília: Ministério da Saúde; 2018 [accessed on 2018 Feb 27];49(4). Available from: <https://www.saude.gov.br/images/pdf/2018/janeiro/31/2018-004-Hanseniasse-publicacao.pdf>
36. Nogueira PSF, Marques MB, Coutinho JFV, Maia JC, Silva MJ, Moura ERF. Factors associated with the functional capacity of older adults with leprosy. *Rev Bras Enferm* [Internet]. 2017 [accessed on 2020 Feb 10];70(4):711-8. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672017000400711
37. Schneider PB, Freitas BHBM. Tendência da hanseníase em menores de 15 anos no Brasil, 2001-2016. *Cad Saúde Pública* [Internet]. 2018 mar [accessed on 2019 Nov 20];34(3):e00101817. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2018000305014
38. Ribeiro AF Júnior, Vieira MA, Caldeira, AP. Perfil epidemiológico da hanseníase em uma cidade endêmica no Norte de Minas Gerais. *Rev Bras Clin Med*. 2012;10(4):272-7.
39. Drumond EF, Machado CJ, Vasconcelos MR, França E. R. Utilização de dados secundários do SIM, Sinasc e SIH na produção científica brasileira de 1990 a 2006. *Bras Est Pop*. 2009;26(1):7-19.

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