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Short Communication

COVID-19 Pandemic Causes Increased Clinic Visits with Diagnosis of Tegumentary Leishmaniasis in Brazil in 2020

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ABSTRACT

Coronavirus disease 2019 (COVID-19) protocols has reduced primary and secondary health care for other diseases, such as leishmaniasis, a parasitic, endemic, chronic and persistent disease in Brazil. To ascertain this, we compared the number of leishmaniasis cases diagnosed before and after the COVID-19 pandemic. In 5 regions of Brazil, there was an increase in the mean number of leishmaniasis clinic visits from 2020 pandemic period (over 57%) compared with 2017–2019 years. Interestingly, this increase was due to tegumentary leishmaniasis (TL) while visceral leishmaniasis consultations decreased considerably. The increase in clinic visits with a diagnosis of TL in all regions of Brazil during the pandemic period in 2020, shows that the epidemiological surveillance of neglected tropical diseases cannot slowdown in the country. Expanding information can minimize the negative impacts of COVID-19 on health promotion, prevention and monitoring of the most prevalent neglected diseases.

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SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), a highly pathogenic β -coronavirus (family Coronaviridae) is the etiologic agent of COVID-19 (Coronavirus Disease 2019), the disease that gave rise to a difficult to control pandemic, especially in Brazil (Candido et al., 2020). Due to the lack of vaccines and drugs to contain the disease and given the high transmissibility of the virus through aerosols and droplets, it became consensual in several countries around the world to take respiratory etiquette measures to reduce interactions between people and reduce the risks of transmission and slow the progression of the pandemic (Szylovec et al., 2020). Since the potential for contagion with SARS-CoV-2 is high in closed environments, it was imperative to quickly

implement telehealth services in Brazil, causing primary and secondary care units to reduce regular non-urgent health services (Aquino et al., 2020; Caetano et al., 2020). Apart from all the undeniable benefits, these actions may have resulted in reduced care for other diseases (Caetano et al., 2020), which already face problems such as underreporting and may have suffered secondary consequences of medical prioritization for COVID-19.

However, should be considered the impact of these measures adopted in primary health care in the diagnosis of chronic disorders of parasitic etiology, especially in Brazil, where there is co-existence of diseases typical of neglected populations (Sangenito et al., 2019). Visceral leishmaniasis (VL) is the most serious form, systemic in character and highly lethal if left untreated, on the other hand, tegumentary leishmaniasis (TL) has a limited and usually self-resolving nature but associated with disfiguring and stigmatizing lesions (OPAS, 2020). The key strategies for controlling leishmaniasis in Brazil are early diagnosis and adequate treatment

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Table 1
Difference in the mean number of leishmaniasis clinic visits from 2017–2019 compared to 2020.

Regions of Brazil(population at risk*)	2017–2019 (n)	2020 (n)	Difference (n)	%	Incidence/10,000(2020)	CI 95%
North(≅18,672,591)	3,834	6,200	+2,366	61.7	3.15	3.07–3.23
Northeast(≅57,374,243)	1,641	2,484	+843	51.4	0.43	0.42–0.45
Southeast(≅89,012,240)	1,979	3,359	+1,380	69.7	0.38	0.36–0.39
South(≅30,192,315)	225	250	+25	11.3	0.08	0.07–0.09
Central-West(≅16,504,303)	2,514	3,756	+1,242	49.4	2.28	2.20–2.35
Total(≅211.755.692)	10,192	16,049	+5,857	57.5	0.76	0.75–0.77

Data from the Ministry of Health- SAPS-DESF. * Data from data from the Brazilian Institute of Geography and Statistics (IBGE), 2020.

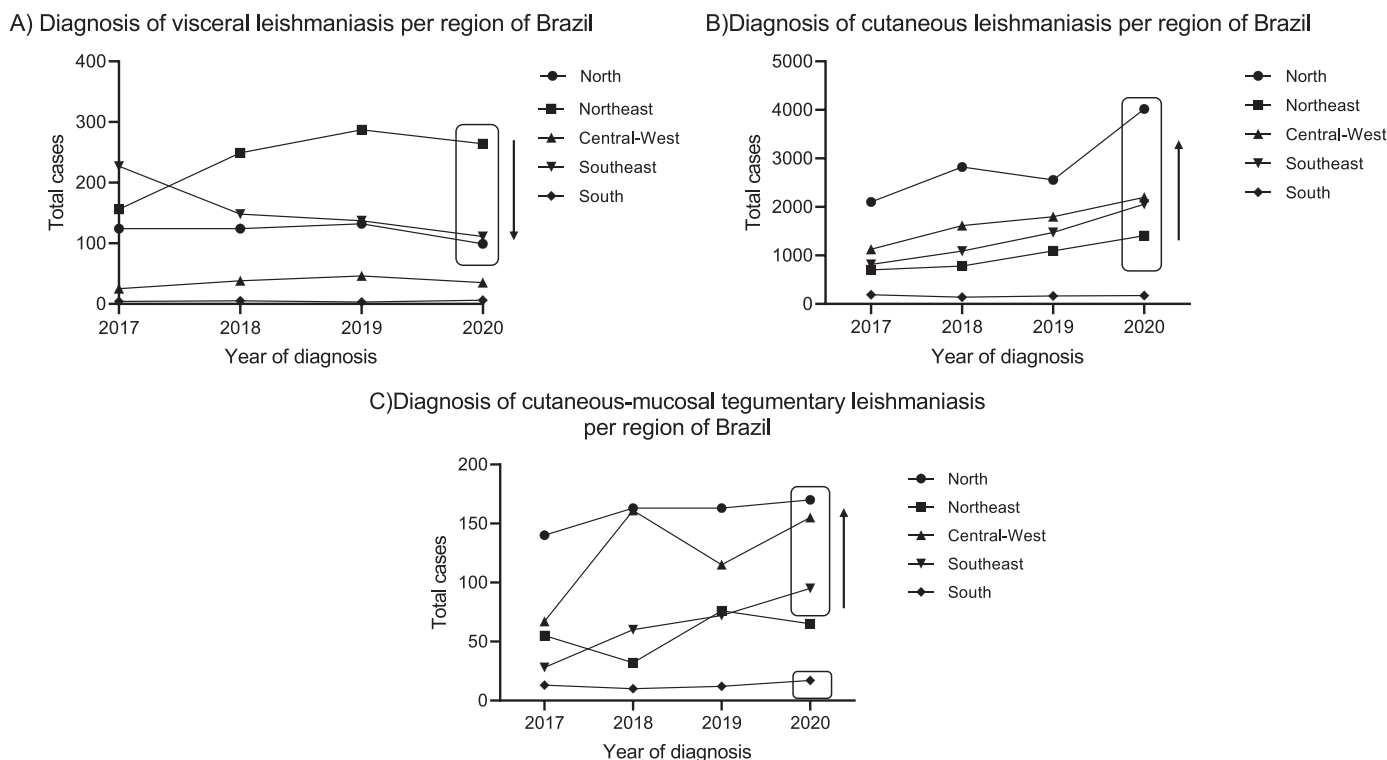


Figure 1. Number of clinic visits for leishmaniasis per disease type, in the period of 2017 to 2020, in the different regions of Brazil. In (A) Diagnosis of visceral leishmaniasis, (B) Diagnosis of cutaneous leishmaniasis, (C) Diagnosis of cutaneous-mucosal leishmaniasis. Arrows indicate a decrease or increase in the number of cases. (Data from Ministry of Health- SAPS-DESF).

of human cases, that is, measures that are directly related to in-depth knowledge of neglected diseases, in addition to an alignment between primary and secondary care and epidemiological health surveillance.

Faced with this problem, we analyzed the number of diagnosed cases of leishmaniasis using data (n=5599) obtained from the Ministry of Health-Secretariat of Primary Health Care (SAPS)-Department of Strategy Family Health (DESF), comparing the pandemic period (2020) with data from the pre-pandemic period (2017–2019). Our results showed an increase in clinic visits for leishmaniasis (Table 1) seen during the pandemic period compared to the pre-pandemic period (2017–2019) in all regions of the country, and the incidence analysis on the population at risk demonstrated that North and Central-West were the regions of greatest impact. This demonstrates a probable harm to the general health of patients, especially in the case of coinfection with *Leishmania* and SARS-CoV-2, which was very likely given the expansion of the pandemic in the country. Interestingly, consultations for VL decreased and, therefore, the increase in global numbers was influenced by TL visits, in both clinical presentations, cutaneous (CL) and cutaneous-mucosal (Figure 1). VL is a chronic disease with persistent and silent evolution in contrast to -TL that presents ulcerated lesions on the skin causing discomfort and stigmatizing the

individual (OPAS, 2020); so social isolation and care restrictions in basic health services are not limiting in the search for treatment by patients with -TL. Many chronic diseases, such as cancer, have an impact on the reduction or delay in diagnosis during the pandemic (Almeida et al., 2021; Kaufman et al., 2020), requiring health services to urgently review their protocols and establish new plans to deal with the consequences of late diagnosis.

With the expansion of the pandemic in the country in 2020 and the need for social distancing, associated with the remote work and tele-teaching, there was an urban exodus (Ferraz and Péchy, 2021), and the population migration to more peripheral forest areas in metropolitan regions may have contributed to greater exposure. The influence of ecological environments and its modifications on the prevalence of TL was evident in studies that dealt with the profile of diagnosed cases in the North and Northeast regions of Brazil. A study carried out in the state of Acre (northern Brazil), showed that the greatest risk of transmission is often found in areas at the interface between forestry and extractive environments, with households where domestic animals are found and can be affected by vectors (Melchior et al., 2017). A similar observation was made by Neto and coauthors (2013), studying cases of CL in the state of Maranhão (northeast region), which observed a higher prevalence of cases in regions of interface be-

tween the Amazon forest and marginal habitations with penetration in urban areas (Gonçalves Neto et al., 2013). This phenomenon of urban or periurban infestation can be explained by the intense deforestation that has taken place, especially in the Amazon region, in recent years, impacting the increase in the number of cases (Rodrigues et al., 2019). The main limitations of this study are the collection of secondary data and the impossibility of precisely pointing out causal relationships for the event. However, the study allows us to present a trend towards an increase in cases and the likely explanatory variables were presented and discussed.

In conclusion, the epidemiological surveillance of neglected tropical diseases cannot slow down because of increased efforts to contain the advance of COVID-19 in the country.

Declarations

Ethical approval

Not applicable.

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Author contributions

MCA: Conception and design of the study, Analysis and interpretation of data, Literature search, Drafting the article, Final approval of the version to be submitted; PRFB: Conception and design of the study, Literature search, Drafting the article, Final approval of the version to be submitted; EH: Conception and design of the study, Acquisition of data, Literature search, Drafting the article; NPM: Acquisition of data, Literature search, Analysis and interpretation of data, Drafting the article; SFGC: Final approval of the version to be submitted; HMJ: Conception and design of the study, Acquisition of data, Analysis and interpretation of data, Literature search, Drafting the article, Final approval of the version to be submitted.

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References

- Almeida ÂS, Ribeiro CJN, Carlini CC, Santos RS, Santos AD, Tavares DS. Spatial and spatiotemporal dynamics of visceral leishmaniasis in an endemic North-eastern region of Brazil. *Geospat Health* 2021;15(2). doi:[10.4081/gh.2020.885](https://doi.org/10.4081/gh.2020.885).
- Aquino EML, Silveira IH, Pescarini JM, Aquino R, Souza-Filho JA, Rocha AS, et al. Social distancing measures to control the COVID-19 pandemic: potential impacts and challenges in Brazil. *Cienc Saúde Coletiva* 2020;25(suppl1):2423–46. doi:[10.1590/1413-81232020256.1.10502020](https://doi.org/10.1590/1413-81232020256.1.10502020).
- Caetano R, Silva AB, Guedes ACCM, Paiva CCN, Ribeiro GDR, Santos DL, et al. Challenges and opportunities for telehealth during the COVID-19 pandemic: ideas on spaces and initiatives in the Brazilian context. *Cad Saude Publica* 2020;36(5) Epub 2020 Jun 1. PMID: 32490913. doi:[10.1590/0102-311x00088920](https://doi.org/10.1590/0102-311x00088920).
- Candido DS, Claro IM, de Jesus JG, Souza WM, Moreira FRR, Dellicour S, et al. Evolution and epidemic spread of SARS-CoV-2 in Brazil. *Science* 2020;369(6508):1255–60. 4 <https://www.science.org/lookup/doi/10.1126/science.abd2161>.
- Ferraz R, Péchy A. Bons serviços e economia em alta estimulam migração para o interior. *Revista Veja online*. Publicado em 15 de janeiro de 2021. Available in: <https://veja.abril.com.br/brasil/com-bons-servicos-e-economia-em-alta-cidades-menores-estimulam-migracao/> (accessed August 18, 2021).
- Gonçalves Neto VS, Barros Filho AK, Santos AM, Prazeres MP, Bezerril ACR, Fonseca AVL, et al. An analysis of the spatiotemporal distribution of American cutaneous leishmaniasis in counties located along road and railway corridors in the State of Maranhão, Brazil. *Rev Soc Bras Med Trop* 2013;46(3):322–8 PMID: 23856875. doi:[10.1590/0037-8682-0056-2012](https://doi.org/10.1590/0037-8682-0056-2012).
- Kaufman HW, Chen Z, Niles J, Fesko Y. Changes in the Number of US Patients With Newly Identified Cancer Before and During the Coronavirus Disease 2019 (COVID-19) Pandemic. *JAMA Netw Open* 2020;3(8). doi:[10.1001/jamanetworkopen.2020.17267](https://doi.org/10.1001/jamanetworkopen.2020.17267).
- Melchior L, Brilhante AF, Chiaravalloti-Neto F. Spatial and temporal distribution of American cutaneous leishmaniasis in Acre state, Brazil. *Infectious Diseases of Poverty* 2017;6(1):99. doi:[10.1186/s40249-017-0311-5](https://doi.org/10.1186/s40249-017-0311-5).
- Organização Pan-Americana da Saúde (OPAS). *Leishmanioses: Informe epidemiológico nas Américas*. Washington, D.C.: OPAS; 2020 Dezembro de Núm. 9 (accessed August 10, 2021).
- Rodrigues MGA, Sousa JDB, Dias ALB, Monteiro WM, Sampaio VS. The role of deforestation on American cutaneous leishmaniasis incidence: spatial-temporal distribution, environmental and socioeconomic factors associated in the Brazilian Amazon. *Trop Med Int Health* 2019;24(3):348–55 Epub 2019 Jan 28. doi:[10.1111/tmi.13196](https://doi.org/10.1111/tmi.13196).
- Sangenito LS, da Silva Santos V, d'Ávila-Levy CM, Branquinha MH, Santos ALS, Oliveira SSC. Leishmaniasis and Chagas Disease - Neglected Tropical Diseases: Treatment Updates. *Curr Top Med Chem* 2019;19(3):174–7. doi:[10.2174/156802661903190328155136](https://doi.org/10.2174/156802661903190328155136).
- Szylovec A, Umbelino-Walker I, Cain BN, Ng HT, Flahault A, Rozanova L. Brazil's Actions and Reactions in the Fight against COVID-19 from January to March 2020. *Int J Environ Res Public Health* 2021;18(2):555 11. doi:[10.3390/ijerph18020555](https://doi.org/10.3390/ijerph18020555).