



Survey of Hospitalizations due to Leishmaniasis in Adults during the Pre and Post COVID-19 Pandemic Periods in Feira de Santana, Brazil

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Authors' contributions

This work was carried out in collaboration among all authors. 'All authors read and approved the final manuscript.'

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ABSTRACT

Aims: Neglected tropical diseases, such as Visceral Leishmaniasis, affect over 1 billion people in tropical and subtropical regions, with Leishmaniasis being endemic in various parts of the world and causing up to 1 million new cases annually. It is crucial to investigate the decline in hospitalization cases in Feira de Santana and its possible linkage with the COVID-19 pandemic and local socioeconomic factors.

Study Design: An exploratory-descriptive bibliographic study with a qualitative approach.

Place and Duration of Study: Department of Health, Higher Education Unit of Feira de Santana, Feira de Santana (Bahia), during the first semester of 2024.

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Methodology: The bibliographic survey was conducted through searches of scientific productions on the proposed theme, from 2018 to 2024. Searches were performed using keywords in Portuguese and English with the Boolean operator "AND". In addition to literature review, the collection of secondary data was conducted by the Department of Health Informatics of the Unified Health System (DATASUS).

Results: The complex interaction among socioeconomic, environmental, and public health factors, exacerbated by the COVID-19 pandemic, impacts the dissemination, underreporting, and control of leishmaniasis, highlighting the urgent need for integrated approaches and strengthening of health systems to effectively address this neglected disease.

Conclusion: Therefore, it is concluded that the main causes may include reductions or delays in notifications, which can lead to difficulties in differentiating diseases with similar clinical presentations and even coinfections.

Keywords: Leishmaniose; pandemia; hospitalização.

1. INTRODUCTION

The World Health Organization defines neglected tropical diseases (NTDs) as a group of infectious and non-infectious diseases caused by bacteria, viruses, fungi, helminths, and protozoa that affect over 1 billion people mainly in tropical and subtropical regions in more than 149 countries. Most affected individuals live in high-risk settings, lacking access to basic sanitation, medical care, and specialized diagnosis, as they live on the fringes of society in primarily underdeveloped and emerging countries [1].

Leishmaniasis is an NTD caused by the protozoan *Leishmania* sp., with approximately 700,000 to 1 million new cases annually. Its main clinical manifestation is Visceral Leishmaniasis (VL), transmitted by the vector of sandflies [2]. VL, commonly known as kala-azar, is considered an endemic disease in more than 13 countries in the Americas, with over 90% of cases potentially leading to the patient's death if not promptly and correctly treated [3].

According to epidemiological data provided by SINAN, in 2022, Bahia had 70 confirmed cases of Visceral Leishmaniasis, whereas in the previous 4 years, in 2018, this number was four times higher (238). Additionally, the average number of cases of VL from 2018 to 2020 decreased from 6.67 cases to 3.33 cases in Feira de Santana compared to the period from 2020 to 2022. Therefore, it is important to trace the possible causes for this decline in the number of confirmed cases of the parasitic disease in the city.

In 2021, Brazil reported the highest number of coronavirus deaths in Latin America, and the Unified Health System (SUS) was heavily

impacted by the pandemic, as simultaneously, other parasitic diseases, such as Leishmaniasis, both emerging and reemerging, were present in Brazil due to its tropical climate and socioeconomic issues [4]. From 2020 until April 2022, there were 1,839,594 confirmed cases of coronavirus disease in Bahia, with over 30 thousand deaths [5].

Therefore, it is important to trace the possible causes of the decline in the number of hospitalization cases due to Leishmaniasis in recent years, the influence of the pandemic on the notification of these cases, and the socioeconomic profile of the affected individuals in Feira de Santana. The consequences of the COVID-19 pandemic on other diseases are a pertinent issue for study; thus, it is necessary to understand the city's epidemiological profile and the potential consequences of the pandemic in the coming years, considering that Feira de Santana is the largest city in the interior of the Northeast Region, with significant economic importance and population flow.

2. MATERIALS AND METHODS

The study was a exploratory-descriptive bibliographic study with a qualitative approach, and these data were used for the elaboration of the scientific article. According to Gil [6], bibliographic research is developed based on previously elaborated material, mainly consisting of books and scientific articles, meaning it is the theoretical survey of a specific subject based on information collected from different authors' reports on the topic.

A study is exploratory in nature when it involves bibliographic research, interviews with individuals who have had (or have) practical experiences

with the researched problem, and analysis of examples that stimulate understanding. Its basic purpose is to develop, clarify, and modify concepts and ideas for the formulation of subsequent approaches. Thus, this type of study aims to provide greater knowledge for the researcher about the subject, so that they can formulate more precise problems or create hypotheses that can be researched in subsequent studies [6].

According to Gonçalves [7], descriptive research records, analyzes, classifies, and interprets the observed facts, often establishing relationships between them. Regarding the approach, this study is qualitative. Minayo [8] describes qualitative research as one in which the researcher's concern is not directed towards the quantitative profile of the data, but rather towards the value of the information that can be collected, correlating phenomena and variables with reality, in order to understand this experience in deeper dimensions, encompassing creativity and directing towards the construction of scenarios and new perspectives within the same reality.

Data collection was carried out through bibliographic research conducted by searching scientific productions on the proposed theme, from 2018 to 2024. The inclusion criteria for content selection were those published in full accordance with the theme, documents, regulations, health entities' norms on the subject, articles published in Portuguese and English. Exclusion criteria included articles that were not relevant to the topic, duplicate materials, incomplete materials, debates, reviews, thesis, dissertations, abstracts, and materials unavailable in full. Literature search was performed in the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS), Scientific Electronic Library Online (SciELO), ScienceDirect, and PubMed. It is worth noting that the LILACS and BDNF

databases were consulted through the Virtual Health Library (BVS). Searches were conducted using the Health Sciences Descriptors (DeCS) from the Regional Library of Medicine (Bireme): Leishmaniasis, pandemic, and hospitalization, in Portuguese and English, using the Boolean operator "AND", as shown in Table 1.

Following this selection, data analysis proceeded in three stages: first, the selected keywords were searched together in the databases described in the flowchart (Fig. 1), where the researcher selects and evaluates articles based on the title; the second stage will involve reading the abstracts only with the articles that were selected based on the title, and a thorough reading of the text, meaning a meticulous and repeated review of all collected data, ensuring that the chosen studies address the content in its entirety; and the third stage will involve constructing categories for better data analysis through objective questions that guide the research.

At the end of the third stage, the categories of articles were organized into a table with the research objectives, which was filled with information obtained from the articles' readings, preserving all citations. To align with the results obtained from the review, the search for statistical data in Feira de Santana was conducted with the intention of investigating the pattern present in the literature.

The data on hospitalizations due to Leishmaniasis included in the results were obtained through the Notifiable Diseases Information System (SINAN), via the digital platform of the Department of Health Informatics of the Unified Health System (DATASUS), linked to the Ministry of Health (MS), on January 25, 2024, through the "hospital morbidity of SUS - 2018 to 2024" item, accessed via the TabNet tabulation tool [9].

Table 1. Descriptors used in bibliographic data searching

	Descriptor 01	Descriptor 02	Descriptor 03
Main Term	Leishmaniasis	Pandemic	Hospitalization
Alternative term	Infection, Leishmania Infections, Leishmania Leishmania Infection Leishmania Infections Leishmaniases	Pandemics	Hospitalizations

Source: own authorship

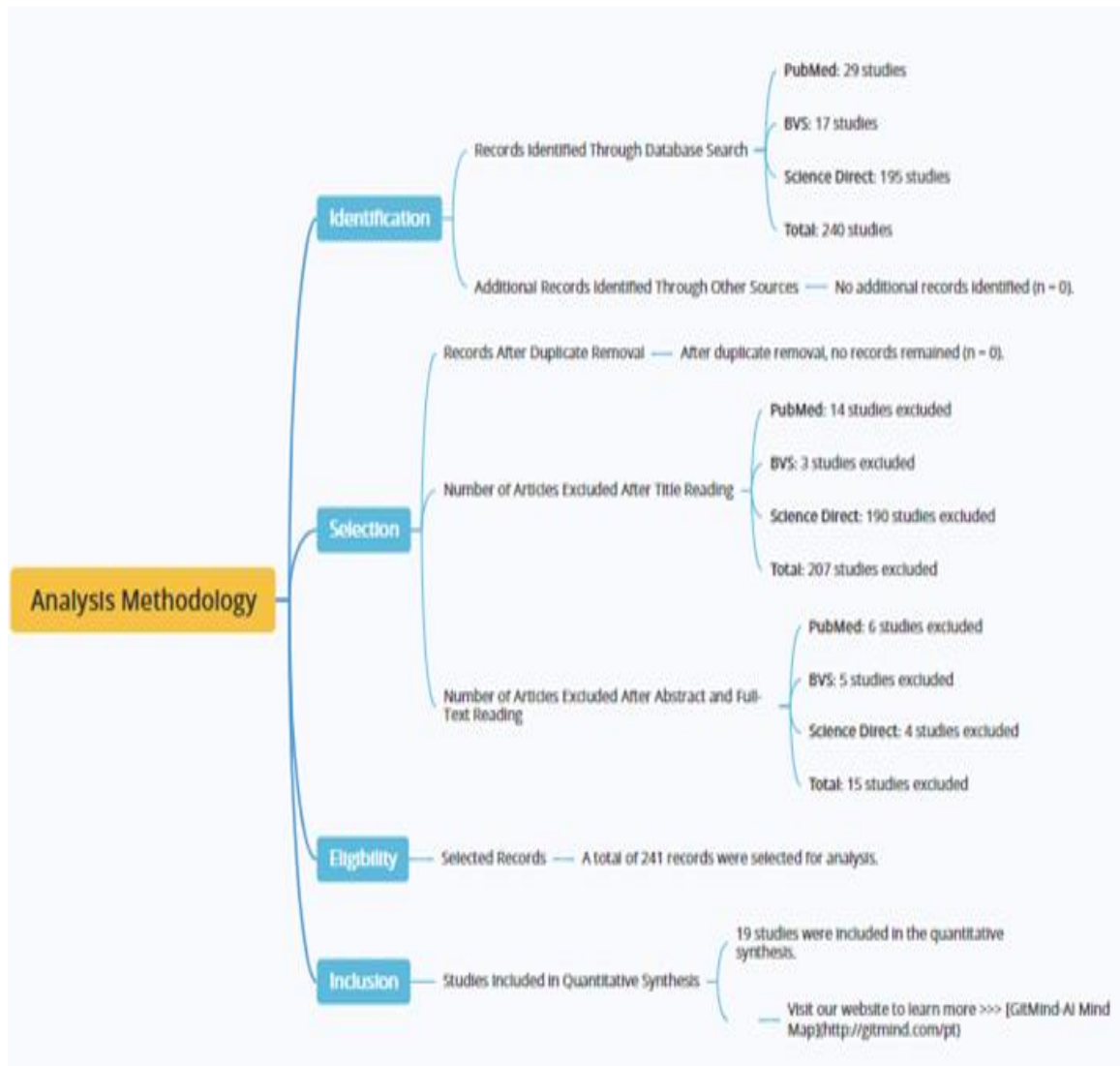


Fig. 1. Flowchart of the research strategy

3. RESULTS AND DISCUSSION

Leishmaniasis, a parasitic disease affecting millions worldwide, reflects the complex interaction between socioeconomic and environmental factors. Population impoverishment, lack of urban planning, population migration, and precarious living conditions, for example, significantly contribute to the disease's spread. Additionally, abrupt climate changes tend to worsen this scenario, creating an environment conducive to vector proliferation [10,11].

Another characteristic that negatively contributes to the aggravation of this scenario is underreporting, representing a significant challenge for understanding its full incidence and

developing effective control strategies. Inadequate surveillance systems and lack of preparedness among healthcare professionals and the community contribute to this underreporting, undermining public health efforts [12,13].

The COVID-19 pandemic has further exacerbated the situation of neglected tropical diseases, including leishmaniasis. Existing medical neglect and global disparities were intensified, resulting in delays in healthcare services, unmet demands, and underreporting, especially in developing nations like Brazil [14,15].

Given this scenario, it is important to adopt integrated approaches that consider not only

medical aspects but also socioeconomic, environmental, and cultural factors. This requires a renewed commitment to strengthening health systems, promoting sustainable development, and mitigating social inequalities to effectively address leishmaniasis and other neglected tropical diseases [1,2].

According to the data collected in the present study, in addition to social, health, and access disparities, along with other socioeconomic factors, medical aspects exacerbated primarily due to quarantine measures implemented during the COVID-19 pandemic, significantly increased the underreporting of vector-borne diseases such as Leishmaniasis. This occurs due to the prioritization of governmental investments in the new viral illness (such as vaccine production, ICU beds, production of diagnostic test kits, production of PPE), while parasitic diseases have faced neglect from the medical community. It is worth noting that the COVID-19 pandemic directly impacted health services and field actions, as surveillance and vector control activities for Leishmaniasis were not carried out as recommended by the Ministry of Health through the Leishmaniasis Surveillance and Control Manual [9,16].

According to the Epidemiological Bulletin of the Americas, by the Pan American Health Organization (PAHO), a comparison between the years 2020 and 2022 (pre and post COVID-19 pandemic) showed a reduction in reported cases in the post-pandemic period, which consequently explains the reduction in hospitalizations and delays in notifications and underreporting. In 2020, 16,432 cases were reported among the types of Cutaneous, Mucosal, and Unspecified Leishmaniasis. However, in 2022, after the pandemic period, there were 12,878 cases reported between Cutaneous and Mucosal Leishmaniasis.

It is evident that the COVID-19 pandemic has resulted in a significant diversion of health resources, especially in peripheral and developing countries, where healthcare systems were already fragile and fraught with challenges. Consequently, the management of Leishmaniasis was severely affected, with resources redirected to deal with the COVID-19 emergency, resulting in a lack of funding and attention to other neglected diseases [17,18]. Additionally, surveillance and monitoring strategies for Leishmaniasis control were weakened during the pandemic period, leading to

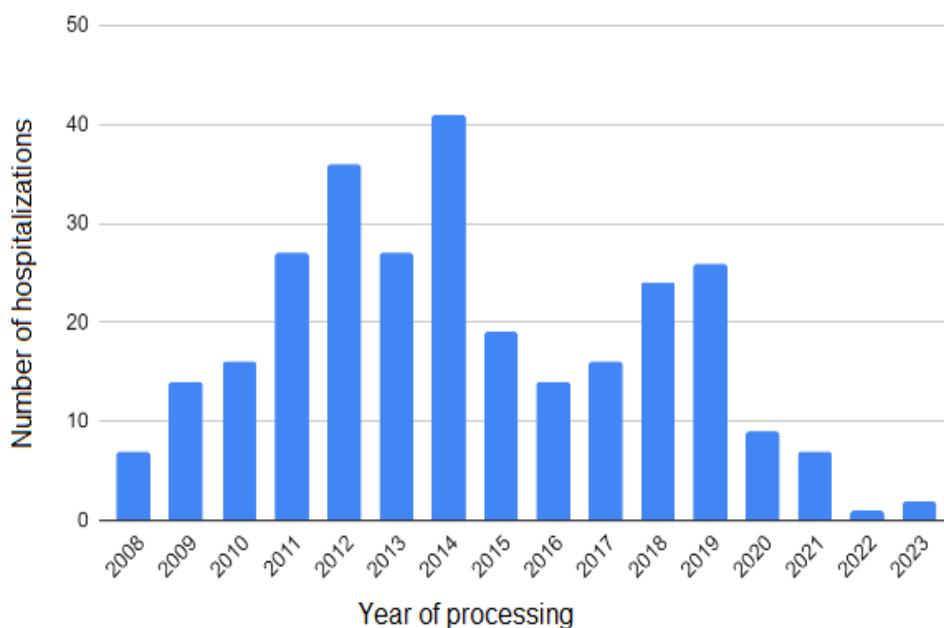
underreporting and delays in diagnosis and treatment of cases [10].

With the interruption of preventive measures and vector-borne disease control programs, there has been a significant decrease in the incidence of new cases of Leishmaniasis [1]. This interruption also resulted in diagnostic errors due to symptom similarity with COVID-19 and increased mortality from the parasitic disease due to the reduction in vector control tools [19].

Underreporting of Leishmaniasis cases was already a concern before the pandemic due to issues related to poor management, healthcare delivery, and delayed diagnosis. However, the situation worsened further during the pandemic, reinforcing Leishmaniasis' status as a neglected disease [15]. Additionally, the pandemic's impact was observed in the decrease in hospitalizations for Visceral Leishmaniasis and the reduction in Cutaneous Leishmaniasis cases, resulting in a significant decline in case reporting compared to previous years [20].

Amid the challenges faced, it is necessary to maintain Leishmaniasis surveillance and control measures, even during and after the pandemic, to prevent setbacks in progress achieved and mitigate the indirect effects of COVID-19. Resumption of preventive measures and control programs is essential to ensure progress in combating Leishmaniasis and other neglected diseases while addressing the COVID-19 pandemic [21].

The strain on the healthcare system caused by the COVID-19 pandemic was intensified with the simultaneous emergence of seasonal diseases. The system's collapse occurs due to the excess of severe patients compared to the number of available beds due to these diseases. Compared to the average hospitalizations over the three years prior to the pandemic (Graph 1), the reduction in notifications resulted in decreased hospitalizations for Visceral Leishmaniasis. Another factor leading to underreporting of febrile infectious diseases is coinfections. Parasitic diseases with symptoms similar to COVID-19 can lead to differential death notification and exacerbate the patient's clinical condition, as distinct pathologies can worsen the immune response against COVID-19. These underreportings resulted in decreased hospitalization rates and increased mortality rates [3].



Graph 1. Hospitalization cases due to Leishmaniasis from 2008 to 2023 in Feira de Santana, Bahia

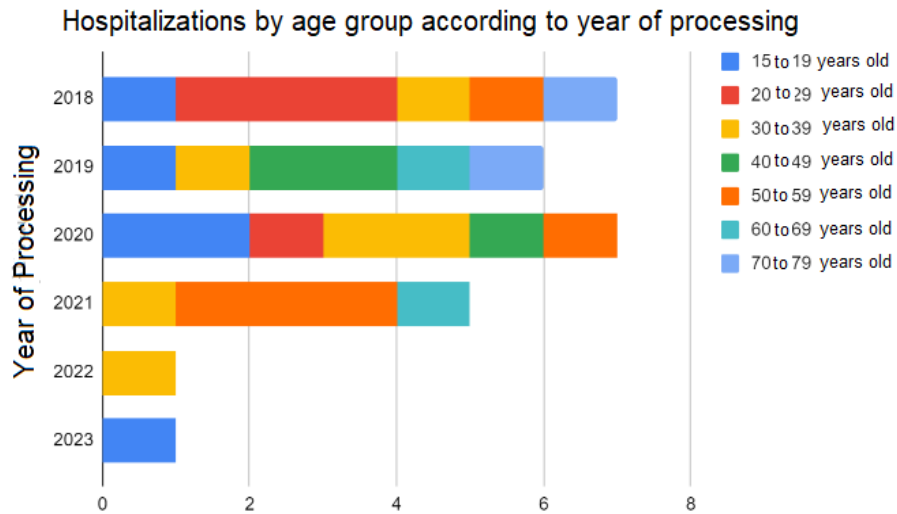
Despite the reduction in leishmaniasis cases, there has been an increase in the mortality rate from the parasitic disease because the transmission rate has increased due to the decrease in vector control tools, leading to more severe infections and hospitalizations. Due to underreporting or delayed reporting, the SUS-Hospital Information System (SIH-SUS) does not include all hospitalizations and deaths that occur in Brazil, making secondary data limited [18,22].

The insufficient funding and attention dedicated to neglected diseases, such as Leishmaniasis, result from a significant diversion of public health resources for COVID-19 control in underdeveloped and emerging countries. This diversion has increased underreporting, delays, and diagnostic and therapeutic errors, as well as reducing disease monitoring, surveillance, and control [23,24].

As a consequence, a decrease in hospitalization cases due to Leishmaniasis has been observed in several regions worldwide, meaning fewer clinical suspicions of the disease are occurring. The reductions in hospitalizations may result from failure to differentiate febrile illnesses, such as COVID-19 and Leishmaniasis, which can simultaneously affect the same patient. Additionally, the possibility of co-infection

increases the risk of only one disease being reported, explaining the reduction in hospitalizations [25,26,27].

As shown in the table (Table 2) available in the Epidemiology and Morbidity section, presented in Hospital Morbidity of the Hospital Information System of the Unified Health System (SIH/SUS), on the website of the SUS Informatics Department (DATASUS), hospitalizations for Leishmaniasis from January 2018 to January 2024, for the age group of 15-80 years and older (adult population), in the municipality of Feira de Santana, totaled 27, with only seven cases occurring after the COVID-19 pandemic in three years (2021-2023). Before the pandemic period, the average was six hospitalizations per year. The age group of 30 to 39 years had the most hospitalizations, with the majority of cases occurring before the pandemic period. After the pandemic (2022-2023), in addition to the reduction in hospitalizations, the age groups recorded varied from 15-19 years and 30-39 years, as shown in the graph below (Graph 2). The investigated diseases were grouped according to the International Classification of Diseases (ICD-10), including Visceral Leishmaniasis, Cutaneous Leishmaniasis, Mucocutaneous Leishmaniasis, and Unspecified Leishmaniasis [28-30].



Source: own authorship

Graph 2. Hospitalizations due to Leishmaniasis in the municipality of Feira de Santana, Bahia, by age group and year of processing

Table 2. Deaths from Leishmaniasis by age group from January 2018 to January 2024 in Feira de Santana, Bahia, Brazil

Year of processing	15 to 19 years old	20 to 29 years old	30 to 39 years old	40 to 49 years old	50 to 59 years old	60 to 69 years old	70 to 79 years old	Total
TOTAL	5	4	6	3	5	2	2	27
2018	1	3	1	-	1	-	1	7
2019	1	-	1	2	-	1	1	6
2020	2	1	2	1	1	-	-	7
2021	-	-	1	-	3	1	-	5
2022	-	-	1	-	-	-	-	1
2023	1	-	-	-	-	-	-	1

Source: Ministry of Health - Hospital Information System of the Unified Health System (SIH/SUS)

4. CONCLUSION

Before the COVID-19 pandemic, Feira de Santana, like other endemic areas, faced challenges with leishmaniasis. The disease was a public health concern in the region, with frequent cases reported among humans and animals. Health authorities were involved in control and prevention programs, such as combating the vector. However, the disease has always been considered neglected by epidemiologists in the region, as it was never properly controlled by public health promotion mechanisms, such as basic sanitation in the city's peripheral areas, which has always been neglected by public authorities. In conclusion, this study fulfills the objective of presenting the profile of post-pandemic hospitalizations, discussing that the main causes may be reductions or delays in notifications, which can

lead to difficulties in differentiating diseases with similar clinical presentations and even co-infections.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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