



Spatial Distribution of 100,477 Thousand Deaths Per COVID-19 in Brazil

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Authors' contributions

This work was carried out in collaboration among all authors. Author DMS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors ALDSF, JCDG, TMRLU, GFC, DDCL, KVBL, RJDPSEG and LNGCL managed the analyses of the study, managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJTDH/2020/v41i2130396

Editor(s):

(1) Prof. Charbell Miguel Haddad Kury, University of Rio de Janeiro, Brazil.

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Complete Peer review History: <http://www.sdiarticle4.com/review-history/63636>

Short Communication

Received 22 November 2020
Accepted 20 December 2020
Published 31 December 2020

ABSTRACT

The COVID-19 reached the pandemic level and in Brazil has already caused 100,477 deaths. This study is a Short Communication about the spatial distribution of deaths by COVID-19 in Brazil, from data from the Coronavirus Brasil platform. It was shown that Rio de Janeiro, São Paulo, Ceará,

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Pará, and Amazonas present the greatest lethality in Brazil, especially in the metropolitan regions. The distribution of deaths shows that it has already reached all regions of Brazil, with greater impact in some states. It was also possible, from the epidemiological bulletins, to identify that the deaths stand out in men above 60 years of age, with comorbidities such as heart diseases and diabetes.

Keywords: Spatial distribution; deaths; COVID-19; Brazil.

1. INTRODUCTION

The new coronavirus emerged after cases of pneumonia in Wuhan in China on December 31, 2019, with unknown etiology, causing several deaths. In January five genomes of the new virus were isolated. In this context, due to its similarity to SARS-CoV, which is a coronavirus causing respiratory syndromes in humans, it was named SARS-CoV-2. Due to its transmission by droplets and aerosols, its spread reached the level of pandemic declared by the World Health Organization (WHO) on March 11, 2020 [1].

The WHO has named the disease caused by SARS-CoV-2 as COVID-19. In Brazil, the first case was notified on February 26, 2020, a man with a history of travel to Italy, so the spread lost control by imported cases and reached the level of community transmission on March 20, 2020 [2]. Therefore, the states of São Paulo, Pará, Rio de Janeiro, Ceará, and Amazonas represented the highest incidences of cases and deaths, facing several difficulties in the health systems [3].

The COVID-19 presents in three forms, asymptomatic, Grippal Syndrome (GS), and Severe Acute Respiratory Syndrome (SARS). The GS represents up to 80% of the cases, with mild symptoms, fever, cough, sore throat, and myalgia. SARS is associated with GS symptoms, oxygen saturation equal to or <95%, runny nose, dyspnea, gastrointestinal symptoms [4]. However, the literature cites risk factors for the evolution of SARS, such as elderly, chronically ill, obese, pregnant women, and those with malignant neoplasms [5,6,7].

Thus, on August 8, 2020, Brazil reached 3,012,412 cases and 100,477 deaths by COVID-19, showing that in the fifth month of the pandemic, the disease continues to evolve rapidly. Presented mortality of 47.8 and lethality of 3.3%. In this way, presenting the spatial distribution of deaths can provide public health with data on how the disease is affecting different regions, and direct surveillance actions and

health barriers at state and national borders, as well as subsidizing information for public health interventions. Thus, the objective is to present the spatial distribution of deaths until August 08, 2020, in Brazil.

2. MATERIALS AND METHODS

It is a short communication, which was conducted a descriptive and ecological study, based on data from the Coronavirus Brazil platform (<https://covid.saude.gov.br/>). It is a platform of the Brazilian Ministry of Health, which shows the epidemiological data of COVID-19, in a public way, about the data of confirmed cases and deaths, by region and state of the country. It also presents case and death maps, incidence information, mortality.

The data were collected on August 8, 2020. With inclusion criteria: only the cases of deaths by COVID-19 in Brazil. Maps were collected regarding the spatial distribution of deaths and mortality coefficient. Three maps were used.

3. RESULTS AND DISCUSSION

At the time of the study, Brazil had 100,477 deaths per COVID-19. It is observed in Fig. 1, regarding the analysis by state, that only Tocantins, Amapá, Roraima, Rondônia, Acre, and Mato Grosso do Sul represent from 500 to 1,000 deaths, and all the other 20 states and the Federal District present more than 1,000 deaths. In the analysis per city, we can see the concentration of deaths in the metropolitan regions of Brazil.

Concerning mortality per 100,000,000 inhabitants, per region of the country is shown: Center-West 38.5 South 20.1, North 66.9, Northeast 53.6, Southeast 51.2. This shows the highest mortality rate in the northern region [8].

Fig. 2 shows the mortality coefficient of COVID-19 by the state of Brazil. Note that almost all states have a mortality rate higher than 20 per 100,000 inhabitants.

A: Death by state.

B: Death by the municipality

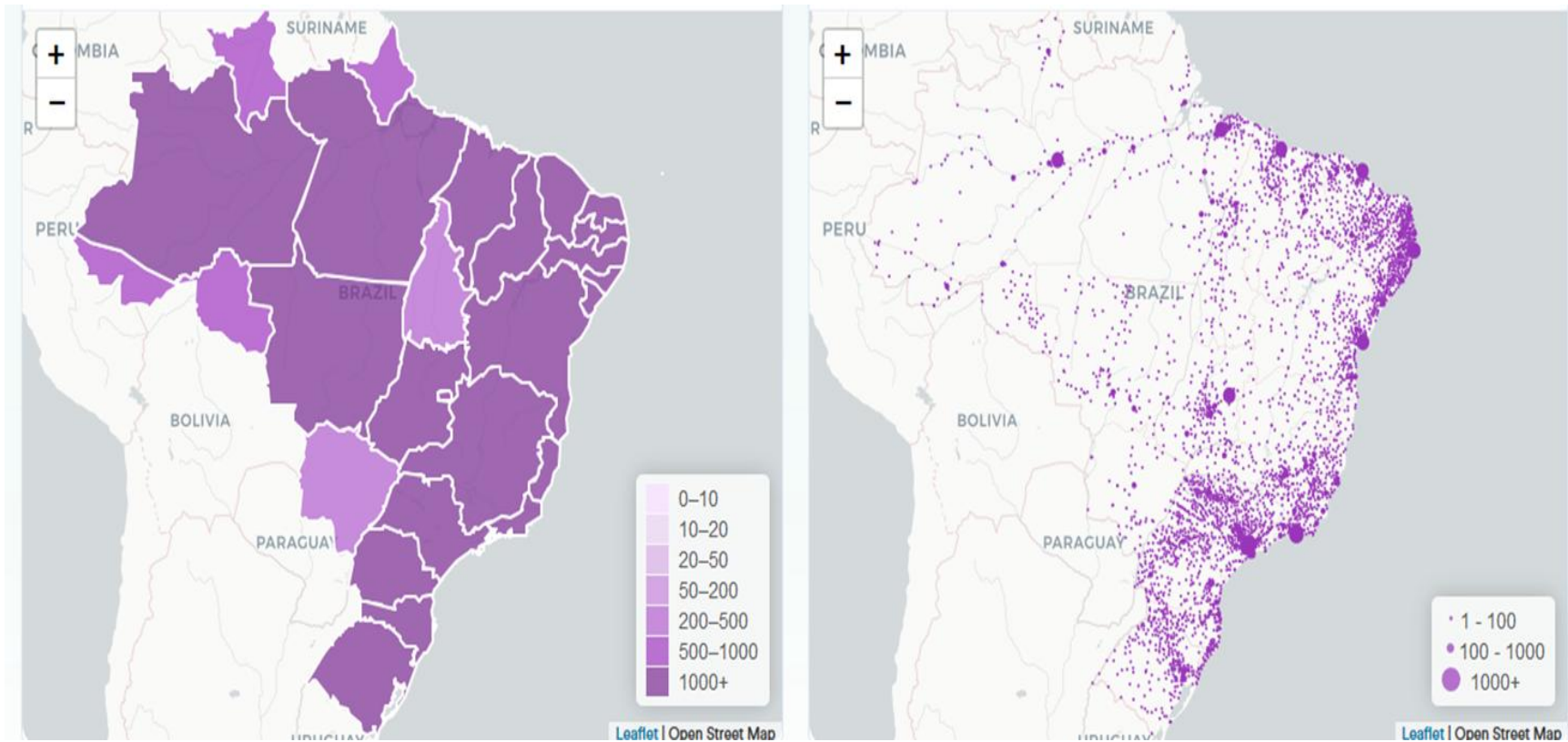


Fig. 1. Spatial distribution of Deaths by COVID-19 in Brazil by state and municipality of notification on August 08, 2020
Source: Coronavirus Brazil, Ministry of Health, 2020.

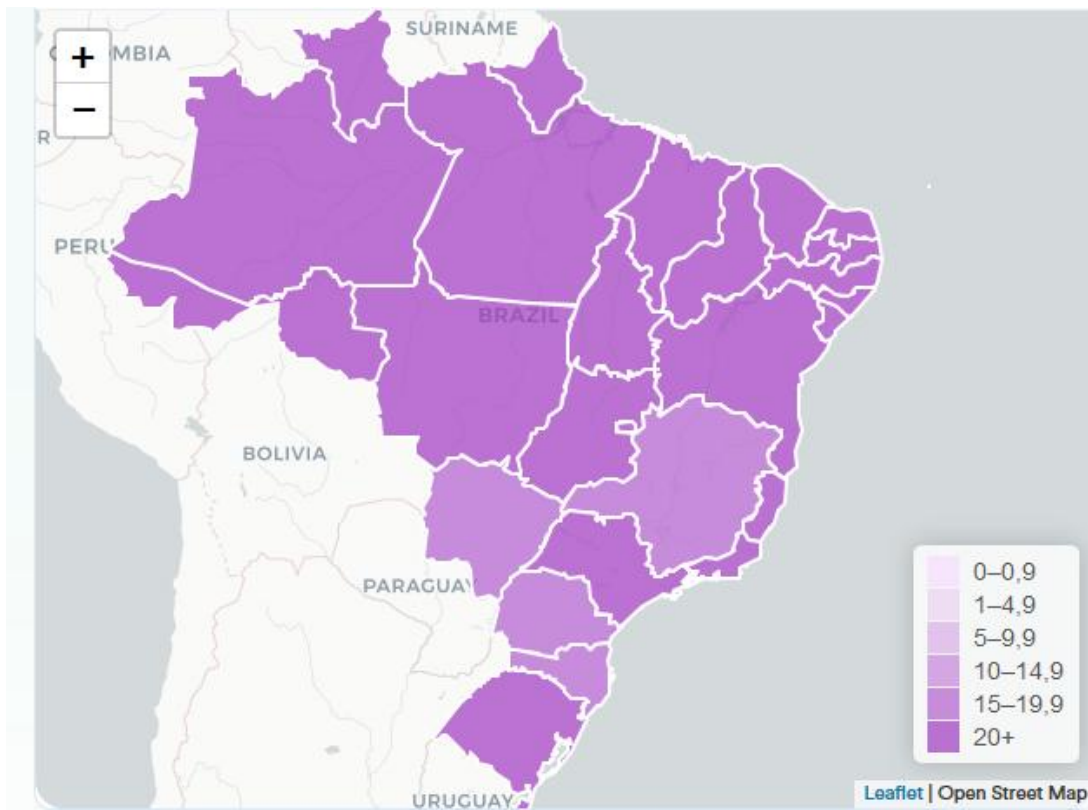


Fig. 2. Spatial distribution per Brazilian state mortality coefficient, by COVID-19, on August 08, 2020

Source: Coronavirus Brazil, Ministry of Health, 2020

Regarding the high mortality rate in the northern region, the states of Pará and Amazonas stand out, Pará on August 8, 2020, represents 5,885 deaths, with a lethality of 3.51%, registering the occupation of adult Intensive Care Unit (ICU) beds of specifics for COVID-19 at 54.67% [9]. In Amazonas on August 7, 2020, the state had 3,349 deaths, with the lethality of 3.2%, and occupation of specific adult ICU beds of 35.2%. In Amazonas, the predominance in the 60 to 69 years old age group, and the most prevalent comorbidities in deaths, heart disease 39% and diabetes 32.5% in over 60 years old, are still outstanding. [10].

It also stands out for the state of São Paulo, which on August 8, 2020, had 25,016 deaths, as the lethality of 4%, being higher than the national lethality which reaches 3.3% [11]. The state of Ceará also stands out in the spatial analysis, because on August 9, 2020, it has 7,954 deaths, with lethality of 4.2%, surpassing the lethality of the state of São Paulo and Brazil [12].

Another state that draws attention in the analysis was Rio de Janeiro, which on August 8, 2020, had 14,070 deaths, with the lethality of 7.88%, being the highest lethality in Brazil [13].

The epidemiological bulletin of COVID-19 of Brazil referring to epidemiological week 31, showed the profile of deaths, most of them in the 70 to 79 years (25.1%), male (58.2%), brown race (35.4%), followed by white (25,249; 27.8%), black (4,621; 5.1%), yellow (1,018; 1.1%) and indigenous (350; 0.4%). Regarding comorbidities, the majority of the deaths presented at least one comorbidity, highlighting those over 60 years, representing heart disease (29%) and diabetes (22%) [14]. In a meta-analysis, the data in the literature evaluated the profile of deaths and highlighted the risk factors for death, male, over 65 years of age, with heart diseases and diabetes [15].

The evolution of SARS is the main cause of death, characterized by severe pneumonia, which requires treatment in the ICU. Thus,

imaging examinations are fundamental for the early diagnosis of pulmonary complications, and strategies that should be implemented along with laboratory tests [16], since the Ministry of Health recommends the modality of case closure by clinical-imaging, in the impossibility of performing laboratory tests. In this modality, the image must present specific characteristics [17].

4. CONCLUSION

In this study, it was possible to observe the states of Brazil with higher lethality by COVID-19, such as Rio de Janeiro, São Paulo, Ceará, Pará, and Amazonas. In a phase of the pandemic that Brazil reached 100,477 deaths. The distribution of deaths shows that it has reached all regions of Brazil, with greater impact in some states. It was also possible, from the epidemiological bulletins, to identify that the deaths stand out in males over 60 years of age, with comorbidities such as heart diseases and diabetes.

Thus, it is evident that the evolution of the pandemic in Brazil is growing, despite its installation in the fifth month in the country. It is highlighted that isolation and social distancing are still the best non-pharmacological strategies to minimize the potency of cases and deaths, in a pandemic where there is no vaccine. Therefore, measures such as hand hygiene and mandatory use of masks also contribute to the reduction of transmissibility.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard was written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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