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Brazil and covid-19: one country, several epidemics

Brasil e covid-19: um país, várias epidemias

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Daniela Soares Leite
Pará State University - UEPA. Center for Biological and Health Sciences. Campus VIII. Department of Morphology and Physiological Sciences. Avenida Hiléia, S/Nº. Agrópolis do Incra. Bairro Amapá. Marabá-PA, Brazil. (CEP 68502-100).
Orcid: 0000-0002-3412-1375
Email: danielaleite@uol.com.br

ABSTRACT
In Brazil, the first case of Covid-19 was confirmed on February 26, 2020, in the State of São Paulo. The first case of infected indigenous people was registered on April 1, in the state of Amazonas. On June 19, Brazil reached the mark of one million cases of Covid-19. Thus, the objective of this work was to show the profile of the pandemic in Brazilian territory, as well as among the general population and the original peoples, at a time when Brazil surpassed the mark of one million confirmed cases of Covid-19. This is a descriptive, retrospective study, conducted with secondary data available online related to confirmed cases of Covid-19 in the country. The variables of interest were: incidence, mortality, testing, effective reproduction rate (Rt). From February 25 to Jul 07, 2020 (28th epidemiological week), Brazil recorded 1.672.998 confirmed cases of Covid-19, 66.828 deaths, 976.977 of recovered cases. The highest mortality rates are in states in the North Region and the lowest in states in the South Region. Regarding indigenous groups, 8.098 confirmed cases and 184 deaths. Underreporting harms the estimates of health indicators, as well as the estimation of mathematical models predictive of the virus transmission rate. Epidemiological surveillance, testing and adequate treatment are essential at this time, as well as a regionalized look at a country of continental dimensions (with actions in the present scenario as for the future), with regard to the needs of beds, supplies and professionals and awareness of the population regarding adherence to protective measures recommended by WHO.

Keywords: Covid-19. Health Indicators. Indigenous Peoples. Epidemiological monitoring. Anthropology of Health. Pandemic.

RESUMO
No Brasil, o primeiro caso da Covid-19 foi confirmado em 26 de fevereiro de 2020, no Estado de São Paulo. O primeiro caso de indígena infectado foi registrado no dia 1º de abril, no estado do Amazonas. Em 19 de junho, o Brasil atingiu a marca de um milhão de caixas da Covid-19. Assim, o objetivo deste trabalho foi mostrar o perfil da pandemia no território brasileiro, bem como entre a população em geral e os povos originários, em um momento em que o Brasil ultrapassava a marca de um milhão de casos confirmados de Covid-19. Este é um estudo descritivo, retrospectivo, realizado com dados secundários disponíveis online relacionados a casos confirmados de Covid-19 no país. As variáveis de interesse foram: incidência, mortalidade, testes, taxa efetiva de reprodução (Rt). De 25 de fevereiro a 07 de julho de 2020 (28ª semana epidemiológica), o Brasil registrou 1.672.998 casos confirmados de Covid-19, 66.828 mortes, 976.977 de casos recuperados.

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As maiores taxas de mortalidade estão nos estados da Região Norte e as menores nos estados da Região Sul. Em relação aos grupos indígenas, 8.098 casos confirmados e 184 óbitos. A subnotificação prejudica as estimativas de indicadores de saúde, bem como a estimação de modelos matemáticos preditivos da taxa de transmissão do vírus. A vigilância epidemiológica, a testagem e o tratamento adequado são essenciais neste momento, assim como um olhar regionalizado para um país de dimensões continentais (com ações no cenário presente como no futuro), no que se refere às necessidades de leitos, insumos e profissionais e conscientização da população quanto à adesão às medidas de proteção preconizadas pela OMS.

Palavras-chave: Covid-19. Indicadores de saúde. Pessoas indígenas. Monitoramento epidemiológico. Antropologia da Saúde. Pandemia.

1 INTRODUCTION

Coronaviruses are RNA viruses that cause respiratory disease of varying severity, ranging from the common cold to fatal pneumonia. They were initially described in poultry in the 1930s, in addition to respiratory diseases, gastrointestinal, liver and neurological diseases in animals[1]. So far, it is known that seven coronaviruses cause disease in humans, three of which cause respiratory infections very most serious in humans, sometimes fatal and were responsible for large outbreaks of fatal pneumonia in the 21st century, they are Sars-CoV-2, which is the new coronavirus, identified as the etiological agent of the disease by coronavirus 2019 (Covid-19) which started in Wuhan, China in late 2019 and spread to 210 countries [2,3]; Mers-CoV, which was identified in 2012 as the etiologic agent of the Middle East respiratory syndrome (mers) and Sars-CoV, which was identified in 2002 as the etiologic agent of the severe acute respiratory syndrome epidemic (sars) [4].

The World Health Organization (WHO) declared, on January 30, 2020, that the outbreak of the disease caused by the new coronavirus (Covid-19) was characterized as a Public Health Emergency of International Importance - the highest level of alertness Organization, as provided for in the International Health Regulations. E. on March 11, 2020, Covid-19 was characterized by WHO as a pandemic. And until July 7, there were 11,500,302 cases of COVID-19 (172,512 new compared to the previous day) and 535,759 deaths (3,419 new compared to the previous day) [5]. And Brazil, on July 7, recorded 1,672 .998 cases (45,305 new compared to the previous day) and 66,828 accumulated deaths (1,254 new compared to the previous day) [6].

In Brazil, the first case of Covid-19 was confirmed on February 26, 2020. And on March 3, the country had 488 reported suspected cases, 2 confirmed and 240 discarded in the country, with no evidence of local transmission. The first two confirmed cases in the country were male, living in the city of São Paulo, SP, who had returned from a trip to Italy [7].

On March 20, 2020, community transmission of Covid-19 was recognized throughout the country[8]. The Ministry of Health was quick to respond to the confirmation of the first case of Covid-19 in the country; declares public health emergency of national importance (ESPIN) due to Human Infection with the new Coronavirus (2019-nCoV)[9], established a National Contingency Plan for Human Infection with the new Coronavirus in the event of an outbreak and defined the level of response and the corresponding command structure to be configured, at each response level[10], launched a tool to answer questions, assist in diagnosis, inform about the assistance network and guide health professionals, via messaging application[11], guided the production of simple models masks, cloth, which act as barriers in the spread of the disease[12], among other measures deemed necessary, the most recent being guidelines for the Management of Patients with Covid-19[13]. The publication of the epidemiological bulletins on Covid-19 began in January 2020.

However, the outlook is unclear and the estimates, of the number of cases and deaths by Covid-19, are not valid and reliable, due to underreporting, as well as the implementation of the suppression measures were not effective due to the contradictory recommendations of the authorities in each level of government at the beginning, in country[14]. Thus, the Covid-19 epidemic is in full swing in the country, being present in all states of the Federation.

It also affected indigenous populations, quilombolas and traditional communities. The first case of infected indigenous people was registered on April 1, in the state of Amazonas[15]. The Special Secretariat for Indigenous Health (SESAI), which is responsible for coordinating and executing the National Policy on Health Care for Indigenous Peoples and the entire management process of the Indigenous Health Care Subsystem (SasiSUS) in the Unified Health System (SUS) made information and brochures available in April and June on Covid-19 and indigenous health[16]. On May 21, the Senate approved the Bill 1142/2020, which determines emergency actions to combat the advance of Covid-19 among indigenous, quilombolas and traditional communities. The project is awaiting presidential sanction[17].

Brazil is a country of continental dimensions, and so, it presents distinct moments of the epidemic in its territory, very clear at that moment when the country surpassed the mark of one million confirmed cases, on June 19[6]. The lack of a protocol unified action against Covid-19 generated this current scenario of several epidemics in the country and different among the groups that live here.

Thus, the objective of this work was to show the profile of the pandemic in Brazilian territory, as well as among the general population and the original peoples, at a time when Brazil surpassed the mark of one million confirmed cases of Covid-19.

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2 METHODOLOGY

Descriptive, retrospective study conducted with secondary data available online related to confirmed cases of Covid-19 in the country. The variables of interest were: incidence, mortality, testing, effective reproduction rate (Rt) for the general population (Rt is a mathematical measure, representing how many people, on average, an infected individual transmits the disease and are calculated from case and death data released daily). The CSV extension file, made available online, by the Ministry of Health[6] was used, which contains a series of accumulated data from February 25 to July 7, 2020. From this spreadsheet, the incidence (for 100,000 inhabitants - 100,000 inhabitants) and mortality (for 100,000 inhabitants) were calculated for Brazil and for each state of the federation (26 states and one Federal District), using resident population estimated for 2019[18] Data for the effective reproduction rate (Rt) were obtained from a model for forecasting the number of cases and deaths of Covid-19 in Brazil built by researchers at PUC Rio[19].

For the indigenous population, which, according to the Special Secretariat for Indigenous Health (SESAI), is made up of 762,127 indigenous people, 416 ethnic groups and 6,238 villages, updated data on the situation of the coronavirus were obtained in indigenous people served by the Health Care Subsystem. Indigenous (SasiSUS). And the information is obtained from each of the thirty-four Special Indigenous Sanitary Districts (DSEI) that are divided by territorial criteria, based on the geographic occupation of the indigenous communities and thus do not obey the limits of the states. Its service structure has basic indigenous health units, base poles and Indigenous Health Support Houses (CASAI). And, after validated by the Department of Attention to Indigenous Health (DASI), these data are made available online by (SESAI)[20]. The data were organized in tables in ®Excel 2013 and in maps built in Tabwin4.15 of Data SUS.

As secondary data available online were used, the research was not submitted to an Ethics Committee on Human Research.

3 RESULTS

From February 25 to July 7, 2020 (28th epidemiological week), according to the Ministry of Health, Brazil recorded an accumulation of 1.672.998 confirmed cases of Covid-19, 66.828 deaths, 976.977 recovered cases. An incidence rate of 796.1 / 100.000 inhab. (1.672.998 /210.147.125), with a mortality rate of 31.8 / 100.000 inhab. (66.828 /210.147.125) and lethality of 4% (66.828 / 1.672.998) (Table 1). In those months, since the confirmation of the first case, the dynamics of the epidemic have changed in the country. Currently, it is present throughout the

national territory (capitals and interiors), as well as presenting varying incidence and mortality rates (Figures 1A and 1B, Table 1), when looking at all states and the Federal District.

The epidemic whose first case was confirmed in the Southeast Region6, is now more prevalent in the North Region, where all states, with the exception of Tocantins, have an incidence above 1000 / 100.000 inhabitants. And in the Northeast Region, where Maranhão and Ceará have incidences above 1000 / 100.000 inhab. In contrast, the South, Central-West (Mato Grosso do Sul, Goiás) and Southeast (Minas Gerais) regions have the lowest incidence rates, up to 493 / 100.000 inhab. (Figure 1A, Table 1).

The highest mortality rates are in states in the North Region (Amazonas, Roraima, Acre, Amapá and Pará), in the Northeast Region (Ceará and Pernambuco) and in the Southeast Region (Espírito Santo and Rio de Janeiro). And the smallest in the states of the South Region, Midwest Region (Mato Grosso do Sul and Goiás) and Southeast (Minas Gerais) (Figure 1B, Table 1).

Regarding the transmission rate (Rt), the average forecast for Brazil at the time of closing the data for this work was 1.18, with Amapá presenting the lowest rate (0.77), followed by Pará, Ceará, Pernambuco and Alagoas (up to 1) and Paraná and Roraima (1.62 and 1.64 respectively) with the highest rates. The other states have a transmission rate between 1 and 1.5. The most current estimates[19] of Rt, were calculated by state taking into account the projections made by the most current forecast model (Figure 2, Table 2).

In the analyzed period, 3.889.883 tests were carried out in the country, with an average of 1,851 tests per 100.000 inhabitants. The Federal District, led testing per 100.00 inhab., With 267. 307 tests performed (8.865 / 100.000 inhab.), While Mato Grosso was the state that performed less tests per 100.00 inhab, 25.095 (720.1 / 100.000 inhab.) (Table 2).

With regard to indigenous groups, until the data collection closure period (July 7), there were 8.098 confirmed cases and 184 deaths, recorded by the DSEI, with an overall incidence rate of 1.062,5 / 100.000 inhabitants. (8.098 / 762.127), with a general mortality of 24.1 / 100.000 inhab. 184 / 762.127) and overall lethality of 2.27% (184 / 8.098) (Table 3). When observing the geographic location of the DSEIs, it is observed that 66.3% of confirmed cases (5.365 / 8.098) and 63.5% of deaths (117/184) occurred in indigenous territories in the Amazon (North Region) (Table 3).

The DSEI Rio Tapajós currently has the highest incidence rates (5.693/ 100.000 inhab.) and mortality (75.3 / 100.000 inhab.), Higher than the rates observed for Brazil. The data, by the current geographical distribution, indicate a rapid advance of infections among the indigenous people (Table 3).

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4 DISCUSSION

After four months of the Covid-19 epidemic, Brazil has passed the milestone of 1.000.000 confirmed cases, joining the United States as the only other country in the world with six-digit cases. The WHO Report on Covid-19 of 28 June records worldwide 9.84 million cases (189.077 new cases) and 495,760 deaths (4.612 new cases). This is the highest daily incidence reported to date. As of June 30, there are more than 10.000.000 cases worldwide. The pandemic continues to accelerate[21].

WHO[22] emphasizes that if effective treatments or vaccine availability do not arise, the Region of the Americas may experience constant outbreaks of Covid-19, interspersed with periods of limited transmission, over the next two years.

In Brazil, the evolution of the epidemic occurred differently across the country since its initial identification in the Southeast Region, and currently the North Region is the region with the highest incidence (1612.6 / 100.000 inhab.) And mortality (54.9 / 100.000 hab.) by Covid-19, an indication that the epidemic should be looked at in a regionalized way.

The average of tests in Brazil was 1851 / 100.000 inhab., A number well below the recommended by the WHO, of about 10 to 30 tests per case confirmed as being a quantity of adequate tests, to have a number closer to the actual number of cases in the population[23]. The actual total number of deaths from Covid-19 is likely to be greater than the number of confirmed deaths due to limited testing and problems in attributing the cause of death. See Minas Gerais, which was one of the states with the lowest number of tests in the period (the average increased in July), as well as one of the states with the lowest mortality rate, 6.0 / 100.000 inhabitants, however, registered an increase of 648% in deaths from severe acute respiratory syndrome in 2020, when compared with retrospective data from the death records, from 2017 to 2019[24]. This deficiency of tests causes managers to use mortality data and availability of ICU beds to decide on relaxation of measures, which does not match the reality of real cases of Covid-19 in the population. Thus, testing is of paramount importance to detect the infected, isolate them and contain the pandemic's progress in the country.

The worldwide lethality rate for Covid-19 was estimated at around 0.5 to 4%. Lethality in the country so far is around 4%, higher than that predicted at the beginning of the pandemic, by WHO (3.4%)[25].

Regarding the transmission rate (Rt)[19] proposed for the country, with an average of 1.18 for the consultation period, which indicates that the epidemic is not controlled, because for a disease to be contained, it is important to make R be <1 for at least a few weeks, that is, the disease

will no longer be spreading among people. All federative units (with the exception of Amapá, Pará, Ceará, Pernambuco and Alagoas) have a transmissibility rate> 1, which can lead to an increase in incidence and mortality if preventive measures are not maintained and / or taken. And quarantine is an important measure in reaching this goal of reducing virus transmission, as it reduces the possibility of virus circulation. And, when having a disease with this lethality rate and with a certain speed of transmission, the number of cases tends to increase considerably without adequate measures to control the spread of this disease. When analyzing 29 modeling studies[26] (simulation to predict how events may occur over time), which measured the efficiency of quarantine, it was concluded that quarantine is important to reduce the number of infected and the number of deaths, as well as as, it is even more efficient when associated with other propagation control measures, such as social distance and has a much lower cost when started early.

However, a few months after the application of the quarantine, social detachment, in the country, and in some places, the *lockdown*, the Ministry of Health published guidelines for safe resumption of activities, on June 19[27]. And, from that, on at least, 17 states have enacted plans to resume activities, making the measures previously taken more flexible (quarantine, social distance, *lockdown*)[28]. If, on the one hand, states are concerned with the economic situation, on the other hand, growth can be seen. number of Covid-19 cases, as the epidemic is not yet controlled in the country. The data for the next epidemiological weeks will show the result of this resumption.

Notifications of confirmed cases in Brazil represented only 9.2% of the actual numbers. And with variations between states, with the difference between the highest rate (31.7% in Roraima) and the lowest (3.4% in Paraíba), thus suggesting that the states use different policies for conducting tests and notification[29]. Underreporting harms estimates of health indicators, as well as estimating mathematical models for the rate of virus transmission.

This lack of control in relation to the spread of the epidemic has affected indigenous peoples. In which, 66.3% of confirmed cases and 63.5% of deaths occurred in indigenous territories in the Northern Region (the current 'epicenter' of the epidemic in the country). And the health-disease process of indigenous peoples, presents multiple perspectives, due to the socio-cultural particularities of each ethnic group (particularities that must be respected in the course of the pandemic), as well as it is related to processes of social, economic, environmental, demographic changes and national society[30].

Underreporting is also reported for indigenous peoples. Parallel to the bulletins published by SESAI, the Articulation of Indigenous Peoples of Brazil (APIB) (which is a body of

agglutination and national reference of the indigenous movement in Brazil)[31], surveys the situation of Covid-19 in indigenous peoples. The numbers obtained by APIB are higher than those recorded by SESAI. For example, for the study period (data updated until July 7, 2020), APIB recorded 12.048 confirmed cases and 446 accumulated deaths, while SESAI registered 8.098 confirmed cases and 184 accumulated deaths. This discrepancy is due to the fact that SESAI records only the data on homologated indigenous lands. The compilation of data from APIB has been done by the National Committee for Indigenous Life and Memory and by APIB[31]-based indigenous organizations. On June 29, APIB launched a Plan to Confront Covid-19 'Indigenous Emergency, whose objective is to raise funds to promote direct cooperation actions to confront Covid-19.

Brazil is a country of continental dimensions, socioeconomic and cultural differences, and these vulnerabilities must be looked at in the fight against the pandemic. The passage of time, due to the delay in initiating measures to contain the spread of the virus, allowed the most diverse panoramas for the epidemic in Brazilian territory, including the arrival of the virus to traditional populations. Epidemiological surveillance, rapid diagnosis and adequate treatment are essential at this time, as well as health authorities have to have a regionalized look (implement actions for both the present and the future scenario), regarding the needs of beds, supplies and professionals . And, as important as these measures, is the population's awareness of the epidemic and adherence to the maintenance of the protection measures recommended by WHO[5], as well as adequate support for traditional populations (indigenous, quilombolas).

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Figure 1 - In A, estimate of the incidence rate for the period from 25 February to 7 July 2020; in B, estimate of the mortality rate for the period from February 25 to July 7, 2020. In both, the diameters of the circles are proportional to the numbers in each state and in the Federal District.

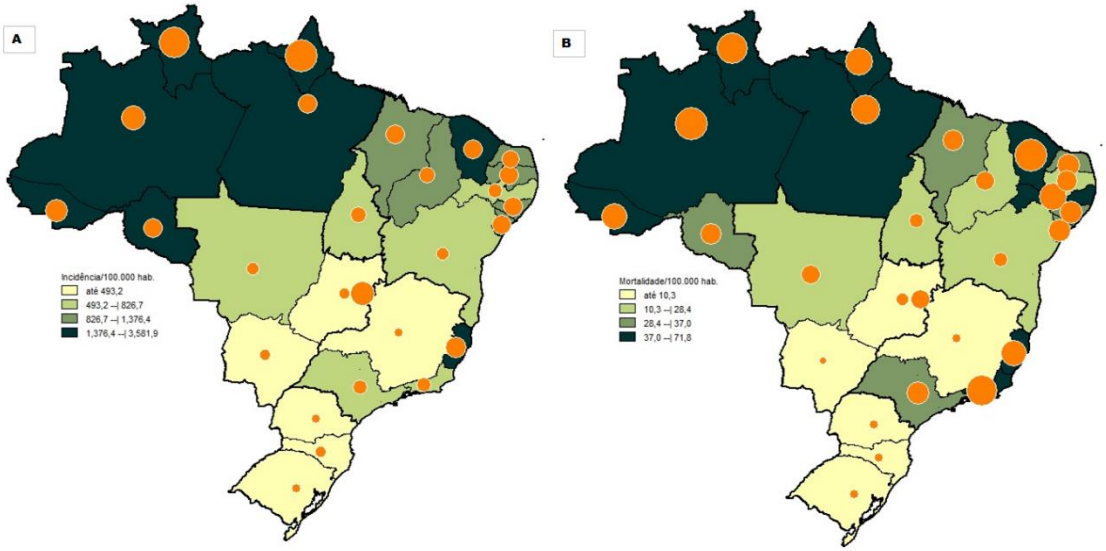

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Table 1 - Epidemiological data from Brazil, up to the 28th epidemiological week.

Federative Units and Federal District *	Total accumulated cases	Deaths	Incidence / 100.000 inhab.	Mortality / 100.000 inhab.
Rondônia	24564	577	1382,1	32,4
Acre	14941	399	1694,1	45,2
Amazonas	79167	2952	1910,1	71,2
Roraima	19088	376	3151,0	62,0
Pará	118744	5169	1380,2	60,0
Amapá	30294	455	3581,9	53,7
Tocantins	13004	228	826,7	14,4
Maranhão	92088	2286	1301,5	32,3
Piauí	27514	834	840,5	25,4
Ceará	126142	6563	1381,3	71,8
Rio Grande do Norte	35820	1291	1021,4	36,8
Paraíba	54802	1145	1363,8	28,4
Pernambuco	66151	5234	692,1	54,7
Alagoas	41524	1192	1244,2	35,7
Sergipe	31640	851	1376,4	37,0
Bahia	91954	2216	618,2	14,8
Minas Gerais	60897	1282	287,6	6,0
Espírito Santo	56703	1880	1410,9	46,7
Rio de Janeiro	124086	10881	718,7	63,0
São Paulo	332708	16475	724,5	35,8
Paraná	34308	851	300,0	7,4
Santa Catarina	35342	420	493,2	5,8
Rio Grande do Sul	33800	793	297,0	6,9
Mato Grosso do Sul	10687	128	384,5	4,6
Mato Grosso	22406	857	643,0	24,5
Goiás	31930	726	454,9	10,3
Distrito Federal	62694	767	2079,2	25,4
Brasil	1672998	66828	796,1	31,8

Source: Ministry of Health [6] * Changes may occur, for the period, due to corrections in the bulletins, such as late results and identification of the person's place of residence.

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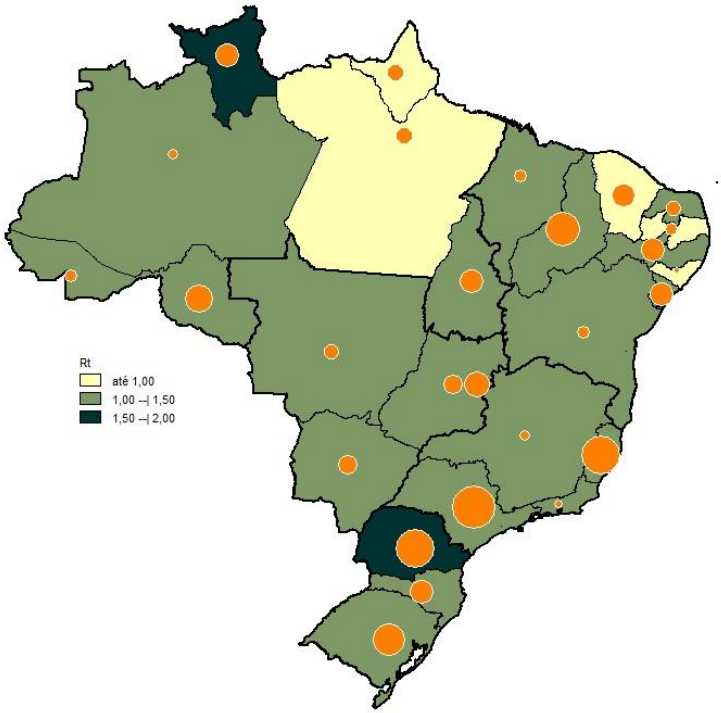
Figure 2 - Estimated transmission rate (R), on the last day of the analysis period. The circles correspond to the number of days that each State and the Federal District are in the same Rt range



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Tabe 2: Number of tests performed in the country, in the analyzed period and transmission rate (R) on the last day of the analysis.

Federative Units and Federal District *	Tests *	Tests / 100.000 inhabitants .**	Rt**	Days in this range **
Rondônia	84745	4768.3	1,03	26
Acre	34332	3026,9	1,07	6
Amazonas	174415	4208.2	1,04	4
Roraima	22474	3710.0	1,64	19
Pará	125097	1454.1	0,93	11
Amapá	52726	6234	0,77	11
Tocantins	22854	1453.0	1,31	19
Maranhão	184443	2606.9	1,03	6
Piauí	119901	3663.0	1,35	43
Ceará	306145	3352.4	0,98	20
Rio Grande do Norte	89065	2539.7	1,24	7
Paraíba	156612	3897.6	0,98	6
Pernambuco	129972	1359.9	1,19	21
Alagoas	86736	2598.9	1	1
Sergipe	55826	2428.5	1,05	19
Bahia	268503	1805.2	1,34	5
Minas Gerais	242456	1145.3	1,39	4
Espírito Santo	118678	2953.1	1,16	53
Rio de Janeiro	150441	871.3	1,05	3
São Paulo	602384	1311.8	1,11	64
Paraná	126816	1109.1	1,62	54
Santa Catarina	143943	2009.0	1,5	18
Rio Grande do Sul	182819	1606.8	1,32	38
Mato Grosso do Sul	54909	1975.8	1,26	13
Mato Grosso	25095	720.1	1,4	7
Goiás	61189	871.8	1,08	13
Distrito Federal	267307	8865.1	1.25	24
Brasil	3889883	1851.0	1,18	-

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Table 3 - Epidemiological data of Special Indigenous Health Districts (DSEIs).

DSEI	Federative Units	Population	Incidence per 100.000 inhab.	Mortality per 100.000 inhab.	Confirmed	Deaths
Alagoas e Sergipe	AL	12479	697,1	16	87	2
***Altamira**	PA	4323	3423,5	-	148	0
***Alto Rio Juruá**	AC	18208	1142,3	22	208	4
***Alto Rio Negro**	AM	28858	1323,7	3,17	382	11
***Alto Rio Purus**	AC	12597	1475,5	31,7	186	4
***Alto Rio Solimões**	AM	70823	1145,1	36,7	811	26
***Amapá E Norte Do Pará**	AP	12964	3818,2	7,7	495	1
Araguaia	MT	6290	63,5	-	4	0
Bahia	BA	32449	178,4	3	58	1
Ceará	CE	35757	939,6	11,2	336	4
Cuiabá	MT	8667	1107,6	69,2	96	6
***Guamá-Tocantins**	PA	17198	3709.7	93	638	16
Interior Sul	SC	38945	739,5	15,4	288	6
Kaiapó Do Mato Grosso	MT	4939	101,2	-	5	0
***Kaiapó Do Pará**	PA	6152	7719,6	113,7	468	7
***Leste De Roraima**	RR	51797	737,5	21,2	382	11
Litoral Sul	PR	24699	498	4	123	1
***Manaus**	AM	29506	881,1	33,8	260	10
Maranhão	MA	37167	2335,4	37,6	868	14
Mato Grosso Do Sul	MS	80841	220,1	2,4	178	2
***Médio Rio Purus**	AM	10721	242,5	9,3	26	1
***Médio Rio Solimões E Afluentes**	AM	20264	834	34,5	169	7
Minas Gerais e Espírito Santo	MG	16787	238,2	-	40	0
***Parintins**	AM	17130	379,5	17,5	65	3
Pernambuco	PE	39543	346,4	7,5	137	3
***Porto Velho**	RO	13407	484,8	15	65	2
Potiguara	PB	15374	930,1	-	143	0
***Rio Tapajós**	PA	13279	5693,2	75,3	756	10
Tocantins	TO	12531	662,4	-	83	0
***Vale Do Javari**	AM	6281	1958,3	-	123	0
***Vilhena**	RO	5933	202,3	-	12	0
Xavante	MT	21433	853,8	98	183	21
Xingu	MT	8000	700	25	56	2
***Yanomami**	RR	26785	638,4	15	171	4
Total	-	762127	625,7	16,8	8098	184

* Located in the North Region (Amazon) Source: SESAI [20]