ORIGINATING PEOPLES IN THE STATE OF TOCANTINS: VISCERAL LEISHMANIASIS AND ITS EPIDEMIOLOGICAL ASPECTS

POVOS ORIGINÁRIOS NO ESTADO DO TOCANTINS: LEISHMANIOSE VISCERAL E SEUS ASPECTOS EPIDEMIOLÓGICOS

PUEBLOS ORIGINARIOS EN EL ESTADO DE TOCANTINS: LEISHMANIASIS VISCERAL Y SUS ASPECTOS EPIDEMIOLÓGICOS

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ABSTRACT

Visceral leishmaniasis (VL) is a severe zoonosis caused by protozoa of the Leishmania genus, transmitted through the bite of infected female phlebotomine sandflies. In Brazil, the disease has an endemic character and a heterogeneous distribution, with particular emphasis on the Northern Region, where environmental, social, and cultural factors directly influence its incidence. This study aims to analyze confirmed cases of visceral leishmaniasis in Indigenous populations in the state of Tocantins between 2015 and 2025, correlating the available epidemiological data with geographical and social variables. It is a descriptive and quantitative research based on secondary data extracted from the Notifiable Diseases Information System (SINAN/DATASUS). The results revealed the occurrence of the disease in four health regions of Tocantins, with a predominance in the Capim Dourado region, and showed a higher incidence among Indigenous individuals under 10 years of age. The findings reinforce the need for specific and continuous public policies aimed at prevention, early diagnosis, and monitoring of VL in Indigenous communities, especially in vulnerable and hard-to-reach territories.

Keywords: Visceral Leishmaniasis. Indigenous. Health. Epidemiology. Tocantins.

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RESUMO
A leishmaniose visceral (LV) é uma zoonose grave causada por protozoários do gênero Leishmania, transmitidos pela picada de flebotomíneos fêmeas infectadas. No Brasil, a doença apresenta caráter endêmico e distribuição heterogênea, com destaque para a Região Norte, onde fatores ambientais, sociais e culturais influenciam diretamente na sua incidência. Este estudo teve como objetivo analisar os casos confirmados de leishmaniose visceral em populações originárias no Estado do Tocantins, no período de 2015 a 2025, correlacionando os dados epidemiológicos disponíveis com variáveis geográficas e sociais. Foi uma pesquisa descritiva e quantitativa baseada em dados secundários extraídos do Sistema de Informação de Agravos de Notificação (SINAN/DATASUS). Os resultados revelaram ocorrência da doença em quatro regiões de saúde do estado do Tocantins, com predominância na região de Capim Dourado, além de evidenciar maior incidência em indivíduos indígenas menores de 10 anos de idade. Os achados reforçam a necessidade de políticas públicas específicas e contínuas voltadas à prevenção, diagnóstico precoce e monitoramento da LV em comunidades indígenas, especialmente em territórios vulneráveis e de difícil acesso.

Palavras-chave: Leishmaniose Visceral. Povos. Originários. Epidemiologia. Tocantins.

RESUMEN
La leishmaniasis visceral (LV) es una zoonosis grave causada por protozoos del género Leishmania, transmitida por la picadura de flebotominos hembras infectadas. En Brasil, la enfermedad presenta un carácter endémico y una distribución heterogénea, destacándose la Región Norte, donde los factores ambientales, sociales y culturales influyen directamente en su incidencia. Este estudio tiene como objetivo analizar los casos confirmados de leishmaniasis visceral en poblaciones indígenas del estado de Tocantins, en el período de 2015 a 2025, correlacionando los datos epidemiológicos disponibles con variables geográficas y sociales. Se trata de una investigación descriptiva y cuantitativa basada en datos secundarios extraídos del Sistema de Información de Enfermedades de Notificación Obligatoria (SINAN/DATASUS). Los resultados revelaron la ocurrencia de la enfermedad en cuatro regiones de salud de Tocantins, con predominio en la región de Capim Dourado, además de evidenciar una mayor incidencia en individuos indígenas menores de 10 años de edad. Los hallazgos refuerzan la necesidad de políticas públicas específicas y continuas dirigidas a la prevención, el diagnóstico precoz y el monitoreo de la LV en comunidades indígenas, especialmente en territorios vulnerables y de difícil acceso.

Palabras clave: Leishmaniasis Visceral. Salud. Indígena. Epidemiología. Tocantins.

1 INTRODUCTION

Visceral leishmaniasis (VL) is one of the most relevant neglected tropical diseases for global public health, with an estimated incidence of between 50 and 90 thousand new cases per year (World Health Organization, 2023). In Brazil, VL is predominantly caused by the species Leishmania infantum chagasi, whose transmission occurs through the bite of the infected female sandfly Lutzomyia longipalpis, a vector widely distributed in the North and Northeast regions of the country (Costa et al., 2020).

The territorial expansion of the disease has been associated with multiple factors, such as deforestation, disorderly urbanization, human migrations, and social vulnerability (Cavalcanti et al., 2021). In areas of greater vulnerability, such as indigenous communities, visceral leishmaniasis is more worrisome due to the scarcity of sanitary infrastructure, limitations in access to health services, and sociocultural barriers in diagnosis and treatment (Souza; Lima; Gomes, 2022).

According to the Pan American Health Organization (PAHO, 2023), about 97% of reported cases of VL in Latin America occur in Brazil, with the North and Northeast regions accounting for most of the notifications. The State of Tocantins, located in the transition zone between the Cerrado and the Amazon, has favorable environmental conditions for the proliferation of the vector, with a significant occurrence of the disease in rural and peri-urban areas (Almeida et al., 2024).

In addition to environmental determinants, recent studies show that the social component is essential in maintaining the endemic. Indigenous populations, for example, are disproportionately affected by tropical diseases due to low vaccination coverage, precarious housing, and direct contact with domestic and wild animals, considered potential reservoirs of the parasite (Ferreira; Oliveira; Nascimento, 2023).

The proposal of this research sought to contribute to the understanding of the spatial and temporal distribution of the disease, as well as to subsidize more efficient and culturally appropriate public policies for control and prevention. In view of this panorama, the research aimed to analyze the occurrence of visceral leishmaniasis in populations originating in the State of Tocantins, in the period from 2015 to 2025, based on official epidemiological data.

2 CONCEPTUAL ASPECTS

2.1 VISCERAL LEISHMANIASIS: OVERVIEW AND HISTORICAL OVERVIEW

Transmitted by vectors, leishmaniasis is categorized as a zoonosis, or as a subtype of the same disease, called anthropozoonosis. When zoonosis, the main parasitic host is animals, while in anthroponotic cases, the human being ends up serving as a secondary or

accidental reservoir, since the primary origin is in animals, with dogs and cats being the most common (Mesquita et al., 2024).

In this scenario, humans end up being a collateral host due to social and environmental factors, such as deforestation and urbanization, fostering vector dispersion and the occurrence of outbreaks (Saha, 2021).

The World Health Organization (2023) infers that the main means of transmission of visceral leishmaniasis is through the bite of female sandflies, belonging to the psychodidae family, and to the *phlebotominae* subfamily. The most present sandfly in Brazil belongs to the genus *Lutzomyia longipalpis*. While the predominant species in Africa and Asia are of the genus *Phlebotomus*.

2.2 *LUTZOMYIA LONGIPALPIS:* TAXONOMY AND ECOLOGY

The sandflies present in Latin America and Brazil, also called New World Sandflies, have their complex taxonomy explained by the classic author Forattini (1973), schematized in Table 1.

Table 1

Taxonomy of Sandflies

PHILO	CLASS	ORDER	SUBORDER	FAMILY	SUBFAMILY
Arthropoda	*Insecta*	*Diptera*	*Nematocera*	*Psychodidae*	***Phlebotominae***

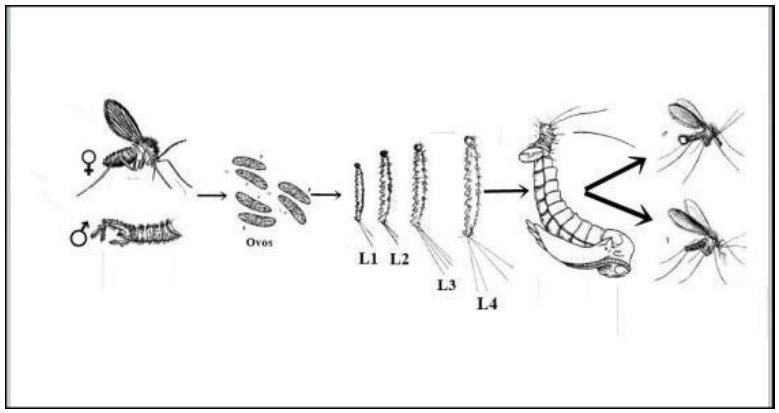
Source: (Prepared by the author, 2025). Adapted from FORATTINI (1973).

In some Brazilian regions they receive the popular name of "sandfly". However, these insects do not fit scientifically into the mosquito family, since their life cycle and morphology are different (World Health Organization, 2023).

Among all sandflies, those of the genus *Lutzomyia* are the most diverse and with the greatest distribution across endemic geographic spaces, containing 11 species and 15 subgenera (Bates et al., 2015). Its size is small, with an average size of 0.3 to 0.4 cm, and its development phases are divided into: egg; four larval stages; pupa is the adult and winged stage of the insect, as shown in Figure 1.

Figure 1

Biological cycle of the insect Lutzomyia longipalpis



Source: (Valença, 2015).

Eggs are deposited in organic matter located in humid and shady environments, whether domestic or not. Hatching occurs variably, depending on the amount of blood ingested by the female and also on the amount of substrate available, and can take from 7 to 17 days, with shorter periods where there are more favorable conditions (Sangiorgi et al., 2012)

Sales (2015) describes the insect *L. Longipalpis* in its adult stage, with a yellowish color and wings that kill themselves erect when at rest, as shown in Figure 2.

Figure 2

Female sandfly L. longipalpis feeding

Source: (Colins, 2011).

Its flight is classified as bouncy, its oral cavity, when in adulthood, serves to sting and sucking, and the diet of males and females is based on the intake of carbohydrates such as glucose and fructose from nectars and plant sap, serving as a source of energy for the execution of basic maintenance and reproduction activities. (Colins, 2011)

It is noteworthy that, even though she has a similar diet, only the female has hematophagous feeding directed to the maturation and laying of the eggs. The practice of

hematophagy usually occurs at night or twilight. Because they are not very selective, sandflies can feed on a varied group of invertebrate animals, which include humans (Sales, 2015).

2.3 VISCERAL LEISHMANIASIS IN HUMANS

Leishmaniasis is a serious vector-borne disease that has broad medical interest, being more common in dogs and, in some cases, in cats. In certain situations and epidemiological conditions, human beings can end up being contaminated and, therefore, the fight against visceral leishmaniasis represents a challenge for agents and agencies responsible for promoting public health (Margen, 2023).

In humans, symptoms can vary, the most recurrent being fever

constant weakness, marked weight loss, and other conditions such as pancytopenia (reduction of blood cells) and hepatosplenomegaly (considerable enlargement of the spleen and liver). When not identified and treated, the disease can have a considerably high lethality, especially in cases where the individual has an immunodeficiency such as HIV, or when it affects children (World Health Organization, 2023; Goswami et al., 2020).

It should be noted that infection by direct contact with body fluids such as blood and saliva of infected animals is unfounded, and that in humans, leishmaniasis infection occurs only when the individual is bitten by the infected female *Lutzomyia Longipalpis* mosquito (Rodrigues et al., 2025).

The most effective treatment indicated by the World Health Organization, due to its low toxicity, consists of the individual or combined use of amphotericin A or amphotericin B, which represent a significant advance in reducing treatment time and any associated costs. However, in regions with fewer resources, the most commonly used substances are pentavalents, which present greater risk, toxicity, and parasite resistance (Burza et al., 2022; Van Griensven et al. 2024).

The actions to combat VL are varied, and range from chemical control with insecticides, directed to residential areas to eliminate vectors in places where there are confirmed cases of leishmaniasis, to monitoring through databases and spreadsheets that help in directing actions and strategies (Costa, 2018).

Among the national leishmaniasis monitoring services, the Department of Information and Informatics of the Unified Health System (DATASUS), administered by the Brazilian Ministry of Health, stands out, with data and statistics provided and administered by all federative entities (states) of the country.

2.4 NATIVE PEOPLES OF THE STATE OF TOCANTINS

In Brazil, indigenous peoples "constitute societies with their own social organization, languages, customs, and traditions that distinguish them from the rest of national society" (FUNAI, 2023).

For Silva (2019, p. 45), "native peoples represent the civilizational basis of Brazil, expressing a cultural plurality that precedes and resists the colonial process", they are ethnic groups that inhabited the Brazilian territory before European colonization, having their own forms of social organization, languages, beliefs, productive systems and ways of relating to the environment (Silva, 2019, p. 45).

The State of Tocantins, located in the northern region of Brazil, has as its main biomes the Cerrado and the Amazon Forest. Created in 1988, it is the newest federative entity in the country, also known for housing nine indigenous ethnic groups, three of which are

who form the Iny people (Xambioá, Karajá and Javaé); added to six others; Avá-Canoeiros, Pankararu, Xerente, Krahô, Krahô-Kanela and Apinajè (TOCANTINS, 2021).

Reflecting on the health of indigenous peoples in Tocantins, it is imperative to recognize the complexities and magnitudes of this contemporary issue, but also that they be directed not only to the cultural diversity of the country, but also to enable us to take more effective measures to improve the health and well-being of these historically stigmatized peoples (RIOS; DA COSTA and DA COSTA, 2024).

3 MATERIALS AND METHODS

This was a quantitative, descriptive and documentary research**,** developed from the analysis of secondary data available in the Notifiable Diseases Information System (SINAN), accessed through the Department of Informatics of the Unified Health System (DATASUS).

The DATASUS system is fed by subsystems such as SINAN (Notifiable Diseases Information System). This system has records of diseases and injuries, carried out from 2007 onwards.

When selecting the State of Tocantins in the DATASUS system, the system divides the state into different health regions, coordinated by Regional Interagency Commissions (CIRs). The CIRs can be classified as instances composed of all the municipal health secretaries of a territory, with the proposal of promoting health at different levels of care, in addition to demonstrating the effectiveness of the SUS regionalization project (Silveira Filho, 2016)

In Tocantins, the CIRs operate in 8 health regions that were defined in CIBnº 161/2012 Resolution, covering a specific number of municipalities, as outlined in Table 02.

Table 2

Composition of the Health Regions (CIR) in the State of Tocantins

HEALTH REGION	NUMBER OF MUNICIPALITIES
Cerrado Tocantins Araguaia	23
Bico do Papagaio	24
Cantão	15
Capim Dourado	14
Ilha do bananal	18
Médio Norte Araguaia	17
Sudeste	15
Amor Perfeito	13
TOTAL	**139**

Source: (Prepared by the author, 2025). Adapted from the State of Tocantins, Resolution CIBnº 161/2012.

The spatial cut covered the State of Tocantins**,** and the time frame considered the period from 2015 to 2025**.** Information was collected regarding the distribution of confirmed cases of human visceralleishmaniasis among populations originating from the state of Tocantins. The spatial cut covered the State of Tocantins**,** and the time frame considered the period from 2015 to 2025**.** Information was collected regarding the distribution of confirmed cases of human visceral leishmaniasis among indigenous populations, including variables such as health region (CIR), municipality of residence, age group, and gender.

The tabulation and organization of the data were performed with the aid of electronic spreadsheets, allowing the elaboration of tables and graphs for descriptive statistical analysis. The study used as comparative parameters the regional classifications of the IBGE (2017) and CIB Resolution No. 161/2012, which defines the health regions of Tocantins.

As this is a study based on secondary data in the public domain, there was no need to submit it to the Research Ethics Committee, as established by Resolution No. 510/2016 of the National Health Council (Brasil, 2016).

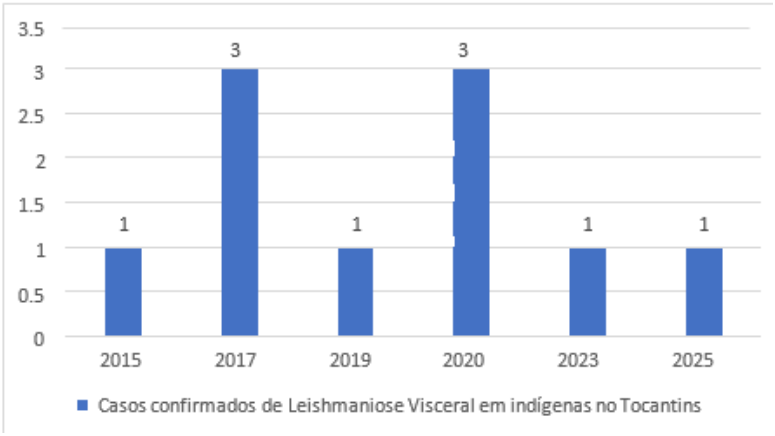
4 RESULTS AND DISCUSSIONS

The research encompassed the health regions of the State of Tocantins (CIR), and all periods within the pre-established time frame (2015-2025). A total of 10 confirmed cases of VL were found in the entire study area.

The temporal analysis of confirmed cases of visceral leishmaniasis in indigenous people, delimited between the periods of 2015 and 2025, showed a mild oscillation over the periods studied, as shown in Figure 3. For the periods of 2016, 2018, 2021, 2022 and 2024, no confirmed cases were recorded in the search source of the survey.

Figure 3

Total number of confirmed VL cases in the indigenous population in Tocantins by period.



Source: (Prepared by the author, 2025).

In the periods of 2017 and 2020, the highest number of confirmed cases of VL in the indigenous population was identified. The graphical analysis also reveals a continuous oscillation between the periods, with a slight stabilization in the number of cases in the last 3 years analyzed.

Among the health regions in the state of Tocantins, the region with the highest number of notifications of confirmed VL cases in indigenous people was the Capim Dourado CIR with 5 of the confirmed cases, as shown in Table 3.

Table 3

Confirmed cases of VL in indigenous people according to time lapse 20-2025 and health regions (CIR) – Tocantins

HEALTH REGIONS (CIR) TOCANTINS					
YEAR NO TIFICATION	**MIDDLE NORTH ARAGUAIA**	**BEAK OF PARROT**	**BANANAL ISLAND**	**GOLDEN GRASS**	**TOTAL BY LV CONFIRMED CASES**
2015	0	0	0	1	**1**
2016	0	0	0	0	**0**
2017	1	1	1	0	**3**
2018	0	0	0	0	**0**
2019	0	0	0	1	**1**
2020	1	0	0	2	**3**
2021	0	0	0	0	**0**
2022	0	0	0	0	**0**
2023	0	1	0	0	**1**
2024	0	0	0	0	**0**

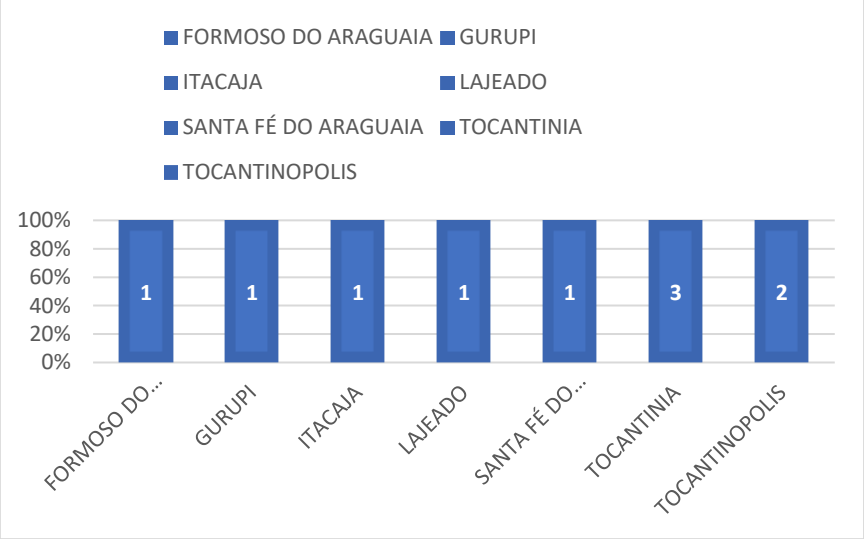
2025	0	0	0	1	**1**
SUBTOTAL	2	2	1	5	**10**

Source: (Prepared by the author, 2025).

Of the total of 10 confirmed cases of VL in the study period, Figure 4 shows in which municipalities of residence the cases were confirmed.

Figure 4

Confirmed cases of VL in the indigenous population by municipalities in the state of Tocantins



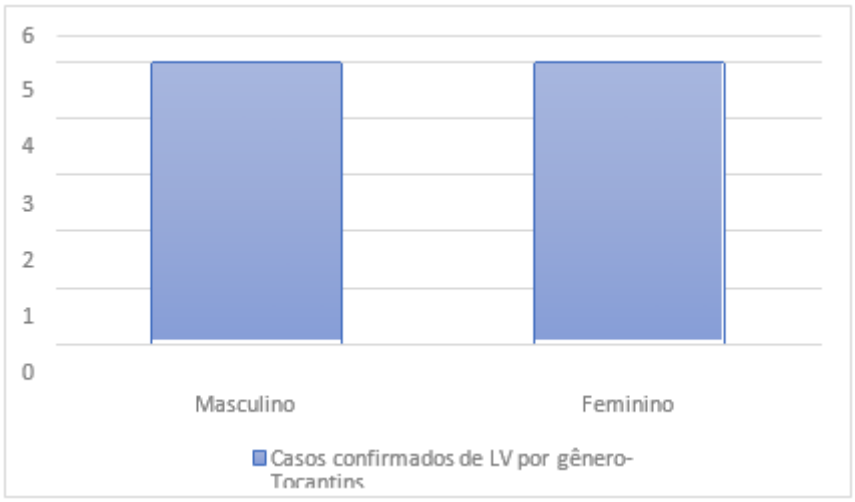
Source: (Prepared by the author, 2025).

The municipality of Tocantínia, located on the right bank of the Tocantins River, in the central region of the State of Tocantins, had the highest number of case records. In this region is the territory of the Xerente people. The second municipality with the most records was Tocantinópolis, located in the north of the State of Tocantins, where the territory of the Apinajé people is located.

Another variable analyzed based on the data studied was gender, represented in Figure 5. A bilateral analysis of the information reveals that the number of infections, both for males and females, is proportionally equal.

Figure 5

Confirmed VL cases in indigenous people by gender in the state of Tocantins, 2015 to 2025



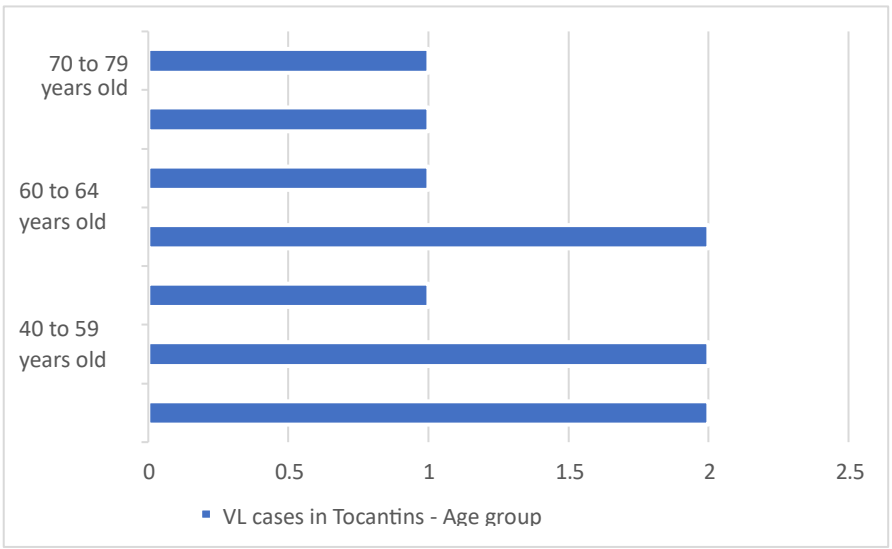
Source: (Prepared by the author, 2025).

The result discards the idea that the biological factor directly influenced the increase or decrease in the rates of infection by the protozoan. On the other hand, the age groups of the individuals show a distribution with more visible contrasts.

Figure 6 shows and highlights the distribution of cases by age group, and is almost uniform, and accentuated in three of the seven age groups studied, namely: <1 year, 1-4 years, and 20 to 39 years. However, when adding the age groups <1 year, 01 to 04 years and 05 to 09 years. It is noted in this analysis that confirmed cases of VL are accentuated in children under 10 years of age.

Figure 6

VL cases in indigenous people, in the state of Tocantins, by age group



Source: (Prepared by the author, 2025).

5 CONCLUSION

The study showed that visceral leishmaniasis remains an important public health problem in the State of Tocantins, especially among indigenous populations. The predominance of confirmed cases in children under ten years of age and the geographic concentration in certain regions, such as Capim Dourado and Médio Norte Araguaia, suggest the persistence of structural and environmental vulnerabilities.

Biological factors such as gender do not demonstrate a direct influence on the increase or decrease in confirmed cases, which highlights the importance of multifaceted analyses.

The data reinforce the need for intersectoral actions aimed at vector control, and the reinforcement of continuous epidemiological surveillance, in addition to health education among native peoples. The adoption of culturally sensitive strategies, the strengthening of primary care, and the training of local Community Health Agents (CHA) and Endemic Disease Control Agents (ACE's) can represent effective measures to reduce the disease.

Finally, recommendations include the continuation of epidemiological and geospatial studies to understand the dynamics of VL and guide long-term public policies, in line with the principles of equity and universality of the Unified Health System (SUS).

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