

Profile of Covid-19 notified and confirmed cases in the period from April and May 2020 in the Federal District

Perfil dos casos notificados e confirmados de Covid-19 entre abril e maio de 2020 no Distrito Federal

Perfil de casos notificados y confirmados de Covid-19 entre abril y mayo de 2020 en el Distrito Federal

Elias Rocha de Azevedo Filho¹, Isabella Reis Praça², Luciola Silva Sandim³, Rafaela Ramos⁴, Maria Liz Cunha de Oliveira⁵, Lucy de Oliveira Gomes⁶

How to cite: Azevedo Filho ER, Praça IR, Sandim LS, Ramos R, Oliveira MLC, Gomes LO. Profile of Covid-19 notified and confirmed cases in the period from April and May 2020 in the Federal District. REVISA. 2020; 9(Esp.1): 646-55. Doi: <https://doi.org/10.36239/revisa.v9.nesp1.p646a655>

REVISA

1. Centro Universitário Planalto do Distrito Federal. Brasília. Federal District, Brazil.

<https://orcid.org/0000-0002-1991-2558>

2. Centro Universitário de Brasília. Brasília. Federal District, Brazil.

<https://orcid.org/0000-0001-9962-0100>

3. Centro Universitário de Goiatuba. Goiatuba, Goias, Brazil.

<https://orcid.org/0000-0002-6541-0014>

4. Universidade Católica de Brasília. Brasília. Federal District, Brazil.

<https://orcid.org/0000-0002-5918-5850>

5. Universidade Católica de Brasília. Brasília. Federal District, Brazil.

<https://orcid.org/0000-0002-5945-1987>

6. Universidade Católica de Brasília. Brasília. Federal District, Brazil.

<https://orcid.org/0000-0002-6673-5507>

Received: 10/04/2020

Accepted: 5/06/2020

RESUMO

Objetivo: Descrever o perfil epidemiológico e destacar a análise demográfica dos casos notificados e confirmados de COVID-19 no sistema de informação e agravos de notificação no Distrito Federal – Brasil. **Método:** Estudo descritivo de pesquisa documental e análise de dados secundários da vigilância epidemiológica do Boletim Epidemiológico de 09.05.2020. **Resultados:** Foram confirmados 2.576 casos da doença, 1.595 (61,9%) do sexo masculino, com idade média de 39 anos, 165 (0,16%) hospitalizados, 66 (2,5%) em Unidade de Terapia Intensiva. **Conclusão:** Confirmou-se a circulação do coronavírus humano no Distrito Federal nesse período e seu caráter de virulência relacionado a uma patologia pública de maior gravidade; dos 2.576 casos notificados e confirmados da doença, o maior número absoluto está na faixa etária de 30 a 39 anos e maior letalidade (1,6%) por faixa etária está no grupo de 80 ou mais.

Descritores: Perfil epidemiológico; COVID-19; Epidemiologia.

ABSTRACT

Objective: to describe the epidemiological profile and to highlight the demographic analysis of the cases notified and confirmed by COVID-19 in the information system and notification conditions in the Federal District - Brazil. **Method:** a descriptive study of documentary research and analysis of secondary epidemiological data from the Epidemiological Bulletin of 09.05.2020. **Results:** 2,576 cases of disease were confirmed, 1,559 (61.9%) were male, with an average age of 39 years, 165 (0.16%) hospitalized, 66 (2.5%) in the Intensive Care Unit. **Conclusion:** A circulation of human coronavirus in the Federal District was confirmed during this period and its virulence character related to a more serious public pathology; of the 2,576 notified and confirmed cases of the disease, the highest absolute number is in the age group of 30 to 39 years and the highest lethality (1.6%) by age group is not in the group of 80 or more..

Descriptors: Epidemiological profile; COVID-19; Epidemiology.

RESUMEN

Objetivo: Describir el perfil epidemiológico y destacar el análisis demográfico de los casos notificados y confirmados de COVID-19 en el sistema de información y las condiciones de notificación en el Distrito Federal - Brasil. **Método:** Estudio descriptivo de investigación documental y análisis de datos secundarios de la vigilancia epidemiológica del Boletín Epidemiológico del 05/09/2020. **Resultados:** se confirmaron 2.576 casos de la enfermedad, 1.595 (61,9%) eran hombres, con una edad promedio de 39 años, 165 (0,16%) hospitalizados, 66 (2,5%) en la Unidad de Cuidados Intensivos. **Conclusión:** se confirmó la circulación del coronavirus humano en el Distrito Federal en este período y su carácter de virulencia relacionado con una patología pública más grave; de los 2.576 casos notificados y confirmados de la enfermedad, el número absoluto más alto está en el grupo de edad de 30 a 39 años y la mayor letalidad (1,6%) por grupo de edad está en el grupo de 80 o más..

Descriptores: Perfil epidemiológico; COVID-19; Epidemiología.

ORIGINAL

Introduction

The coronavirus has been a viral family known to the scientific community since 1960. Seven main types of human coronavirus (CoVh) are known to exist, four of which are responsible for 5% to 10% of mild acute respiratory disorders. They are: HCoV-OC43, HCoV-HKU1, HCoV-229E and HCoV-NL63. Three other types are known to cause severe respiratory syndromes: MERS-CoV (Middle East Respiratory Syndrome), SARS-CoV and SARS-CoV-2 (Severe Acute Respiratory Syndrome).¹⁻²

On December 31, 2019, a new pathogen named SARS-CoV-2 emerged. This new coronavirus produces the disease classified as COVID-19 (from English, Coronavirus Disease 2019), being the causative agent of a series of pneumonia cases in the city of Wuhan, in the province of Hubei (China), in exposed people who were in a market seafood and live animals.³

Based on China's notification of the new pathology, the World Health Organization (WHO) announced to the world, between 11 and 12 January 2020, the existence of the outbreak caused by COVID-19, which constituted a Health Emergency Publication of International Relevance (ESPII), the Organization's highest level of alert, as provided for in the International Health Regulations. That same day, after meeting with experts, WHO declared that COVID-19 was classified as a pandemic.⁴⁻⁶

For an effective growth control of a newly identified virus, it is necessary, initially, to understand its patterns of infection and pathogenicity as soon as possible, in order to provide information about the outbreak and develop prevention and control strategies.⁷

The main parameter to assess the intensity of transmission of an infectious disease is the Basic Reproduction Number of the disease (R_0), established as an indicator of the epidemic threshold; its analysis enables the understanding of the dynamics of the spread of the disease and the definition of strategies for its control.⁸ In the case of SARS-CoV-2, the initial estimates vary from 1.6 to 4.1.⁹⁻¹¹ In general, the available information indicates that the main transmission mode of the new coronavirus is similar to the flu, that is, from one person to another from droplets eliminated by coughing or sneezing, hands contamination with respiratory secretions, by direct (shaking hands) or indirect (touching contaminated surfaces) contact followed by oral, nasal or ocular mucosa contact; however, infection does not occur through the skin and aerosol transmission of SARS-CoV-2 has not been ruled out.¹²

Coronaviruses are a group of enveloped RNA viruses, which is ubiquitous in humans, and can have several hosts, including birds, such as chickens, turkeys and pheasants, and mammals, such as pigs, cats, cattle and bats, which can cause respiratory and digestive disorders, liver and central nervous system. Coronaviruses are adept at adapting to new environments through mutations and recombination with relative dexterity.¹³

Among the viruses routinely associated with Severe Acute Respiratory Syndrome (SARS), the human coronavirus (CoVh) stands out as an emerging etiological agent classified in the order Nidovirales, family Coronaviridae, and is divided into four genera, which can produce enteric, respiratory diseases, hepatic and neurological, with intensity ranging from mild to severe: alphacoronavirus, betacoronavirus, gammacoronavirus and deltacoronavirus.¹⁴⁻¹⁵ Investigations conducted in different countries have shown that SARS-CoV-2

is associated with the genus of betacoronaviruses.¹⁵⁻¹⁶

Considering that the clinical manifestation of COVID-19 is complex, four phenotypes have been identified of varying severity.¹⁷ Some cases are identified with mild symptoms while others are asymptomatic carriers, but both symptomatic and asymptomatic patients are contagious, which leads to difficulty in identifying cases. Attention should be paid to the disease spectrum and transmission modes, to address problems such as rates of asymptomatic infections and whether a patient is contagious during the incubation period. Chinese study showed that overall mortality from the disease is 2.3%.¹⁶

COVID 19 affects individuals of all age groups, although the elderly and those with chronic or immunodepressed diseases are more vulnerable to the most severe forms. The manifestations of the disease can vary from mild involvement of the upper respiratory tract (rhinorrhea, sore throat) to severe pulmonary involvement, with lethal potential. Thus, the average lethality of COVID-19 depends on factors such as age and the presence of associated diseases, being estimated at 2.5%.¹⁸

Patients with SARS-CoV2, in addition to presenting pneumonia due to infection, may show lymphopenia (in 63% of cases), muscle pain (in 11% of cases), malaise, rhinorrhea, confusion, sore throat, pain chest pain, increased respiratory secretions, nausea, vomiting and diarrhea (rarely).^{4-5,19}

Regarding the transmission of SARS-CoV-2, it is suspected that it occurs with greater intensity after the onset of the disease's manifestations; however, the exact period for transmissibility, as well as the risk of transmission during the incubation period (2-14 days) for COVID-19, has not yet been established.¹⁸

To date, studies have not defined the accuracy or incubation cycle of SARS-CoV-2. However, based on the knowledge about SARS-CoV and MERS-CoV, it is suggested that the SARS-CoV-2 incubation period can arrive in 14 days.^{5,20}

Since it is a new virus, susceptibility to it is universal. As for immunity, it is not yet possible to say whether infection in humans will generate immunity against new infections and whether that immunity will last for a lifetime. What is known is that the projection in relation to the numbers of cases is closely linked to transmissibility (RO) and individual susceptibility.²¹⁻²²

Given these facts, this study aimed to describe the epidemiological and demographic profile of notified and confirmed cases of COVID-19 in the Federal District, Brazil.

Method

This is a descriptive study, with documentary research and analysis of secondary data.

The variables analyzed included: cumulative number of positive cases; deaths of residents; distribution, incidence and frequency of confirmed hospitalized cases; lethality rate; and geographical distribution of disease incidence.

The present study was carried out in the Center-West region of Brazil, in the Federal District, which, according to an estimate by the Brazilian Institute of Geography and Statistics (IBGE), has a resident population in Brasília of 2,972,209 inhabitants, with an increase of 14% in the last census until 2018.²³ The male population represents 48% and the female, 52%, with an average life

expectancy of 79 years, data that are directly related to the continuous increase in the aging rate.

The sample included all individuals of any age with symptoms of fever, tiredness and dry cough and, sometimes, pain, nasal congestion, runny nose, sore throat and diarrhea. In severe cases, those with dyspnea, O₂ saturation <95% or respiratory distress were included.

All confirmed and notified cases were analyzed in the Information System and Notifiable Diseases (SINAN) within the scope of the DF, Brazil, published in the Epidemiological Bulletin of the Secretariat for Health Surveillance, of the Secretariat of State and Health, in the period between April 3 and May 9, 2020.

According to Epidemiological Bulletin No. 6 of the Public Health Emergency Operations Center COVID-1924, in Brazil, the incidence coefficient per 100,000 inhabitants was calculated considering the IBGE projection for 2020, which has the highest incidence coefficients recorded in the Southeast regions (6.4/100,000), Midwest (3.6/100,000) and South (3.2/100,000). Among the Federated Units (UF), the highest rates were registered in the Federal District (13.2/100,000), Sao Paulo (8.7/100,000), Ceara (6.8/100,000), Rio de Janeiro (6.2/100,000) and Amazonas (6.2/100,000).

For the calculation of incidence, in the numerator, cases confirmed by state of residence were considered, and in the denominator, the resident population by UF and year, the result being multiplied by 100 thousand, according to the following calculation method:

$$\text{INCIDENCE} = \frac{\text{Number of new cases occurred in a place X in a given time}}{\text{Total number of individuals in the base population (at risk) of place X at a given time}} * 10^n$$

The lethality rate is commonly used to determine the proportion of fatal cases among the total number of cases; and thus assess the severity of an epidemic.²⁵ To calculate the lethality in the Federal District, the number of death records by COVID-19 was considered in the numerator among the cases classified as confirmed that were reported in SINAN.

$$\text{LETALITY} = \frac{\text{Number of deaths caused for the disease A}}{\text{Total cases of disease A}} * 10^n$$

The study used aggregated secondary data, of public domain, presented in a consolidated form and with complete omission of the subjects' identity, available in the database of the Health Surveillance Secretariat of the Federal District, Brazil. For this reason, it was not necessary to submit and analyze an Ethics in Research Committee (CEP). This research followed the criteria of Resolution No. 510/2016, of the Brazilian National Council for Ethics in Research (CONEP).

Results

According to the analysis of the reports referring to the Epidemiological Bulletin of the Secretariat for Health Surveillance, released from April 3 to May 9, 2020 (Table 1), within the scope of the DF, the number of notified and confirmed cases is monitored: 1) In a publication of 03.04.2020, 419 cases of COVID-19 are reported, where 381 (94%) are residents of Federal District; 2)

The bulletin released on April 6, 2020 exposes 485 cases, 440 (94%) residents of the Federal District; 3) On 08.04.2020, 509 cases were confirmed and, from the notified cases, 472 (93%) were residents of Federal District; 4) As of 10.04.2020, there were 556 cases, notified 518 (94%) were living in Federal District; 5) On April 22, 2020, 959 confirmed cases and 898 (94%) residents of the Federal District; 6) On April 25, 2020, 1,020 cases were confirmed, of which 946 (93%) of the notified cases were residents of the Federal District; 7) Up to 5 pm on May 9, 2020, 2,576 confirmed cases were notified in the Federal District. With regard to the residence place (Table 1), 2,350 (91%) were living in Federal District and 179 (7%) were living in other Federation Units, with the surrounding municipalities accounting for the highest proportion of cases.

Table 1- Distribution, frequency, incidence of cases per 100 thousand inhabitants, according to Health Region and Administrative Region. Federal District, 03.04.2020 to 05.05.2020.

Epidemiological bulletin of Federal District from 03/04/2020 to 09/05/2020														
Health Region	03/04/20		06/04/20		08/04/20		10/04/20		22/04/20		25/04/20		09/05/20	
	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%
South-west	81	21,3	93	21,1	103	21,8	115	22,2	186	21,0	197	20,8	507	21,6
Central	227	59,6	258	58,6	567	56,6	283	54,6	344	38,8	349	36,9	573	24,4
South Center	35	9,2	40	9,1	44	9,3	49	9,5	96	10,8	105	11,1	258	11,0
North	9	2,4	9	2,0	11	2,3	14	2,47	32	3,6	35	3,7	137	5,8
South	9	2,4	17	3,9	20	4,2	24	4,6	47	5,33	51	5,34	145	6,2
West	16	4,2	17	3,9	17	3,6	19	3,7	38	4,3	48	5,1	136	5,8
East	4	1,0	6	1,4	10	2,1	14	2,7	144	16,2	161	17,0	140	6,0
Total	381	100	440	100	472	100	518	100	887	100	946	100	2.350	100

Source: Research conducted in 2020 with data secondary to the COVID-19 PANEL. Directorate of Epidemiological Surveillance / SVS / SESDF.²⁶

Table 2 presents, in an objective way, the numerical distribution of notified and confirmed disease cases by Administrative Region (AR) of Federal District, in the bulletins released on 03 and 25.04 and 09.05.2020: 1) On 03.04.2020, are the AR in that order: Plano Piloto - 118 (31%), followed by Lago Sul - 57 (15%), Aguas Claras - 56 (13.1%), Octogonal Southwest - 32 (8.4%) and Guara - 24 (6.3%); 2). On April 22, 2020, Plano Piloto presented the largest number of confirmed cases of the disease - 200, followed by Aguas Claras - 92, Lago Sul - 66, Guara - 48 and Sudoeste / Octogonal - 43; 3) On May 9, 2020, the AR were, respectively: Plano Piloto - 326, Aguas Claras - 206, Lago Sul - 118, Guara and Taguatinga - 112, Samambaia - 111 and Ceilandia - 109.

On April 25, a change in the outlook is noted, as the five AR mentioned above had an incidence 50% higher than the Federal District, which is 30.99. And on May 9, 2020, another perspective was observed: four RA, hitherto not mentioned, Vicente Pires, Taguatinga, Samambaia and Ceilândia, had an incidence 50% above of the FD, which is 29.4.'

Table 2- Distribuição, frequência, incidência de casos por 100 mil habitantes, segundo Região de Saúde e Região Administrativa. Distrito Federal, 03.04, 25.04 e 09.05.2020.

AR	03/04		25/04		09/05	
	Nº	%	Nº	%	Nº	%
Plano Piloto	118	31,0	205	21,7	326	13,9
Lago Sul	57	15,0	95	10,0	206	8,8
Águas Claras**	50	13,1	66	7,0	118	5,0
Sudoeste Octogonal	32	8,4	54	5,7	116	4,9
Guara	24	6,3	43	4,5	76	3,2

Source: Research conducted in 2020 with secondary data from BE Public Health Emergency COVID. Directorate of Epidemiological Surveillance/SVS/ SES-DF.²⁶⁻²⁸

Table 3 shows the lethality rate by region. On April 22, 2020, 25 deaths were recorded, which represents a lethality percentage of 2.8%; with the highest rates recorded in the Southwest health regions, followed by Center-South, South, West, Central and East. On April 25, 2020, 26 deaths were recorded, which represented a lethality of 2.7%. The fourth position was maintained from fourth to seventh in relation to April 22, however, there was an inversion; the Center-South region came to occupy the first position and the Southwest and Central regions, 2nd and 3rd places, respectively. In a May 9 publication, 38 deaths and 1.6% lethality were resumed; the Center-South, Southwest, South and West regions maintained from the first to the fourth position of lethality.

Table 3- Data referring to the lethality rate of COVID -19 by Federal District, 22.04.2020 to 09.05.2020.

Epidemiological bulletin by health regions of Federal District						
Health Region	22/04		25/04		09/05	
	Nº	%	Nº	%	Nº	%
South-west	5	2,7	5	2,5	11	2,2
Central	3	0,9	3	0,9	3	0,5
South Center	6	6,3	7	6,7	9	3,5
North	0	0,0	0	0,0	1	0,7
South	5	10,6	5	9,8	6	4,1
West	4	10,5	4	8,3	6	4,4
East	2	1,4	2	1,2	2	1,4
Total	25	2,8	26	2,7	38	1,6

Source: Adapted from the Directorate of Epidemiological Surveillance /SVS/SES-DF.^{26,28-29}

The number of deaths confirmed by COVID-19 was presented by AR, on April 26, 2020: Guará - 3, Águas Claras - 2, Riacho Fundo - 2 presented the highest numbers. On April 25, 2020, the ARs with the highest number of deaths confirmed by COVID-19 were: Ceilândia - 4, Guará - 3 and Gama - 3. On May 9, 2020, the RA that presented the highest numbers were: Ceilândia - 6, Águas Claras - 5, Guará - 4 and Gama - 4. Only the RA Vicente Pires, Cruzeiro, Lago Norte, Varjão do Torto, Candangolândia, Parkway, Riacho Fundo II, SIA, Fercal, Sobradinho I, Sobradinho II, Brasilândia, Itapoã, Paranoá and São Sebastião did not present confirmed deaths from COVID-19.

The epidemiological bulletin of May 9, 2020 still points out that, of the victims of COVID-19 in DF, 74% had at least one risk factor. The most frequent

morbidity was associated heart disease, present in 27 of the deaths, followed by metabolic disorders (in 15 deaths), pneumopathy (in 7 deaths), immunosuppression (in 4 deaths) and obesity (in 7 deaths). Of these, 22 (56.4%) were male. Among the deaths confirmed by COVID-19, the informed profession - there was 1 (2.6%) public security and 2 (5.6%) health professionals. The age group of people from 70 to 79 years old presented the highest lethality, followed by the group of 80 years and over. There was no difference in the proportion of cases that evolved to death in relation to gender and all cases were over 60 years old or had comorbidity.

Discussion

The COVID-19 pandemic generated an unprecedented crisis in a short space of time. The long-term impacts will depend on how quickly the new coronavirus will be beaten. It is important to emphasize that the population's immunization time by the virus is not yet known, but it is estimated that it may be weeks or even months, according to what was previously observed in cases of infection by MERS-CoV and SARS-CoV.³⁰⁻³¹

In the case of SARS-CoV2, the average incubation period for the infection is 5.2 days, with an interval that can reach up to 12.5 days.⁷ The transmissibility of patients infected with SARS-CoV is, on average, 7 days after the onset of symptoms. However, according to preliminary data, it is suggested that transmission may occur even without the appearance of signs and symptoms. So far, there is not enough information to define how many days before the onset of signs and symptoms an infected person starts transmitting the virus.³²

In the cases classified as confirmed for the pandemic COVID-19, there is a slight increase in the lethality of AR in the Federal District, with the highest incidence, around 6 (5.5%) cases, is Ceilândia, followed by Águas Claras (lethality 5; 2.4%), Guarã (lethality 4; 3.4%), Gamma (lethality 4; 3.4%). This can be an important finding because it demonstrates the severity of the infection, or it can be a warning bias of the services, since these are relevant data for surveillance and assistance to the population known to be at greatest risk.

The higher parity of comorbidities cataloged in the classified cases suggests that the population was oriented about the characteristics of the symptoms of COVID-19 infection, alert to risk conditions and oriented to seek health services. This suggests, therefore, the sensitivity of the health system to risk groups, showing that the quality of care may have favored less lethality.

However, it is necessary to encourage local surveillance levels to be trained and make extensive use of data from information systems, in order to make urgent decisions, improving quality and making them effective for those for whom they are intended.

Among the limitations of this study, the absence of relevant secondary information in the database that could guide the best view of the situation in the DF is highlighted. In addition, the underreporting of COVID-19 cases that may exist in the studied region, which results in greater difficulty in obtaining accurate data in the characterization of the reported cases.

Conclusion

Based on the foregoing, the epidemiological profile of the notified and confirmed cases of COVID-19 in DF - Brazil is similar to the profile of cases reported in the scientific literature; of the 2,576 notified and confirmed cases of the disease, the highest absolute number is in the age group of 30 to 39 years and the highest lethality (1.6%) by age group is in the group of 80 or more.

Therefore, we recommend to monitor their circulation among the population of the region, so that reliable epidemiological data are generated, as well as to map the existence of a seasonality profile. In this way, sufficient information will be provided for prophylactic alternatives to be created in order to reduce the risk of infection by SARS-CoV-2.

Acknowledgement

This work was carried out with the support of the Coordination for the Improvement of Higher Education Personnel - Brazil (CAPES) - Financing Code 001.

References

1. Chen Y, Liu Q, Guo D. Emerging coronaviruses: Genome structure, replication, and pathogenesis. *J Med Virol* [Internet]. 2020; 92(4):418-423. DOI: <https://dx.doi.org/10.1002/jmv.25681>.
2. Silva DF, Oliveira MLC. Epidemiologia da COVID-19: comparação entre boletins epidemiológicos. *Com. Ciências Saúde* 2020;31 Suppl 1:61-74.
3. McIntosh K. Novel Coronavirus (2019-nCoV) [Internet]. Updated Jan 2020 [cited 2020 Mar 5]. Available from: <http://www2.ebserh.gov.br/documents/1688403/5111980/4.pdf/49227786-d768-470e-9ea2-7e021aa96cc9>.
4. Secretaria de Vigilância em Saúde (Brasil). Boletim Epidemiológico COE nº 02. Infecção Humana pelo Novo Coronavírus (2019-nCoV). Brasília: MS; 7 fev. 2020 [citado 2020 abr 4]. Disponível em: <https://portal.arquivos2.saude.gov.br/images/pdf/2020/fevereiro/07/BE-COE-Coronavirus-n020702.pdf>.
5. Federação Farmacêutica Internacional; Conselho Federal de Farmácia. Orientação Sanitária da FIP. Epidemia por Coronavírus SARS-CoV-2: Informações e diretrizes provisórias para farmacêuticos e colaboradores da farmácia. Tradução de Gonçalo Sousa Pinto. The Hague: FIP/CFF; 2020 fev [citado 2020 mar 19]. Disponível em: <https://www.fip.org/coronavirus>.
6. Organização Pan-Americana da Saúde. Coronavírus: Tire suas dúvidas sobre o novo coronavírus (COVID-19). Brasília: OPAS Brasil; 2020 fev [citado 2020 mar 29]. Disponível em: https://www.paho.org/bra/index.php?option=com_joomlabook&view=topic&id=52.
7. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical Characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* 2020. doi: 10.1001/jama.2020.1585.
8. Mello MHPL, Silva RFD. O número básico de reprodução de uma doença e a matriz próxima geração. *Cadernos do IME - Série Matemática* 2019; 13. DOI: <https://doi.org/10.12957/cadmat.2019.47043>
9. Liu T, Hu J, Kang M, Lin L, Zhong H, Xiao J, et al. Transmission dynamics of 2019 novel coronavirus (2019-nCoV). *BioRxiv* [Internet]. Updated 26 Jan 2020. DOI: <https://doi.org/10.1101/2020.01.25.919787>.

10. Cao Z, Zhang Q, Lu X, Pfeiffer D, Jia Z, Song H, et al. Estimating the effective reproduction number of the 2019-nCoV in China. medRxiv [Internet]. Updated; 2020 Jan 29. DOI: <https://doi.org/10.1101/2020.01.27.20018952>.
11. Fundação Oswaldo Cruz [Internet]. Como o coronavírus é transmitido? Rio de Janeiro: Fiocruz; 2020 fev 3 [citado 2020 mar 14]. Disponível em: <https://portal.fiocruz.br/pergunta/como-o-coronavirus-e-transmitido>.
12. Li S, Lin L, Wang H, Yin J, Ren Y, Zhao Z, et al. The Epitope Study on the SARS-CoV Nucleocapsid Protein. Genomics, Proteomics & Bioinformatics 2003 Aug; 1(3): 198-206. [https://doi.org/10.1016/S1672-0229\(03\)01025-8](https://doi.org/10.1016/S1672-0229(03)01025-8). PMID: 15629032; PMCID: PMC5172353.
13. Woo PC, Lau SK, Huang Y, Yuen KY. Coronavirus Diversity, Phylogeny and Interspecies Jumping. Exp Biol Med (Maywood) 2009; 234:1117-1127. <https://doi.org/10.3181/0903-MR-94>.
14. Perlman S, Netland J. Coronaviruses post-SARS: update on replication and pathogenesis. Nat Rev Microbiol 2009; 7:439-450. doi: 10.1038/nrmicro2147.
15. Centers for Disease, Control and Prevention. Epi Info™, Division of Health Informatics & Surveillance (DHIS), Center for Surveillance, Epidemiology & Laboratory Services (CSELS); 2019 Dec 12 [cited 2020 Mar 15]. Available from: https://www.cdc.gov/epiinfo/por/pt_index.html.
16. Chinese Center for Disease Control and Prevention. Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. Chin J Epidemiol 2020 Feb 17;41(2):145-151. doi: 10.3760/cma.j.issn.0254-6450.2020.02.003.
17. National Health Commission of the People's Republic of China; National Administration of Traditional Chinese Medicine. Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Version 6). 2020 Feb 2019 [cited 2020 Mar 19]. Available from: <http://www.nhc.gov.cn/xcs/zhengcwj/202002/8334a8326dd94d329df351d7da8aefc2.shtml>.
18. Martins F, Castiñeiras TM, redatores. Boletim técnico da UFRJ sobre COVID-19: doença causada pelo novo coronavírus. Rio de Janeiro: Universidade Federal do Rio de Janeiro; 2020.
19. Brasil. Ministério da Saúde. Secretaria de Atenção Especializada à Saúde. Departamento de Atenção Hospitalar, Domiciliar e de Urgência. Protocolo de Tratamento do Novo Coronavírus (2019-nCoV). Brasília: MS; 2020 [citado 2020 mar 25]. Disponível em: <https://portal.arquivos2.saude.gov.br/images/pdf/2020/fevereiro/05/Protocolo-de-manejo-clinico-para-o-novo-coronavirus-2019-ncov.pdf>.
20. Centers for Disease, Control and Prevention. Coronavirus Disease 2019 (COVID-19): Symptoms. CDC; 2020 Feb 10 [cited 2020 Mar 15]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>.
21. Guerra FM, Bolotin S, Lim G, Heffernan J, Deeks SL, Li Y, Crowcroft NS. The basic reproduction number (R_0) of measles: a systematic review. Lancet Infect Dis 2017 Dec;17(12):e420-e428. doi: 10.1016/S1473-3099(17)30307-9.
22. Read JM, Bridgen JRE, Cummings DAT, Ho A, Jewell CP. Novel coronavirus 2019-nCoV: early estimation of epidemiological parameters and epidemic predictions. medRxiv [Internet]. Updated 27 Jan 2020. Version 2. doi:10.1101/2020.01.23.20018549.
23. Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2010 – Características Gerais da População. Rio de Janeiro: IBGE [citado 2020 abr 12]. Disponível em: <http://www.censo2010.ibge.gov.br>.
24. Secretaria de Vigilância em Saúde (Brasil). Centro de Operações de Emergência em Saúde Pública COVID-19. Boletim Epidemiológico COE nº 6. Brasília: MS; 2020 abr 03 [citado 2020 abr 12]. Disponível em: <https://portal.arquivos.saude.gov.br/images/pdf/2020/Abril/03/BE6-Boletim-Especial-do-COE.pdf>.
25. Organização Pan-Americana da Saúde. Módulos de Princípios de Epidemiologia para o Controle de Enfermidades. Módulo 3: medida das condições de saúde e doença na população. Brasília: OPAS; 2010. 94 p.: il. 7 volumes. ISBN 978-85-7967-021-3.

26. Secretaria de Estado de Saúde (Brasil). Boletim Epidemiológico nº 68, de 09/05/2020 - Emergência de Saúde Pública COVID-19 no âmbito do Distrito Federal. Situação Epidemiológica do Distrito Federal. Brasília: Diretoria de Vigilância Epidemiológica/SVS/SESDF; 2020 [citado 2020 maio 05]. Disponível em: http://www.saude.df.gov.br/wp-conteudo/uploads/2020/03/Boletim-COVID_DF-09_05_-2020.pdf.
27. Secretaria de Estado de Saúde (Brasil). Boletim Epidemiológico nº 32, de 03.04.2020 - Emergência de Saúde Pública COVID-19 no âmbito do Distrito Federal. Brasília: Diretoria de Vigilância Epidemiológica/SVS/SESDF; 2020 [citado 2020 maio 05]. Disponível em: http://www.saude.df.gov.br/wp-conteudo/uploads/2020/03/Boletim-COVID_DF-03.04.2020.pdf.
28. Secretaria de Estado de Saúde (Brasil). Boletim Epidemiológico nº 54, de 25.04.2020 - Emergência de Saúde Pública COVID-19 no âmbito do Distrito Federal. Brasília: Diretoria de Vigilância Epidemiológica/SVS/SESDF; 2020 [citado 2020 maio 05]. Disponível em: http://www.saude.df.gov.br/wp-conteudo/uploads/2020/03/Boletim-COVID_DF-25-04-2020.pdf.
29. Secretaria de Estado de Saúde (Brasil). Boletim Epidemiológico nº 51, de 22.04.2020 - Emergência de Saúde Pública COVID-19 no âmbito do Distrito Federal. Brasília: Diretoria de Vigilância Epidemiológica/SVS/SESDF; 2020 [citado 2020 maio 05]. Disponível em: http://www.saude.df.gov.br/wp-conteudo/uploads/2020/03/Boletim-COVID_DF-22.04.2020.pdf.
30. Richman DD, Whitley RJ, Hayden FG, eds. Clinical Virology. 4th ed. Washington, USA: ASM Press; 2016. <https://doi.org/10.1086/344824>.
31. Su S, Wong G, Shi W, Liu J, Lai ACK, Zhou J, Liu W, Bi Y, Gao GF. Epidemiology, genetic recombination, and pathogenesis of coronaviruses. Trends Microbiol. 2016 Jun; 24(6):490-502. doi: 10.1016/j.tim.2016.03.003.
32. Brasil. Ministério da Saúde. Doença pelo Coronavírus 2019. Informe Técnico nº 01. Brasília: Secretaria Especial de Saúde Indígena/MS; 2020 mar 16.

Correspondent Author

Elias Rocha de Azevedo Filho
SHA Ranch. 23A, Conjunt 2, Residência do IPÊ
Building. ZIP:71993-580. Aguas Claras, Federal District,
Brazil.