ISSN 2316-9281

Scientific Electronic Archives
Issue ID: Vol.19, January/February 2026, p. 1-10
DOI: http://dx.doi.org/10.36560/19120262125
+ Corresponding author*:* bruno.sanchez@ufmt.br

Prevalence of American Cutaneous Leishmaniasis in the municipality of Sinop, Mato Grosso, from 2010 to 2022.

Nayara Silva de Azevedo, Karla de Sena Guedes, Bruno Antonio Marinho Sanchez +

Universidade Federal de Mato Grosso, Campus Sinop

Abstract. American Tegumentary Leishmaniasis (ATL) remains endemic in the state of Mato Grosso, Brazil, with persistent high incidence in the municipality of Sinop. Despite the availability of diagnostic and therapeutic tools, ATL continues to represent a major public health challenge in the region. A descriptive epidemiological study was conducted using confirmed ATL cases reported in Sinop between 2010 and 2022. Variables analyzed included sex, age, ethnicity, schooling, residence area, diagnostic criteria, clinical forms, autochthony, temporal distribution, and clinical outcomes. Data were obtained from the Brazilian Notifiable Diseases Information System (SINAN). A total of 1,354 cases of ATL were confirmed during the study period. The disease predominantly affected males (≈85%), individuals of pardo ethnicity (≈45%), with low to intermediate schooling, and within the productive age group of 20–39 years (≈45%). Both urban and rural residents were affected. The cutaneous form represented >95% of diagnoses. Most cases were confirmed by laboratory criteria (90.9%), while the clinical-epidemiological method accounted for <10%. Regarding evolution, cures were recorded in 66.3% of patients, but a considerable proportion of outcomes remained ignored (31.2%). Temporal analysis revealed persistent annual transmission with seasonal peaks during the dry months (July–August) and a predominance of autochthonous cases (67.1%). ATL in Sinop exhibits a classic epidemiological profile, affecting predominantly young male adults of pardo ethnicity with low schooling, and shows persistent endemic transmission. The predominance of laboratory-based diagnosis reflects advances in surveillance capacity, although the high proportion of ignored outcomes underscores limitations in case follow-up. Continuous surveillance, prevention, and control measures are essential to reduce the disease burden and interrupt local transmission.
Keywords: Cutaneous Leishmaniasis; Epidemiology; Sinop; Mato Grosso

Introduction

Leishmaniasis is a parasitic disease that constitutes a significant public health concern in Brazil. Caused by protozoa of the genus Leishmania and transmitted by phlebotomine sandflies, the disease exhibits diverse clinical manifestations and affects individuals of all age groups across various regions of the country. Its endemicity and wide geographic distribution have maintained leishmaniasis as a persistent focus of surveillance and intervention for public health authorities.

The etiological agent, Leishmania spp., was first identified in 1903 by Leishman and Donovan (reviewed by Herwaldt, 1999). The parasite alternates between two morphologically distinct forms throughout its life cycle: the promastigote, a motile extracellular form present in the midgut of the vector, and the amastigote, a non-flagellated intracellular form that resides within phagocytic cells of the vertebrate host.

Transmission to mammalian hosts, including humans, primarily occurs through the bite of infected female sandflies (family Psychodidae). Following inoculation into the dermis, promastigotes are phagocytosed by dendritic cells and macrophages and differentiate into amastigotes, which replicate within the phagolysosomes (Chappuis et al., 2007). The parasites subsequently disseminate via the lymphatic and hematogenous routes, targeting monocytes and macrophages within the reticuloendothelial system, including the bone marrow, liver, spleen, and, in some cases, lymph nodes.

Clinically, leishmaniasis encompasses a spectrum of syndromes, including localized cutaneous leishmaniasis (CL), characterized by ulcerative lesions at the site of inoculation; diffuse

cutaneous leishmaniasis (DCL), presenting with widespread non-ulcerative nodules; mucosal leishmaniasis (ML), marked by progressive mucosal tissue destruction; and visceral leishmaniasis (VL), a systemic form involving reticuloendothelial organ infiltration (Reithinger et al., 2007).

The establishment and progression of Leishmania infection are influenced by a combination of parasite virulence factors, vector competence, host genetic susceptibility (Croft et al., 2003), as well as inoculum size and route of infection. Over the past two decades, the global incidence of all clinical forms of leishmaniasis has increased. Consequently, the disease is considered emerging in some regions and re-emerging in others (Ashford, 2000). Multiple factors contribute to this epidemiological trend. Reithinger (2007) identified environmental changes, immunosuppression, and treatment failures as major drivers of disease expansion. Shaw (2007) further emphasized the complex interactions between vector species, reservoir hosts, and human populations, which modulate host immunity and influence the likelihood of symptomatic infection.

Leishmaniasis is endemic in over 60 countries across Africa, Europe, Asia, and the Americas (Murray, 2002). As reviewed by Piscopo and Mallia (2006), it ranks among the parasitic diseases with the highest global mortality. Leishmaniasis is endemic in 88 countries in the world, and 350 million people are considered at risk (WHO, 2006). An estimated 14 million people are infected, and each year about two million new cases occur. (Riebenbauer et al., 2024). In the Americas, the disease remains a pressing public health issue, with over 300,000 cases reported each year (Maia-Elkhoury et al., 2016; PAHO, 2022). In Brazil, more than 14,000 cases were recorded in 2022 (Brasil and Franco, 2023).

There is a limited number of studies evaluating the incidence of American tegumentary leishmaniasis (ATL) in municipalities within the state of Mato Grosso. In 2021, the state of Mato Grosso reported over 1,300 cases of American tegumentary leishmaniasis (ATL) (PAHO, 2022). Although numerous studies have addressed the incidence of ATL in Brazil over the past decades, epidemiological data specific to the northern region of Mato Grosso remain limited (Moura et al., 1999; Azevedo et al., 2002; Nobre et al., 2013). This data gap highlights the need for localized epidemiological assessments. Sinop serves as a central urban and economic hub in the northern region of Mato Grosso, encompassing a network of more than 15 surrounding municipalities. The city's rapid growth and the expansion of regional activities have contributed to an increased number of ATL cases, underscoring the epidemiological relevance of studying the disease in this Amazonian context (Basano and Camargo, 2004). A comprehensive understanding of the disease's distribution in specific areas is essential to inform targeted control strategies and to mitigate the public health burden associated with ATL. Therefore, the present study aimed to assess the prevalence of ATL in the municipality of Sinop.

Material and Methods

Study Type

This research is descriptive in nature and employs a quantitative approach. According to Lakatos (2007), descriptive studies are a type of empirical investigation aimed at characterizing the attributes of a given population or phenomenon, or at identifying potential relationships among variables. The present study seeks to generate data to test specific hypotheses, applying quantitative methods to systematically collect and analyze information related to the population or phenomenon under investigation.

Study Location

The present study was conducted in the municipality of Sinop, located in the state of Mato Grosso, in the southern portion of Brazil's Central-West region. The city is situated at geographic coordinates 11º50'53" S latitude and 55º38'57" W longitude, at an elevation of 384 meters above sea level, on a predominantly flat terrain. Sinop encompasses a total area of 3,942.2 km² and, according to the 2021 census by the Brazilian Institute of Geography and Statistics (IBGE), has a population of 196,067 inhabitants.

Instrument and Data Collection

This study analyzed all reported cases of autochthonous American Tegumentary Leishmaniasis (ATL) in the municipality of Sinop between January 2010 and December 2022. Data were obtained from DATASUS (Department of Information Technology of the Unified Health System), which is responsible for providing information systems and IT support to the Brazilian Unified Health System (SUS) for planning, operational, and monitoring purposes.

DATASUS enables the entry and analysis of data via the internet and subsequently provides access to epidemiological summaries. These allow for timely and efficient epidemiological analysis, improving the quality, flow, and timeliness of information at the municipal, state, and national levels—thus supporting the implementation of appropriate and timely disease control measures. For this study, ATL data were retrieved specifically from the SINAN (Notifiable Diseases Information System) database available through DATASUS.

Statistical analysis

ATL notification data archived in the SINAN system from 2010 to 2022 were evaluated, analyzed, and interpreted. The objective was to extract and examine variables including: frequency and incidence of the disease (differentiating autochthonous and imported cases), year of diagnosis (2010–2022), cure criteria, case outcome, clinical form of ATL, age group, month of diagnosis,

sex (male; female), area of residence (urban; rural), and self-declared ethnicity (white; black; mixed race).

The data was tabulated and organized in Microsoft Excel 365 spreadsheets. Graphs and tables were subsequently generated to facilitate the visualization of the most relevant epidemiological patterns for further analysis and discussion.

Results and discussion

American cutaneous leishmaniasis (ACL) has been reported in all Brazilian states and is among the most prevalent dermatological diseases in the country. In Brazil, it is considered a priority public health problem due to its magnitude, the risk of disfiguring lesions, and the associated psychological, social, and economic impacts. In most cases, ACL can be classified as an occupational disease, given its strong association with rural and forest-related activities (Brazil, 2017).

Based on data from the Notifiable Diseases Information System (SINAN), a 12-year retrospective analysis (2010–2022) was conducted, incorporating several epidemiological indicators. Figure 1 illustrates the annual distribution of confirmed ACL cases in the municipality of Sinop, Mato Grosso, between 2002 and 2022. Orange bars represent the absolute number of cases per year of diagnosis, while the red line depicts the three-year moving average, highlighting temporal trends. From 2010 onward, there was a marked increase, particularly between 2010 and 2017, when annual cases ranged from 83 to 138, representing the peak of transmission. After 2017, the incidence progressively declined, reaching 41 cases in 2022. Overall, 1,354 cases were confirmed during the study period, showing a heterogeneous temporal distribution characterized by a sustained period of high incidence followed by a consistent decline in recent years.

According to the Ministry of Health (2012), the incidence of ACL in Sinop was nearly 4.5 times higher than the average for the northern region of Brazil. Nobres et al. (2013) suggested that this elevated incidence may be linked to occupational activities common in the region (mining, logging, and agriculture), the extensive deforestation process for pastureland, the establishment of agricultural settlements near forested areas, and climatic conditions favorable to vector development.

By analyzing the temporal distribution, it was observed that cases occurred throughout all months of the year, indicating continuous transmission in the region (Table 1).

However, the frequency of notifications varied over the years. The months of August (n=186; 13.7%) and July (n=154; 11.4%) had the highest number of reported cases during the study period, indicating a mid-year peak, particularly in the dry season. In contrast, the lowest records were observed in December (n=57; 4.2%) and May (n=81; 6.0%). The remaining months maintained intermediate frequencies, ranging from 84 to 142 cumulative cases (Figure 2).

In total, 1,354 cases were reported between 2010 and 2022, confirming that although ATL occurs year-round, there is a marked seasonality characterized by an increase in notifications during the central months (June to September) and a decline at the end of the year (November to December). Temporal analysis demonstrates that American cutaneous leishmaniasis (ACL) is transmitted continuously throughout the year in Sinop, Mato Grosso, with no seasonal interruption, which is consistent with stable transmission cycles in the Amazon region (Brazil, 2017; WHO, 2023).

Nonetheless, a variation in case intensity was observed according to the month of notification, with peaks in July and August, coinciding with the dry season in northern Mato Grosso. This pattern is consistent with previous studies conducted in the Brazilian Amazon, which identified higher transmission risks during drier months, possibly related to changes in vector behavior and greater human exposure during rural and extractive activities (Guerra et al., 2015). Conversely, the lower-case numbers in December and May suggest that climatic factors, such as increased rainfall and the consequent reduction in sandfly density, may play a role in reducing transmission (Brazil, 2017; Cordeiro et al., 2019).

Previous studies also indicate that sandfly abundance and natural infection rates exhibit marked seasonal fluctuations, which directly influence the epidemiological dynamics of ACL (Cruz et al., 2013; Saraiva et al., 2017). Moreover, the persistence of cases across all months suggests that transmission does not rely exclusively on seasonal peaks, but reflects an endemic scenario sustained by intense interactions among hosts, vectors, and reservoirs (WHO, 2023; Maia-Elkhoury et al., 2018).

Table 2 shows that a higher proportion of males were reported and diagnosed with American cutaneous leishmaniasis (ACL) (85.4% and 84.4%, respectively), with individuals aged 20–39 years accounting for the largest share of cases (45.3%). This finding is consistent with the epidemiological profile of ACL described in other endemic regions of Brazil, where young adult men are at greater risk due to occupational exposure related to agriculture, deforestation, and extractive activities, which favor contact with phlebotomine vectors (Guerra et al., 2015; Brasil, 2017). The predominance of cases in the economically active age group reinforces the strong link between disease occurrence and labor-related activities. Previous studies in the Amazon and other endemic regions likewise demonstrate that ACL disproportionately affects young adults because of their greater involvement in high-risk environments, including forested and peri-urban areas (Silva et al., 2014; Maia-Elkhoury et al., 2018).

With respect to ethnicity, higher frequencies were observed among mixed-race (≈45%) and white (≈44%) individuals. This distribution partly reflects

the demographic composition of the local population but also suggests that exposure is not restricted to specific ethnic groups; rather, it is closely associated with socioeconomic and occupational determinants (Brasil, 2017; WHO, 2023).

Analysis of education level revealed that ACL most frequently affected individuals with incomplete middle school (5th to 8th grade, 18.9%) and those with completed high school (18.8%). This intermediate educational profile supports the hypothesis that ACL is associated with socially vulnerable populations, engaged in high-risk activities but lacking adequate protection—such as the use of personal protective equipment (PPE) or full access to preventive measures (Cordeiro et al., 2019; Santos et al., 2020).

Taken together, these findings reinforce the classic epidemiological profile of ACL: a disease that disproportionately affects young, mixed-race and white adult males with intermediate education, a pattern consistently identified in Brazil and other Latin American countries and strongly linked to occupational and environmental risk factors.

Figure 3 shows the distribution of confirmed cases of American cutaneous leishmaniasis (ACL) in Sinop, Mato Grosso, according to the autochthony criterion between 2010 and 2022. Cases were classified as autochthonous (local occurrence), non-autochthonous (imported from other municipalities/states), and undetermined (no conclusive information). During this period, 1,354 cases were recorded, of which 909 (67.1%) were autochthonous, 346 (25.6%) non-autochthonous, and 99 (7.3%) undetermined. Local transmission predominated in all years, with the highest absolute number of cases in 2014 (n=136) and 2015 (n=134), confirming the persistence of active transmission in the region. This finding is consistent with the epidemiological profile described in other endemic areas of the Legal Amazon, where autochthonous transmission is predominant and sustained by environmental and occupational factors that favor contact between humans, vectors, and reservoirs (Alvar et al., 2012; Kaye & Scott, 2011).

The proportion of non-autochthonous cases remained relatively stable over time, ranging from 5 to 43 annually, representing an important contingent for understanding regional transmission dynamics. Although smaller in proportion (25.6%), these cases highlight the role of migratory flows and population mobility in high-risk contexts. Similar findings have been reported in national studies linking ATL occurrence to activities such as deforestation, agriculture, mining, and construction, which facilitate the geographic expansion of the disease (Buitrago et al., 2019; Castañeda-Capote et al., 2020).

Undetermined cases (7.3%) were concentrated in 2010 (n=23) and 2019 (n=24), when they represented >15% of all notifications. These peaks reflect limitations in data completeness and reporting quality, as documented in evaluations of Brazil's health information systems (Martins-Melo et al., 2018; PAHO, 2022). Such gaps underscore the need to strengthen surveillance and ensure more reliable case records.

A declining trend in total cases after 2018 was also identified, which may be associated with changes in socio-environmental determinants, intensified surveillance measures, or natural fluctuations in the epidemiological cycle. Nevertheless, this reduction does not eliminate the need for sustained control strategies, as autochthonous transmission remains the primary mechanism of ACL occurrence in Sinop, with significant epidemiological impact at the regional level (Reithinger et al., 2007; WHO, 2023).

The Ministry of Health establishes that cases of American cutaneous leishmaniasis (ACL) must be confirmed using either clinical-laboratory or clinical-epidemiological criteria (Brazil, 2019). Figure 4 shows the distribution of confirmed ACL cases in Sinop, Mato Grosso, from 2010 to 2022, according to the confirmation criteria applied at notification and diagnosis.

Most cases were confirmed by clinical-laboratory methods, totaling 1,231 records (90.9%), reflecting advances in the healthcare network and the increasing availability of diagnostic tools in Brazil. Laboratory confirmation has relied on parasitological and histopathological techniques and, more recently, on molecular methods such as PCR, which provide higher sensitivity and specificity (Romero & Boelaert, 2010; Schubach et al., 2020). In contrast, only 123 cases (9.1%) were confirmed by clinical-epidemiological criteria.

Although laboratory methods clearly predominate, clinical-epidemiological diagnosis remains relevant in contexts with limited access to laboratory testing, such as remote areas or outbreak situations. In such scenarios, well-conducted epidemiological investigations can reduce diagnostic delays and ensure timely treatment (Arana et al., 2017; Bailey et al., 2017). Therefore, the findings in Sinop reflect adherence to national and international guidelines, in which laboratory confirmation is prioritized to strengthen diagnostic accuracy, while the complementary role of clinical-epidemiological criteria is acknowledged for specific situations.

When analyzing the evolution of American cutaneous leishmaniasis (ACL) cases in Sinop (2010–2022), most patients were classified as cured (66.3%), confirming the therapeutic effectiveness of appropriate treatment. This pattern is consistent with findings from other endemic regions of Brazil, where cure rates frequently exceed 60%, depending on access to early diagnosis and adherence to therapy (Amato et al., 2008; Brito et al., 2019).

Nevertheless, a considerable proportion of cases were recorded as "unrecognized" (31.2%), reflecting weaknesses in health information systems and gaps in data completeness. Similar limitations have been reported in national analyses of SINAN, where the high frequency of missing fields hinders accurate assessment of clinical outcomes and compromises the monitoring of public health policies (Martins-Melo et al., 2018; Henn et al., 2021).

Other outcomes occurred at lower frequencies, including treatment abandonment (0.7%), transfer (0.7%), change of diagnosis (0.4%), and mortality related to ACL (0.2%). Although rare, mortality underscores the potential severity of the disease, particularly in mucosal forms or in patients with comorbidities (Gontijo & Carvalho, 2003; Bailey et al., 2017). Treatment abandonment also represents a relevant challenge and may be related to drug-related adverse events or barriers in accessing healthcare services (PAHO, 2022; Romero & Boelaert, 2010).

Table 1. Temporal distribution of American Cutaneous Leishmaniasis (ACL) cases in Sinop-MT, from 2010 to 2022.

Year	***Months***											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2010	9	7	12	13	7	9	13	19	16	11	14	4
2011	6	4	7	4	6	11	8	12	4	3	9	7
2012	4	3	7	10	5	13	11	17	17	15	6	7
2013	3	7	5	8	11	7	8	16	16	11	11	3
2014	6	13	8	15	12	4	19	21	14	12	12	-
2015	13	4	9	10	6	13	21	29	8	8	9	4
2016	10	8	9	12	3	9	17	10	16	10	18	7
2017	11	8	12	6	9	13	9	14	9	12	17	7
2018	12	11	10	10	7	6	21	12	11	10	7	7
2019	8	4	6	7	6	8	13	15	13	10	6	2
2020	8	8	4	4	4	4	8	8	10	10	3	3
2021	7	4	3	5	3	2	4	6	6	3	6	4
2022	3	3	2	4	2	6	2	7	2	8	2	2
TOTAL	**100**	**84**	**94**	**108**	**81**	**105**	**154**	**186**	**142**	**123**	**120**	**57**

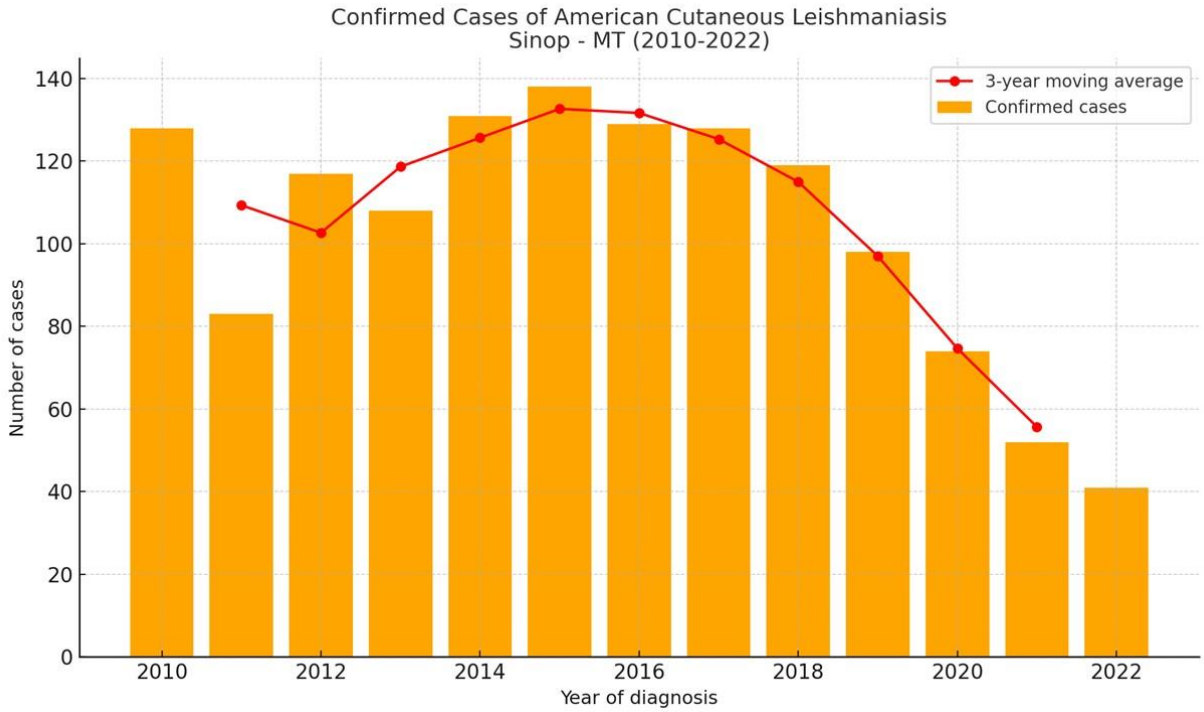

Figure 1. Column chart (orange bars) by year, with the red 3-year moving average line showing the trend: The columns show the absolute number of cases per year. The red line smooths out the fluctuations, highlighting the peak between 2010–2017 and the continuous decline from 2018 onward.

Table 2. Characteristics of patients with a positive diagnosis for American Cutaneous Leishmaniasis (ATL), from 2010 to 2022, in the municipality of Sinop, MT.

	Notification		***Diagnostic***	
Characteristics	**N**	**%**	**N**	**%**
Genre				
Male	1.156	85,4	1.151	84,4
Female	198	14,6	196	14,4
Total	1.354		1.346	
Age range (years)				
< 1 year	1	0,07	1	0,07
1-4	5	0,37	5	0,37
5-9	14	1,03	14	1,03
10-14	45	3,32	45	3,32
15-19	84	6,20	84	6,20
20-39	614	45,35	614	45,35
40-59	463	34,19	463	34,19
60-64	59	4,36	59	4,36
65-69	34	2,51	34	2,51
70-79	28	2,07	28	2,07
80 e +	7	0,52	7	0,52
Total	1.354		1.354	
Ethnicity				
Ethnicity	39	2,88	39	2,90
Ignored	595	43,94	589	43,76
White	69	5,10	69	5,13
Black	8	0,59	8	0,59
Yellow	612	45,20	610	45,32
Brown	31	2,29	31	2,30
Total	1354		1346	
Education				
Ignored/Blank	151	11,15	151	11,15
Illiterate	29	2,14	29	2,14
1st to 4th grade of elementary school (incomplete)	153	11,30	153	11,30
4th grade of elementary school (complete)	88	6,50	88	6,50
5th to 8th grade of elementary school (incomplete)	256	18,91	256	18,91
Elementary school (complete)	124	9,16	124	9,16
High school (incomplete)	157	11,60	157	11,60
High school (complete)	255	18,83	255	18,83
Higher education (incomplete)	51	3,77	51	3,77
Higher education (complete)	78	5,76	78	5,76
Not applicable	12	0,89	12	0,89
Total	**1354**		**1354**	

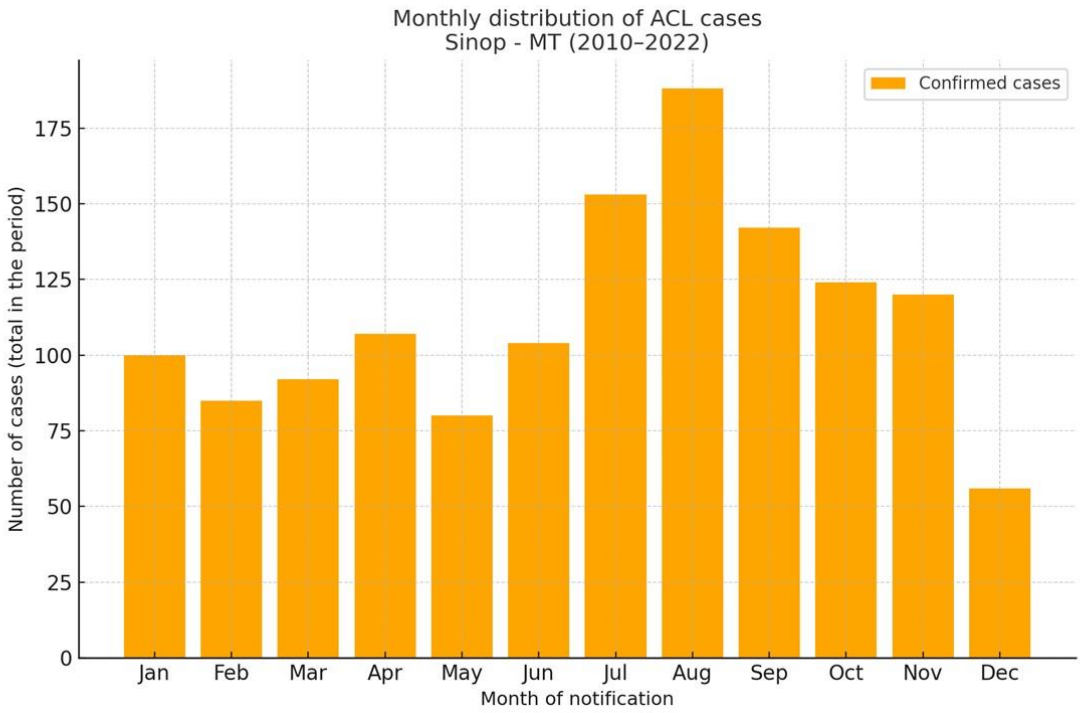

Figure 2. Monthly bar chart (2010–2022) showing the distribution of ACL cases in Sinop-MT.

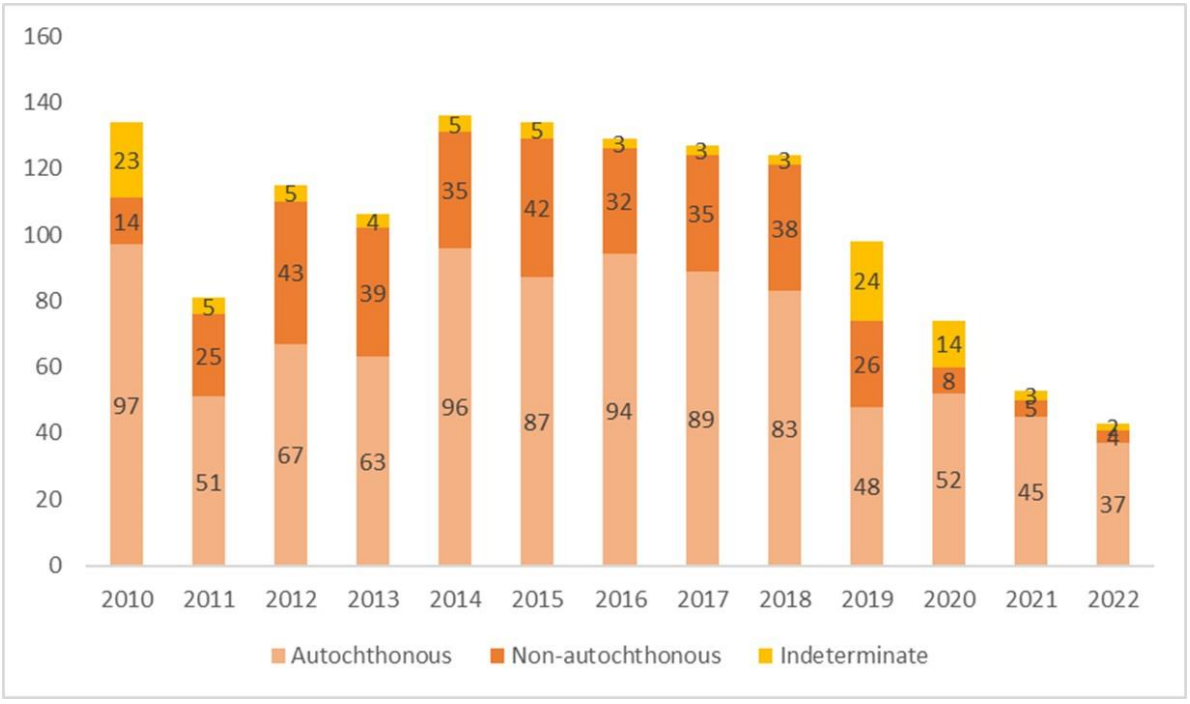

Figure 3. Stacked bar graph showing the distribution of American Cutaneous Leishmaniasis cases in Sinop-MT according to the autochthony criterion, from 2010 to 2022. The light orange bars represent the autochthonous, the dark orange bars represent the non-autochthonous and the yellow bars represent the undetermined cases.

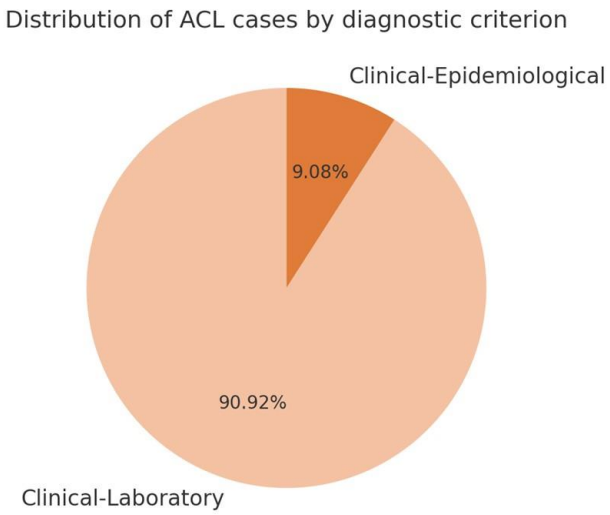

Figure 4. Distribution of confirmed cases of American Cutaneous Leishmaniasis (ACL) in Sinop, Mato Grosso, from 2010 to 2022, according to the confirmation criteria used at the time of notification and diagnosis.

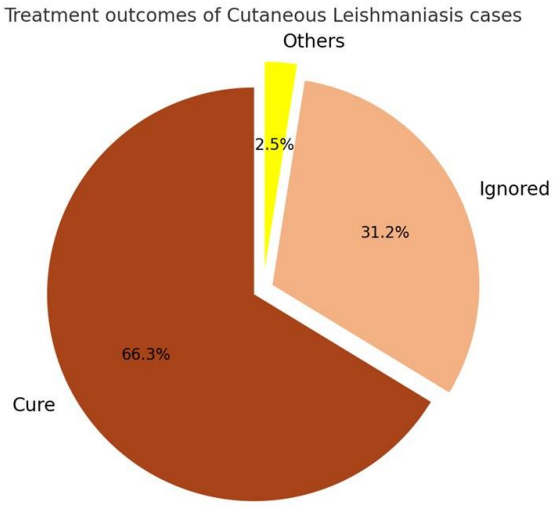

Figure 5. Outcomes of the evolution of ACL cases in Sinop (2010–2022).

Conclusion

Cutaneous Leishmaniasis remains endemic in Mato Grosso, with persistently high incidence in Sinop during the study period. The population most affected comprised men of mixed race/skin color, with low education levels, and predominantly within the productive age group (20–39 years), residing in both urban and rural areas. Diagnostic approaches and clinical outcomes observed were consistent with expectations for the disease. In this context, the findings highlight the need to strengthen epidemiological surveillance, improve case reporting, and implement preventive strategies to reduce the disease burden and mitigate the risk of new infections in the region.

References

ALVAR, J. et al. Leishmaniasis worldwide and global estimates of its incidence. PLoS One, v. 7, n. 5, e35671, 2012. DOI: 10.1371/journal.pone.0035671.

AMATO, V. S. et al. Mucosal leishmaniasis: current scenario and prospects for treatment. Acta Tropica, v. 105, n. 1, p. 1-9, 2008. DOI: 10.1016/j.actatropica.2007.08.003.

ARANA, B. A. et al. Clinical-epidemiological diagnosis of cutaneous leishmaniasis in resource-limited settings: validation and limitations. American Journal of Tropical Medicine and Hygiene, v. 97, n. 2, p. 452-457, 2017. DOI: 10.4269/ajtmh.17-0033.

ASHFORD, R. W. The leishmaniases as emerging and reemerging zoonoses. International Journal for Parasitology, v. 30, n. 12-13, p. 1269-1281, 2000. DOI: 10.1016/s0020-7519(00)00136-3.

AZEVEDO, A. C. et al. Epidemiology of cutaneous leishmaniasis in Central Amazonia: zoonotic transmission associated with the presence of infected dogs. Revista da Sociedade Brasileira de Medicina Tropical, v. 35, n. 2, p. 149-154, 2002. DOI: 10.1590/S0037-86822002000200006.

AZZOPARDI, C. Leishmaniasis. Postgraduate Medical Journal, v. 83, n. 976, p. 649-657, 2007. DOI: 10.1136/pgmj.2006.047340.

BAILEY, M. S.; LOCKWOOD, D. N. J. Cutaneous leishmaniasis. Clinical Dermatology, v. 35, n. 2, p. 203-211, 2017. DOI: 10.1016/j.clindermatol.2016.10.004.

BASANO, A. S.; CAMARGO, L. M. A. Leishmaniose tegumentar americana: histórico, epidemiologia e perspectivas de controle. Revista Brasileira de Epidemiologia, v. 7, n. 3, p. 328-337, 2004.

BRASIL, A. M. V.; FRANCO, A. M. R. Aspectos epidemiológicos da Leishmaniose Tegumentar Americana no Brasil em 2022. Peer Review, v. 5, n. 11, p. 294-305, 2023. DOI: 10.53660/591.prw1604.

BRASIL. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. Manual de Vigilância da Leishmaniose Tegumentar. Brasília: Ministério da Saúde, 2017. 189 p.

BRITO, M. G. et al. American tegumentary leishmaniasis: epidemiological and clinical characteristics in Brazil. Revista do Instituto de Medicina Tropical de São Paulo, v. 61, e45, 2019. DOI: 10.1590/S1678-9946201961045.

BUITRAGO, L. S. et al. Epidemiology and spatial distribution of cutaneous leishmaniasis in Latin America. PLoS Neglected Tropical Diseases, v. 13, n. 9, e0007753, 2019. DOI: 10.1371/journal.pntd.0007753.

CASTAÑEDA-CAPOTE, N. et al. Socio-environmental factors associated with cutaneous leishmaniasis in Colombia. PLoS One, v. 15, n. 7, e0235557, 2020. DOI: 10.1371/journal.pone.0235557.

CHAPPUIS, F. et al. Visceral leishmaniasis: what are the needs for diagnosis, treatment and control? Nature Reviews Microbiology, v. 5, n. 11, p. 873-882, 2007. DOI: 10.1038/nrmicro1748.

CORDEIRO, M. D. et al. Phlebotomine sand flies (Diptera: Psychodidae) in an area of leishmaniasis transmission in northern Minas Gerais, Brazil: seasonal dynamics and natural infection by Leishmania. PLoS One, v. 14, n. 9, e0222005, 2019. DOI: 10.1371/journal.pone.0222005.

CROFT, S. L.; SUNDAR, S.; FAIRLAMB, A. H. Drug resistance in leishmaniasis. Clinical Microbiology Reviews, v. 19, n. 1, p. 111-126, 2006. DOI: 10.1128/CMR.19.1.111-126.2006.

CRUZ, M. F. et al. Seasonal variation of phlebotomine sand flies (Diptera: Psychodidae) in an endemic area of American cutaneous leishmaniasis in Maranhão, Brazil. Memórias do Instituto Oswaldo Cruz, v. 108, n. 8, p. 995-1000, 2013. DOI: 10.1590/0074-0276130125.

GONTIJO, B.; CARVALHO, M. L. R. Leishmaniose tegumentar americana. Revista da Sociedade Brasileira de Medicina Tropical, v. 36, n. 1, p. 71-80, 2003. DOI: 10.1590/S0037-86822003000100012.

GUERRA, J. A. O. et al. Tegumentary leishmaniasis in the State of Amazonas: what have we learned and what do we need? Revista da Sociedade Brasileira de Medicina Tropical, v. 48, supl. 1, p. 12-19, 2015. DOI: 10.1590/0037-8682-0268-2013.

HENN, G. A. et al. Quality of epidemiological data on American cutaneous leishmaniasis in Brazil: challenges for surveillance. Revista Brasileira de Epidemiologia, v. 24, e210022, 2021. DOI: 10.1590/1980-549720210022.

HERWALDT, B. L. Leishmaniasis. Lancet, v. 354, n. 9185, p. 1191-1199, 1999.

KAYE, P.; SCOTT, P. Leishmaniasis: complexity at the host–pathogen interface. Nature Reviews Microbiology, v. 9, n. 8, p. 604-615, 2011. DOI: 10.1038/nrmicro2608.

LAKATOS, E. M.; MARCONI, M. A. Fundamentos de metodologia científica. 6. ed. São Paulo: Atlas, 2007.

MAIA-ELKHOURY, A. N. S. et al. Visceral leishmaniasis in Brazil: trends and challenges. Cadernos de Saúde Pública, v. 34, n. 1, e00060117, 2018. DOI: 10.1590/0102-311X00060117.

MARTINS-MELO, F. R. et al. The burden of neglected tropical diseases in Brazil, 1990–2016: a subnational analysis from the Global Burden of Disease Study 2016. PLoS Neglected Tropical Diseases, v. 12, n. 6, e0006559, 2018. DOI: 10.1371/journal.pntd.0006559.

MINISTÉRIO DA SAÚDE. Coeficiente de detecção de casos de Leishmaniose Tegumentar Americana por 100.000 habitantes. Brasil, Grandes Regiões e Unidades Federadas. 1990 a 2010. Brasília: Ministério da Saúde, 2012. Disponível em:

http://portal.saude.gov.br/portal/arquivos/pdf/lta_deteccao_08_09_11.pdf. Acesso em: 05 abr. 2012.

MOURA, A. C. et al. American cutaneous leishmaniasis in the State of Amazonas: studies on the phlebotomine fauna and the isolation of Leishmania from man and vectors. Revista da Sociedade Brasileira de Medicina Tropical, v. 32, n. 4, p. 413-423, 1999. DOI: 10.1590/S0037-86821999000400004.

MURRAY, H. W. et al. Advances in leishmaniasis. Lancet, v. 360, n. 9334, p. 1561-1577, 2002. DOI: 10.1016/S0140-6736(02)11557-X.

NOBRE, L. N. et al. Characterization of American tegumentary leishmaniasis cases in the state of Mato Grosso, Brazil. Revista do Instituto de Medicina Tropical de São Paulo, v. 55, n. 4, p. 261-267, 2013. DOI: 10.1590/S0036-46652013000400007.

NOBRES, E. S.; SOUZA, L. A.; RODRIGUES, D. J. Incidência de leishmaniose tegumentar americana no norte de Mato Grosso entre 2001 e 2008. Acta Amazônica, v. 43, n. 3, p. 297-303, 2013.

PACHIEGA, J. et al. Incidência da Leishmaniose Tegumentar Americana no Centro-Sul de Mato Grosso, Brasil entre 2000 a 2019. Revista Ibero-Americana de Ciências Ambientais, v. 11, n. 4, p. 126-135, 2020. DOI: 10.6008/CBPC2179-6858.2020.004.0011.

PAN AMERICAN HEALTH ORGANIZATION (PAHO). Leishmaniasis: Epidemiological Report of the Americas 2022. Washington, DC: PAHO, 2022.

REITHINGER, R. et al. Cutaneous leishmaniasis. Lancet Infectious Diseases, v. 7, n. 9, p. 581-596, 2007. DOI: 10.1016/S1473-3099(07)70209-8.

RIEBENBAUER, K. et al. The changing epidemiology of human leishmaniasis in the non-endemic country of Austria between 2000 to 2021, including a congenital case. PLoS Neglected Tropical Diseases, v. 18, n. 1, e0011875, 2024. DOI: 10.1371/journal.pntd.0011875.

ROMERO, G. A.; BOELAERT, M. Control of visceral leishmaniasis in Latin America—a systematic review. PLoS Neglected Tropical Diseases, v. 4, n. 1, e584, 2010. DOI: 10.1371/journal.pntd.0000584.

SANTOS, A. M. et al. Epidemiological profile of cutaneous leishmaniasis in Latin America: a systematic review. Tropical Medicine & International Health, v. 25, n. 9, p. 1055-1064, 2020. DOI: 10.1111/tmi.13454.

SARAIVA, L. et al. The phlebotomine fauna (Diptera: Psychodidae) in a transmission area of visceral leishmaniasis in Minas Gerais State, Brazil. Memórias do Instituto Oswaldo Cruz, v. 112, n. 4, p. 275-280, 2017. DOI: 10.1590/0074-02760160418.

SCHUBACH, A. et al. Laboratory diagnosis of American cutaneous leishmaniasis: clinical and epidemiological applications. Anais Brasileiros de Dermatologia, v. 95, n. 6, p. 757-767, 2020. DOI: 10.1016/j.abd.2020.01.006.

SHAW, J. J. The leishmaniases—survival and expansion in a changing world. A mini-review. Memórias do Instituto Oswaldo Cruz, v. 102, n. 5, p. 541-547, 2007. DOI: 10.1590/S0074-02762007000500001.

SILVA, R. A. et al. Clinical and epidemiological study of American cutaneous leishmaniasis in the State of Maranhão, Brazil. Revista da Sociedade Brasileira de Medicina Tropical, v. 47, n. 4, p. 445-452, 2014. DOI: 10.1590/0037-8682-0080-2014.

WORLD HEALTH ORGANIZATION (WHO). Leishmaniasis: epidemiology and control. Geneva: WHO, 2023.

WORLD HEALTH ORGANIZATION (WHO). Control of the leishmaniases. Report by the Secretariat. Executive Board EB118/4. Geneva: WHO, May 2006