

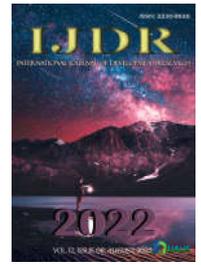


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RESEARCH ARTICLE

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PREVALENCE OF DENGUE CASES IN BRAZIL IN THE PERIOD 2015-2020

*Marinês Tambara Leite, Débora Cristina Limberger, Iuri Trezzi, Leila Mariza Hildebrandt and Sabrina Zancan

Universidade Federal de Santa Maria, Rio Grande do Sul, Brasil

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*Corresponding author:
Marinês Tambara Leite

ABSTRACT

The objective was to verify the prevalence of dengue cases in Brazil, from 2015 to 2020. Documentary, population-based, descriptive research with a quantitative approach. Data available from the Information Technology Department of the Unified Health System (DATASUS) was used. From 2015 to 2020, more than 6.2 million probable cases of dengue were reported in Brazil, unevenly distributed, demonstrating the unpredictability of the prevalence of the disease. In 2020, there was a decrease in the number of reports, a period that intensified actions to combat COVID-19, suggesting underreporting. The highest incidence of dengue in the studied period occurred in the Southeast region and the lowest in the North and South regions, respectively. There was a higher frequency of reports of probable cases among females, brown and white races/colors and in the age group from 20 to 39 years. Deaths occurred more frequently in males, white race/color and in individuals over 60 years of age. The study highlighted the importance of knowing and analyzing the epidemiological characteristics of dengue, given its high incidence, unpredictability and consequences.

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INTRODUCTION

Dengue is an acute febrile disease of viral etiology, benign evolution in its classic form and severe when hemorrhagic. Currently, it is the most important arbovirus (disease transmitted by insect bites, especially by mosquitoes) that affects humans and other animals and constitutes a serious public health problem in the world, especially in tropical countries, where environmental conditions favor the development and proliferation of *Aedes aegypti*, the main mosquito vector of the virus (BRASIL, 2009). Regarding dengue virus serotypes, four are known: DENV 1, DENV 2, DENV 3 and DENV 4. As for immunity, it is permanent for the same serotype (homologous) and temporary, for two to three months, for the cross immunity (heterologous) (BRASIL, 2009). Unpredictability, global epidemiological transmission potential, environment versus human behavior relationship, prevention and eradication capacity are some characteristics of dengue, placing it among the main discussions about public health problems (LIMA-CAMARA, 2016). This virus has been affecting Brazilians since 1986 and whenever new serotypes are introduced in previously unaffected areas, or a change in the predominant serotype, epidemic outbreaks occur approximately every 3 to 5 years (SANCHEZ *et al.*, 2020). In addition, although there are efforts by health authorities, with the re-emergence of arboviruses, there is greater susceptibility of the population, due to the wide distribution of the vector in Brazilian territory, lack of specific

treatment and effective preventive measures (LIMA-CAMARA, 2016). Dengue virus infection can be asymptomatic or symptomatic. When symptomatic, it causes a systemic and dynamic disease with a broad clinical spectrum, which varies from oligosymptomatic to severe forms, and can progress to death (BRASIL, 2016). Some individual risk factors determine disease severity and include age, ethnicity, and possibly comorbidities (bronchial asthma, diabetes mellitus, sickle cell anemia) and secondary infections. The Epidemiological Update released in 2020 by the Pan American Health Organization (PAHO) mentions that dengue in the Americas in 2019 reached the highest number of cases ever recorded in history, with more than 3 million cases, including 1,538 deaths. These numbers exceed the 2.4 million cases recorded in 2015, when the largest dengue epidemic in the region's history occurred. That year, almost 1,400 people died as a result of this disease (OPAS, 2020). In the first five months of 2020, the countries with the most probable cases reported in the Americas are the following: Brazil with 1 million cases (65%), Paraguay with 218,000 cases (14%), Bolivia with 82,000 cases (5%), Argentina with 79 thousand cases (5%) and Colombia with 54 thousand cases (3%) (PAHO, 2020). Also, according to PAHO, the four dengue serotypes are present in the region of the Americas and that, in 2020, all of them were detected in three countries, one of them Brazil (OPAS, 2020). Thus, it is highlighted that Brazil is the country that presented the most cases, with the four circulating virus serotypes.

According to the Epidemiological Update: Dengue in the context of COVID-19, of December 3, 2020, released by PAHO, between Epidemiological Weeks (EW) 1 and 47 of 2020, more than 2.1 million cases of dengue were reported in the Region of the Americas, with a cumulative incidence rate of 221.6 cases per 100,000 population (PAHO, 2020). The cumulative incidence rate up to epidemiological weeks (EW) 47 of 2020 is lower than that recorded during the epidemic year 2019 (PAHO, 2020). In the Southern Cone, the countries with the highest cumulative incidence rates up to EW 47 of 2020 were Paraguay (3,212 cases per 100,000 inhabitants), a country that was affected by the largest dengue epidemic in its history, and Brazil (661 cases per 100,000 inhabitants), in which the number of cases has decreased since EW 11 (PAHO, 2020).

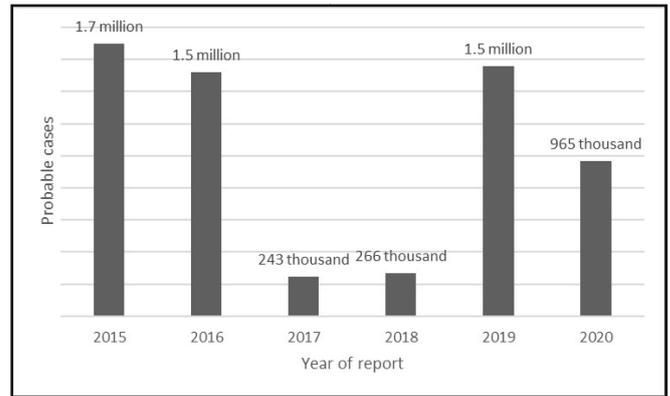
In Brazil, in the period between epidemiological weeks 1 and 53, 987,173 probable cases were reported, an incidence rate of 469.8 cases per 100,000 inhabitants (BRASIL, 2021). By geographic region, the highest incidence occurred in the Midwest region, which presented 1,212 cases per 100,000 inhabitants, followed by the South regions, which presented 940.0 cases per 100,000 inhabitants, Southeast with 379.4 cases per 100,000 inhabitants, Northeast with 263.8 cases per 100,000 and the North, which had 119.5 cases per 100,000 (BRASIL, 2021). In the context of the current pandemic caused by COVID-19 and the persistence of higher than expected cases of dengue in endemic areas in the southern hemisphere, they represent a great challenge, both for the population and for the health systems, which will have to respond to concomitant events of risk to public health. Despite the need to face the consequences arising from the COVID-19 pandemic, efforts still need to be made to combat dengue (OPAS, 2020), drawing attention to the continuity of measures that enable and eliminate disease vectors, including *Aedes aegypti*. Thus, the objective of this study was to verify the prevalence of dengue cases in Brazil, from 2015 to 2020.

METHODOLOGY

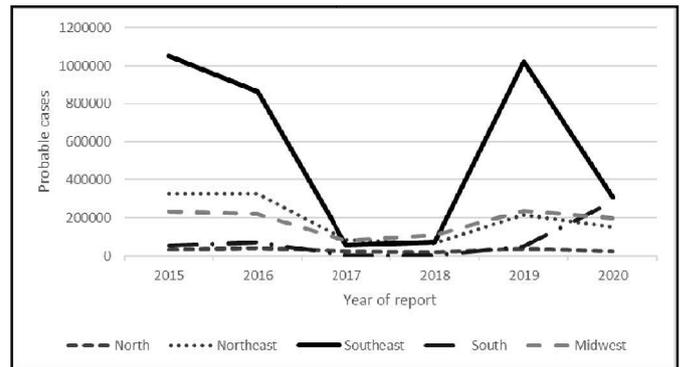
This is a documentary, population-based and descriptive research with a quantitative approach. Data were collected through the Department of Informatics of the Unified Health System (DATASUS), observing the following path: Health Information (TABNET) – Epidemiological and Morbidity – Notifiable Diseases and Disorders from 2007 onwards - Dengue from 2014 onwards. The data comprise the time frame from 2015 to 2020 and their consultation was carried out on September 23, 2021. The analyzed data refer to all probable and notified cases of dengue in the period from 2015 to 2020. The variables investigated were the region, year of report, probable cases, and lethality coefficient and disease evolution. Also, the profile of individuals who contracted the virus considering the following variables: sex, color/race and age group. The collected data were analyzed in a descriptive way, with the help of Microsoft Excel® version 2016 software and presented in the form of tables and graphs.

RESULTS AND DISCUSSION

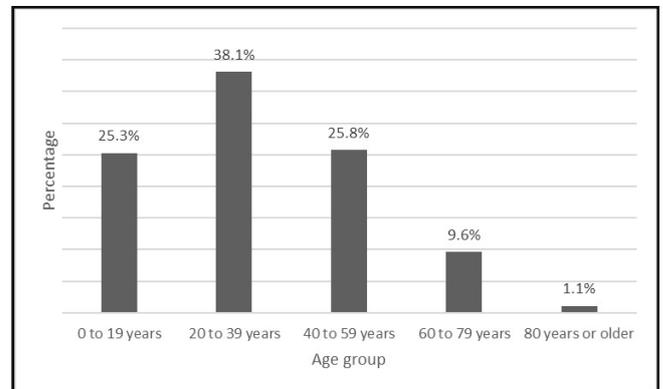
Regarding the geographical characterization of dengue cases in the period from 2015 to 2020, more than 6.2 million probable cases were reported in Brazil. Graph 1 shows the reports of probable cases of dengue in this period. It was found that there were more than 1.5 million reported probable cases of dengue in the years 2015 and 2016. This situation led to an increase in the number of actions to combat dengue in 2016, led by the Ministry of Health, including 188 campaigns, with a view to reducing the incidence of dengue rates in the country. These actions seem to contribute to reducing the prevalence of dengue in the population, as in 2017 there was an 84% reduction in the total number of probable cases, when compared to the previous year. This percentage increased by only 9% in 2018, suggesting stability. However, in 2019 there was a vertiginous increase of 484% of probable cases reported and, in 2020 these reached one million cases, indicating that this disease still remains among the Brazilian population.



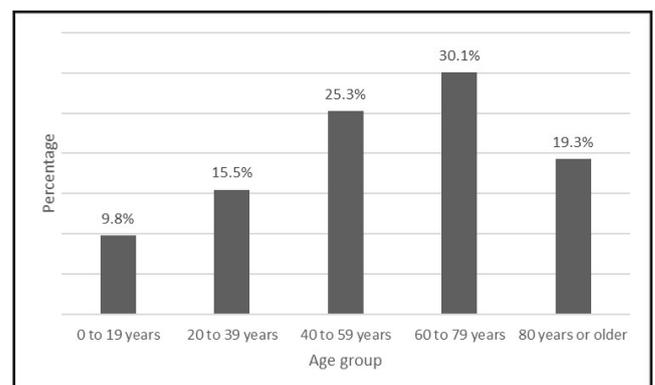
Graph 1. Probable cases of dengue in Brazil reported in the period 2015-2020 Brazil, 2021



Graph 2: Distribution of probable cases of dengue by year and region of report Brazil, 2021



Graph 3. Percentage of reports of probable cases by age group, period 2015-2020 Brazil, 2021



Graph 4. Percentage of reports of death by age group, period 2015-2020 Brazil, 2021

Table 1. Lethality coefficient of dengue for every ten thousand cases per year and regions in Brazil, 2021

Year of Report	North Region	Northeast Region	Southeast Region	Southern Region	Midwest Region	Total
2015	6.54	4.93	6.11	4.80	6.71	29.09
2016	1.29	3.74	4.90	9.25	4.91	24.10
2017	3.18	8.49	8.17	0.00	10.24	30.08
2018	5.06	10.67	6.56	11.50	8.49	42.28
2019	4.71	5.37	4.88	6.66	7.90	29.52
2020	6.86	2.64	5.20	7.19	6.90	28.78
Total	27.64	35.83	35.83	39.41	45.16	183.86

Brazil, 2021.

Table 2. Lethality coefficient of dengue according to age group, from 2015 to 2020

Age group	Lethality coefficient
0 to 19 years	2.19
20 to 39 years	2.32
40 to 59 years	5.57
60 to 79 years	17.74
80 years or older	102.44

Brazil, 2021.

This fluctuation in the number of cases shows the unpredictability of the disease and, among other factors, may be related to the effect of campaigns against dengue, since from 2017 to 2020 there was a mean of 40 publications reported on the Ministry of Health website, and, in 2018, only 21 disclosures. In 2020, there were 37 news items related to dengue, while, in the same period, there were more than a thousand campaigns against the coronavirus, which highlights the change in the focus of actions from preventive measures to diseases that generate more negative consequences in the population at the time. In this way, the other pathologies are in the background, which seems to weaken collective actions to prevent and combat diseases such as dengue, which can lead to the occurrence of new epidemics. However, a study found that the exclusive use of mass audiovisual campaigns, normally used by the Ministry of Health, is not enough to mobilize, inform and guide the population on ways to prevent the proliferation of the *Aedes aegypti* mosquito, which causes dengue. This study also found that the population requests actions that prioritize communication by health professionals, in accessible language, with information that conveys credibility and trust (ALBARADO *et al.*, 2021). In the Epidemiological Bulletins issued weekly by the Ministry of Health, it is observed that as of EW 10 of 2020 there was a decline in the number of reports of dengue cases. A period that coincided with the intensification of health actions in the country to combat COVID-19, suggesting possible underreporting at a time when a seasonal increase in dengue cases is expected in Brazil (MASCARENHAS *et al.*, 2020), pointing to the data fragility. As well as the study by Sánchez *et al.* (2020), which mentions the risk of a Syndemic between COVID-19 and dengue in southern Mexico, Brazil, in the same period, also had this risk. Simultaneous infection worsens the epidemiological situation, makes diagnosis, control and treatment of both diseases difficult, can increase the number of deaths and cause a collapse of health systems. In addition, another study suggests that, given the history of dengue cases in the country and the presence of COVID-19, concern naturally emerged that these epidemics may be overlapping and impacting the non-diagnosis of dengue infections (WU *et al.*, 2020). In Brazil, between the years 2015 and 2020, there was a disparity in the probable cases in the different years and regions of report, as can be seen in Graph 2. It is observed that the highest prevalence of dengue, in the period from 2015 to 2020, occurred in the Southeast region, with a total of 3.4 million probable cases, representing 54%. In the North and South there were fewer cases, 2.7% and 7.3%, respectively. However, although the South region had the second lowest percentage of cases in the period, when comparing the year 2019 with 2020, the number of probable cases increased almost six times. For this region, the number of reported cases increased from 49,000 to more than 282,000, of which 266,000 (94%) were in the state of Paraná (BRASIL, 2021). In the same period, of the total number of individuals affected by dengue, more than 4.5 million (73.35%) were cured of the disease, 3.5 thousand died (0.06%) and in more than 1.6 million (26.56%) of the cases there

was no record of this information. A study by Marques, Siqueira and Portugal (2020) evaluated the incompleteness of the records of compulsory reporting of dengue cases in a municipality in Brazil and identified a high proportion of ignored and blank information for most variables of the compulsory dengue report form. It is worth noting that the correct and complete completion of these forms is a condition that makes it possible to analyze the health situation regarding the incidence of dengue in the population, make decisions based on evidence and plan public actions aimed at reducing the occurrence of this disease in the community. Just as the Southeast region presented approximately half of the probable cases of dengue, it also had 51% of the total number of deaths, with 1,816 deaths from dengue in the period studied, and followed by the Midwest (21.3%) and Northeast (16.3%) regions. In Brazil, there were 3,563 deaths from dengue, with fatality rate of 5.7 for every ten thousand probable cases. Table 1 shows the dengue lethality rate per ten thousand cases over the last six years, in each of the regions. It is identified that the South and Midwest regions stand out in relation to the number of deaths, as they had the highest lethality rates, although they are the third and fourth regions in the ranking of the number of probable cases.

Also, the highest number of deaths in the country occurred in 2017 and 2018, years with the lowest occurrence of reported probable cases. The analysis of the profile of subjects affected by dengue in Brazil was based on data available in DATASUS, with a time frame from 2015 to 2020. According to the available reports, for the period studied, the highest prevalence of probable cases of dengue was in females, 55.6%, while males represented 44.2% of the total. Regarding deaths, the highest percentage occurred among males, 52.2%. Thus, women were more affected by dengue, but the evolution of the disease to death occurred more frequently among men. It is noteworthy that 99.8% of probable cases had their sex identified and, in the case of deaths, only one of them was not classified as male or female. In a study developed by Guedes and Rocha (2019), in a municipality of Goiás, on the epidemiological profile of dengue cases in the years 2014 and 2015, a higher frequency of reports of female individuals, mixed race/color and in the age group from 20 to 59 years. Females also predominated, ranging from 54.4% to 60.4% in a study developed in Fortaleza/Ceará (OLIVEIRA *et al.*, 2018). Such results corroborate the data obtained in the present research. In addition, several factors contribute to the occurrence of dengue and, in this context, unfavorable socioeconomic conditions need to be considered. A study carried out in the state of Paraíba points out that the inadequate disposal of garbage, the fragile availability of the sewage network, the precarious access to the water network and unemployment can also explain the increase in the incidence of dengue in this state (SILVA *et al.*, 2020). In the same line of thought, research carried out in Santos/SP found a higher incidence of dengue in neighborhoods with worse socioeconomic

conditions (SANTOS and RIBEIRO, 2021). When analyzing the cases related to color/race, it was identified that brown and white colors/race represented the majority of probable cases, 31.3% and 30.9%, respectively, followed by black color/race with 3.5 %, yellow with 0.7% and indigenous with 0.2%. As for deaths, there was an inversion between browns and whites, in which the highest prevalence was in the white color/race, 42.1%, followed by brown, with 31.9%, black with 3.8%, yellow with 1.0% and indigenous with 0.3%. It is noteworthy that from the available data regarding color/race, 33.3% of probable cases and 20.8% of deaths were recorded as ignored/white. The distribution of probable dengue cases by age group is recorded in the DATASUS system, with different amplitudes. In the present study, this information was used to calculate the means and they were reorganized for the graphic representation of both probable cases and deaths. Graph 3 shows the percentage of probable cases by age group. The mean age of the individuals considered probable cases was 34.5 years; the majority (38.1%) was between 20 and 39 years old. There was no difference in the age profile, in relation to the prevalence of dengue, when the probable cases were distributed by regions of Brazil or by year of report. A study developed in Pinhalzinho/SC, from 2015 to 2016, points out that most of the reported cases had a mean age of 20 to 29 years, followed by people aged 30 to 39 years (ANDRIOLI *et al.*, 2020), demonstrating that this disease reaches a young and economically productive population. In Graph 4, the deaths caused by dengue are presented, distributed by age group. The mean age of individuals who died as a result of dengue was 54.5 years. A gradual increase in dengue deaths was observed with advancing age, suggesting that younger people have a greater chance of being cured. Individuals over 60 years old represented the highest percentage of deaths, 49.4% of cases. In an investigation carried out with 33 elderly people hospitalized for arboviruses, a higher prevalence of dengue was identified, 54.5% of the cases and most of the elderly were aged between 60 and 69 years. In these individuals, the most frequent comorbidities were systemic arterial hypertension and diabetes (VIANA, *et al.*, 2018). It is worth noting that, in the elderly population, the presence of comorbidities is frequent, which may constitute a greater risk of severity, in case they are affected by dengue.

A review study on dengue in the elderly in different countries of the world shows that elderly people have fewer typical symptoms of dengue, which can make their diagnosis difficult. Allied to this, there is a tendency for this arbovirus to increase in the older population in most regions of the world, which can increase dengue case fatality rates, given the higher risk of mortality in this population group (LIN *et al.*, 2017). Table 2 shows the dengue lethality coefficient for every 10,000 probable cases from 2015 to 2020, according to age group. It appears that younger individuals have lower lethality coefficients when compared to the others. Dengue lethality grows exponentially with advancing age, reaching 102 deaths for every 10,000 probable cases of dengue in individuals over 80 years of age, a significantly high coefficient when compared to other age groups. A study on dengue morbidity and mortality in the elderly in Brazil, from 2008 to 2015, also identified higher mortality percentages in the elderly, compared to the general population (GRACIANO *et al.*, 2017). By relating the study data from 2008 to 2015 with the current ones, from 2015 to 2020, it can be observed that the mortality rate in the elderly population remained high and higher than the others. Hence the importance of carrying out studies involving the elderly, for the development of public policies and specific protocols in the diagnosis and treatment of this disease in this age group. The magnitude and severity of diseases that are recurrent and unpredictable, such as dengue, must be continuously monitored and be on the radar of health professionals and managers, in the sense of expanding knowledge about the disease and developing technologies that can control its main vector, *Aedes aegypti*. Especially because this morbidity is a serious public health problem and can trigger pandemics and/or syndemics, with negative outcomes for the population and the health system.

CONCLUSION

The data show that in the years 2015, 2016, 2019 and 2020 there was a significant increase in the number of probable cases reported of dengue in Brazil, while in the years 2017 and 2018 there was a significant reduction compared to the previous and subsequent years. This demonstrates that the incidence of dengue fluctuates in different periods and reinforces the need for constant attention to this disease. It is noteworthy that, in addition to the increase in dengue cases, the year 2020 was marked by the COVID-19 pandemic, whose health actions focused on this morbidity. This situation may have favored the neglect of actions focused on dengue prevention by professionals, managers and the general population and, as a result, the number of cases increased and there was also underreporting of records. The study highlighted the importance of knowing and analyzing the epidemiological characteristics of dengue, given its high incidence, unpredictability and consequences. Therefore, adequate case management is necessary to prevent the spread of the disease and possible deaths resulting from it. Also, it is necessary to reinforce public policies to combat the vector mosquito, especially in endemic regions, and to implement diagnostic protocols and interventions in probable and/or confirmed cases. It is suggested that further studies on the subject be carried out to disseminate knowledge about the occurrence of dengue in Brazil.

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