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ORIGINAL ARTICLE

Impact of COVID-19 on the registration of tegumentary leishmaniasis cases in Maranhão, Brazil

Impacto da COVID-19 no registro de casos de leishmaniose tegumentar no Maranhão, Brasil

Impacto de la COVID-19 en el registro de casos de leishmaniasis tegumentaria en Maranhão, Brasil

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ABSTRACT

Background and Objectives: Elucidating the potential impact of COVID-19 on surveillance interventions and programs, such as the tegumentary leishmaniasis one, during the first year of the pandemic can help understand its consequences for notification systems, which can inform immediate public policy and health education actions, as well as highlight the need to implement new strategies to strengthen epidemiological surveillance services. The objective of the present study was to analyze the possible impact of the COVID-19 pandemic on the number of cases of tegumentary leishmaniasis in Maranhão, Brazil. **Methods:** Ecological study of confirmed cases of tegumentary leishmaniasis in the period from January 2015 to December 2020. Data were obtained from the Brazilian Information System for Notifiable Diseases. The P-score metrics were used to evaluate the possible underreporting of tegumentary leishmaniasis. **Results:** In the period from 2015 to 2020, 7,886 new cases of the disease were registered. For the year 2020, 1,346 cases were expected, but 1,158 were notified, which represented a decrease of 13.94%. The regional health centers of São Luís, São João dos Patos, and Presidente Dutra showed the greatest drops in possible expected new cases. **Conclusion:** The challenges in diagnosing tegumentary leishmaniasis cases seem to have intensified in the context of COVID-19 in Maranhão, which signals an important alert for health services and managers.

Keywords: *Epidemiology. Neglected Diseases. Coronavirus. Health Services.*

RESUMO

Justificativa e Objetivos: O potencial impacto da COVID-19 nas intervenções e nos programas de vigilância, como a *leishmaniose* tegumentar, durante o primeiro ano da pandemia, auxilia no entendimento das consequências da pandemia nos sistemas de notificação, com o intuito de subsidiar ações imediatas de políticas públicas e educação em saúde, além de evidenciar a necessidade de implementação de novas estratégias de fortalecimento dos serviços de vigilância epidemiológica. Este estudo teve como objetivo analisar o possível impacto da pandemia da COVID-19

no número de registros de casos de *leishmaniose* tegumentar no Maranhão, Brasil. **Métodos:** Trata-se de um estudo ecológico dos casos confirmados de *leishmaniose* tegumentar no período de janeiro de 2015 a dezembro de 2020. Os dados foram obtidos do Sistema de Informação de Agravos de Notificação. A métrica *P-score* foi utilizada para avaliar os possíveis subregistros de *leishmaniose* tegumentar. **Resultados:** No período de 2015 a 2020, foram registrados 7.886 casos novos da doença. Para o ano de 2020, eram esperados 1.346 casos, porém 1.158 foram notificados, o que representa uma diminuição de 13,94%. As regionais de saúde de São Luís, São João dos Patos e Presidente Dutra apresentam as maiores quedas de possíveis novos casos esperados. **Conclusão:** Os desafios no diagnóstico dos casos de *leishmaniose* tegumentar parecem ter se intensificado no contexto da COVID-19 no Maranhão, o que sinaliza um alerta importante para os serviços de saúde e gestores.

Descritores: *Epidemiologia. Doenças negligenciadas. Coronavírus. Serviços de Saúde.*

RESUMEN

Justificación y Objetivos: El posible impacto de la COVID-19 en las intervenciones y programas de vigilancia, como el de la leishmaniasis tegumentaria, durante el primer año de la pandemia, ayuda a comprender las consecuencias de la pandemia en los sistemas de notificación, con el fin de subsidiar las acciones inmediatas de política pública y educación para la salud, además de resaltar la necesidad de implementar nuevas estrategias para fortalecer los servicios de vigilancia epidemiológica. Este estudio tuvo como objetivo analizar el posible impacto de la pandemia de COVID-19 en el número de registros de casos de leishmaniasis tegumentaria en Maranhão, Brasil. **Métodos:** Se trata de un estudio ecológico de los casos confirmados de leishmaniasis tegumentaria desde enero de 2015 hasta diciembre de 2020. Los datos se obtuvieron del Sistema de Información de Enfermedades de Declaración Obligatoria. Se utilizó la métrica P-score para evaluar los posibles subregistros de leishmaniasis tegumentaria. **Resultados:** Entre 2015 y 2020, se registraron 7.886 nuevos casos de la enfermedad. Para 2020 se esperaban 1.346 casos, pero se notificaron 1.158, lo que representa una disminución del 13,94%. Los centros regionales de salud de São Luís, São João dos Patos y Presidente Dutra presentaron las mayores caídas en los posibles nuevos casos esperados. **Conclusión:** Los desafíos en el diagnóstico de los casos de leishmaniasis tegumentaria parecen haberse intensificado en el contexto de la COVID-19 en Maranhão, lo que señala una alerta importante para los servicios y gestores de salud.

Palabras Clave: *Epidemiología. Enfermedades Desatendidas. Coronavirus. Servicios de Salud.*

INTRODUCTION

Between December 18 and 29, 2019, five atypical pneumonia cases were reported in inpatients in the city of Wuhan, China.[1,2] On December 30, 2019, these cases were notified at the World Health Organization (WHO). On January 7, 2020, a new type of coronavirus (CoV) was isolated. At that time, it was designated 2019-nCoV, a term subsequently changed by WHO to severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), responsible for the coronavirus disease-2019 (COVID-19).[3,4]

The COVID-19 pandemic exposed the inequalities in access to health services all over the world.[5] Turning attention to this health issue affected care measures to prevent and treat other pathologies, such as tegumentary leishmaniasis (TL), which delayed its timely diagnosis and led to an increase in disabling and severe complications, especially in vulnerable populations.[6,7]

In South America, the first reported cases of COVID-19 occurred in Brazil, which was one of the countries most affected by the disease, with over 7,716,184 cases and around 195,725 deaths in 2020.[8] In this period, attention was focused on and adjusted to fighting this pandemic. In the Brazilian state of Maranhão, the efforts to prevent a growth in the number of cases of this disease caused the authorities to declare a state of emergency, which made it possible to implement several measures, including increasing the number of hospital beds specifically for patients with this infection in intensive care units and wards, concert and lesson cancellations, as well as restrictions in interstate transportation. This quick response to the increase in COVID-19 cases may have originated gaps in access to health services by patients with TL.[9] The objective of the present study was analyzing the possible impact of COVID-19 on the number of reported TL cases in Maranhão, Brazil.

METHODS

Study area

Maranhão is located in the Brazilian Northeast Region. The state has an area of 333,367 km^2, an estimated population in 2020 of 7,114,598 people, and a demographic density of 19.81 people per km^2. It is bordered to the west by Pará, to the southwest by Tocantins, to the north by the Atlantic Ocean, and the southeast and east by Piauí.[10]

The state is divided into 19 health regions (São Luís, Chapadinha, Itapecuru, Rosário, Timon, Pinheiro, Viana, Açailândia, Imperatriz, Barra do Corda, Presidente Dutra, São João dos Patos, Bacabal, Codó, Pedreiras, Santa Inês, Zé Doca, Balsas, and Caxias), delimited based on municipalities, population, and demographic density, for the

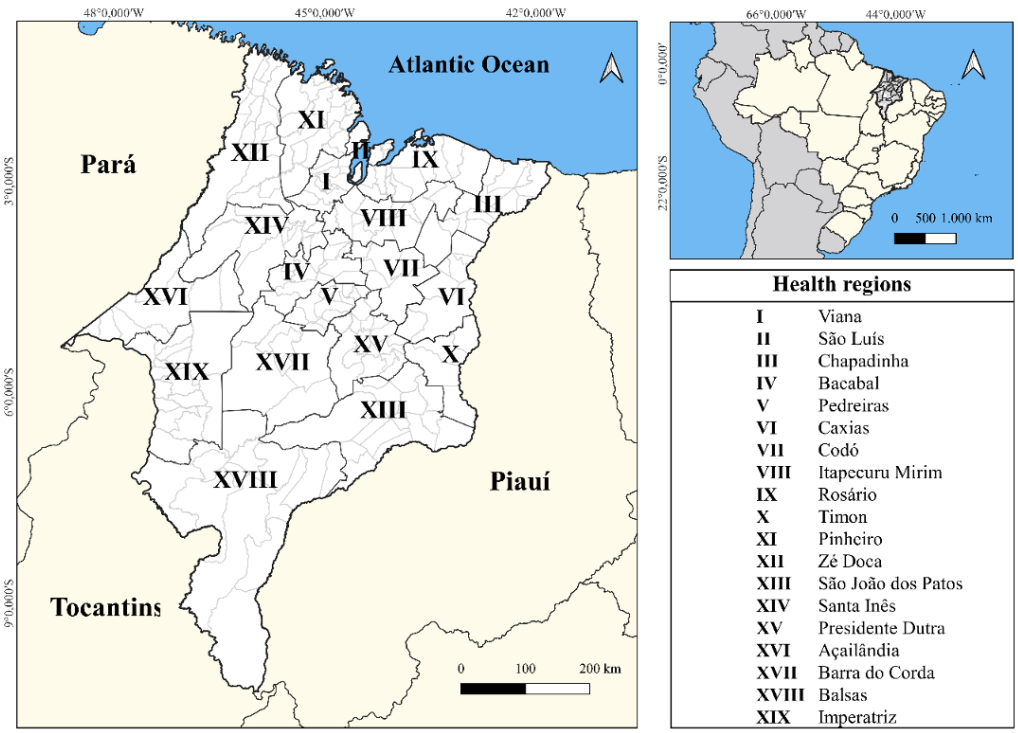

Figure 1. Map of Maranhão and its health regions.

provision of actions and minimum services in each area (Figure 1).[11]

Study type

This was an ecological study that analyzed confirmed TL cases and incidence rates in Maranhão and its health regions between January 2015 and December 2020.

Data source

The data on confirmed new TL cases included in the present study were obtained at the Brazilian Information System for Notifiable Diseases (Sinan, as per its acronym in Portuguese) using the digital platform of the Informatics Department of the Brazilian Unified Health System (Datasus, as per its abbreviation in Portuguese), which is part of the Ministry of Health, on December 5, 2021. The accessed item was "Notifiable diseases", followed by "2007 onwards", via TabNet, a tabulation tool.[12] COVID-19 cases confirmed in 2020 were obtained directly from the CORONAVÍRUS BRASIL panel, updated by the Health Surveillance Secretariat.[8] Confirmed cases in patients who did not live in Maranhão were excluded. The estimated population was obtained from projections for all the years from 2015 to 2020 by the Brazilian Institute of Geography and Statistics.

Data analysis

Data were analyzed by using the P-score metric, which was originally developed to assess mortality increase. However, it proved useful for identifying the underreporting of events in public health.[13] P-score is defined as the percentage difference between the reported number of cases or incidence and the expected number of cases or incidence divided by the reported number of cases or incidence, which is then multiplied by 100. The expected value was considered the average in the period from 2015 to 2019, previous to the COVID-19 pandemic. Incidence was obtained by dividing the number of annual cases in Maranhão or its health regions by the number of people and then multiplying the value by 100,000. The results were expressed as positive and negative percentage values, which indicated increase and reduction, respectively. Office Excel software (Microsoft Corporation) version 2016 was used to treat the data.

Ethical aspects

The present study used secondary aggregate data, with no identification of any patients. Therefore, the proposal did not require approval by a research ethics committee. The study was conducted in accordance with the ethical standards imposed by Ministry of Health Resolutions 466/2012, 510/2016, and 580/2018. The principles of the Declaration of Helsinki were also observed.

RESULTS

Between 2015 and 2020, 7,886 new TL cases were reported in Maranhão, of which 72.9% (5,747) occurred in the male population. For 2020, 1,346 new cases were expected (18.9 per 100 thousand people). However, the actual number was 1,158 (16.3 per 100 thousand people). This meant a reduction of 13.94% in the number of new cases and 14.57% in incidence. The highest drop in the

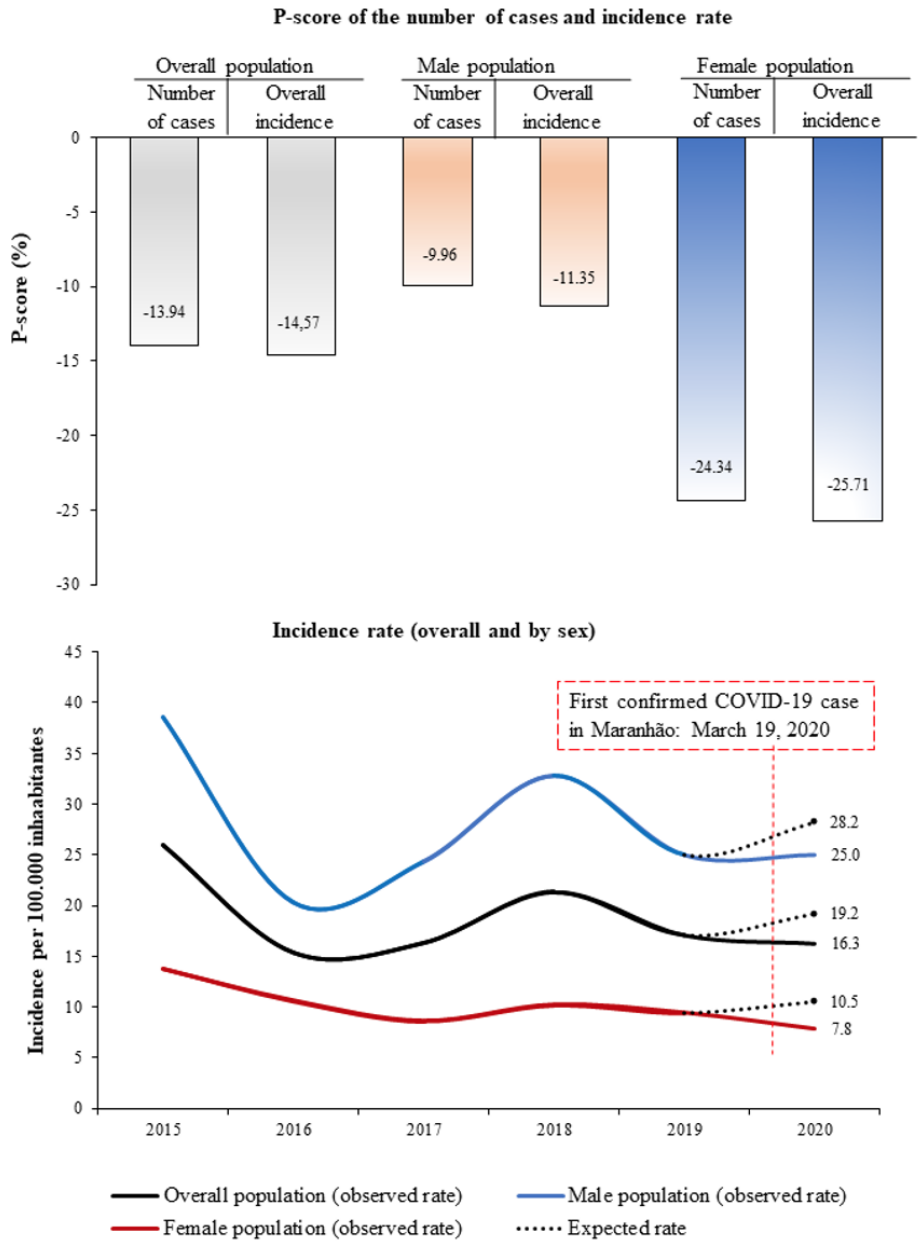

Figure 2. P-score and incidence rate (overall and by sex) of tegumentary leishmaniasis in Maranhão, Brazil, 2015-2020.

number of new cases was observed in women (-24.34%). The probable number of undiagnosed cases for 2020 was 188 (Figure 2).

Analysis of the absolute numbers of the health regions indicated that São Luís (-69.63%), São João dos Patos (-54.02%), Presidente Dutra (-45.95%), and Codó (-41.56%) showed a decrease in the number of reported new cases. The health region of Viana experienced an 80% increase in the number of reported cases in comparison with the expected number for the same period (Figure 3).

Seven health regions (Açailândia, Bacabal, Pedreiras, Rosário, Santa Inês, Timon, and Viana) had an increase in the number of reported TL cases over the pandemic year of COVID-19 (2020) in comparison with the pre-pandemic period examined in the present study (2015-2019). Analysis of TL incidence in 2020 showed that the health regions most affected by this disease were Açailândia, Rosário, and Zé Doca (Table 1).

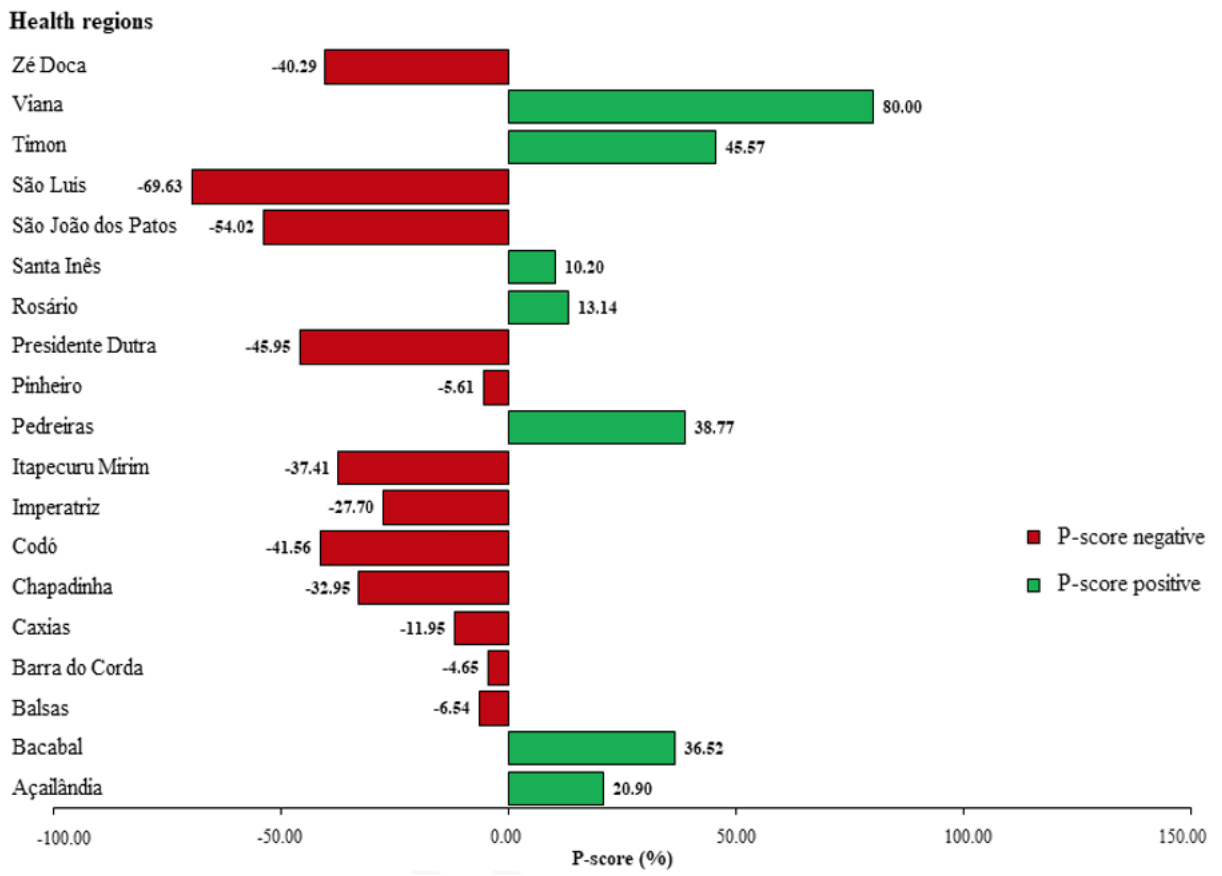

Figure 3. P-score for the absolute number of cases of tegumentary leishmaniasis by health region in Maranhão, Brazil, 2020.

Table 1. Difference between the average number of cases of tegumentary leishmaniasis in Maranhão in 2015-2019 and 2020.

Health regions	2015-2019 (n)	2020 (n)	Difference (n)	%	Incidence per 100,000 people (2020)
Açailândia	116	139	23	54.51	46.37
Bacabal	55	77	22	58.33	28.54
Balsas	21	20	-1	48.78	8.77
Barra do Corda	46	39	-7	45.88	16.61
Caxias	28	27	-1	49.09	8.79
Chapadinha	92	60	-32	39.47	15.74
Codó	30	17	-13	36.17	5.47
Imperatriz	98	72	-26	42.35	13.21
Itapecuru Mirim	129	84	-45	39.44	21.65
Pedreiras	44	63	19	58.88	28.75
Pinheiro	75	74	-1	49.66	18.53
Presidente Dutra	36	19	-17	34.55	6.52
Rosário	121	135	14	52.73	44.48
Santa Inês	116	130	14	52.85	32.85
São João dos Patos	50	19	-31	27.54	7.69
São Luís	57	24	-33	29.63	1.64
Timon	12	24	12	66.67	9.55
Viana	5	8	3	61.54	2.91
Zé Doca	203	122	-81	37.54	40.25

DISCUSSION

The data on reported TL cases showed a higher predominance of new cases in men and a remarkable reduction in disease reporting over 2020, especially in the health regions in the north and south areas of Maranhão. The COVID-19 pandemic interfered with the timely diagnosis of other infectious diseases all over the world in 2020, especially those caused by vectors, such as dengue fever, malaria, and leishmaniases (both visceral and tegumentary).[14,15,16] Maranhão had its first COVID-19 report on March 19, 2020, and was one of the first Brazilian states to implement lockdown and social distancing measures.[17,18]

Social restraints and isolation as a response to the increase in COVID-19 cases were a considerable logistic challenge to health surveillance services and impacted the underreporting of other infectious diseases, including TL.[19] With the pandemic dissemination, the P-score metric became an important analysis tool that helps elucidate the consequences of COVID-19 for health services, since it allows a comparison of a certain disease status between municipalities, states, and countries.[20]

The female gender showed the highest potential drop in a number of reported new cases, and the male gender had the highest TL incidence. Tropical vector-borne diseases, such as TL, tend to afflict certain groups in situations of social vulnerability, that is, more susceptible to poverty.[21] COVID-19 unevenly affects poorer men and women, increasing existing inequalities.[22] Maranhão is considered the poorest state in Brazil.[23] Therefore, neglecting the impact of sexual differences in health records can reinforce healthcare inequalities and reduce the efficacy of interventions.[24,25]

It is important to emphasize that permanent disfiguring scars, which occur when diagnosis is not timely, cause lifelong stigma and decrease quality of life. They are more harmful to women in situations of social vulnerability.[26]

Disease underreporting already existed before the COVID-19 pandemic. Dealing with this problem involves a complex process of getting to understand the coverage level of health surveillance services, as well as aspects related to management, interaction with healthcare teams, factors inherent in the identification of suspected cases, and timely diagnosis.[27]

Maranhão has a high TL burden, and the management of the disabilities and deformities caused by this disease is always an urgent matter.[28] An absent or delayed diagnosis means reinforcing its stigma as a neglected tropical disease. In a context in which attention was focused on COVID-19, an assessment of the actual impact of TL control measures can be designed by analyzing reported new cases, with special emphasis on the detection delay period.[29]

The present study had limitations inherent in the use of secondary data, which is subject to incompleteness, transcription errors, and duplicity. P-score quality depends on the accuracy of the available data.[30] However, it is important to stress the continuous updating of Sinan over the past years, which helped consolidate this system as the most important source of information/decision-making/action related to diseases in Brazil.[31]

Dealing with the COVID-19 pandemic was a challenge regarding reporting of new TL cases in Maranhão, mainly in the health regions of São Luís and São João dos Patos. In this context, it is important that health services, once back to their routine activities, be encouraged to intensify actions oriented toward TL prevention, active screening, diagnosis, and treatment.

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AUTHOR CONTRIBUTIONS

Romário de Sousa Oliveira and **Valéria Cristina Soares Pinheiro** contributed to the study design as well as manuscript writing and critical review, and **Karen Brayner Andrade Pimentel** and **Maria Edileuza Soares Moura** contributed to data analysis and interpretation, and manuscript writing.

All the authors approved the final version of the manuscript and are responsible for all of its aspects, including accuracy and integrity assurance.