

Prevalence of COVID-19 in the population of the State of Rio Grande do Norte in 2020: aspects related to age group and comorbidities

Adriano Menino de Macêdo Júnior*
Michelle Carneiro Fonseca**
Elio Pessoa Cazuza*
Mariana César dos Santos**
Janpson Allan Ribeiro Gurgel***
Clécio Danilo Dias da Silva**
Giancarlo Paiva Nicoletti*

Abstract

The aim of this study was to investigate the experience of the COVID-19 pandemic in the city of Natal, RN, considering the age group of patients affected by the disease and their possible comorbidities, through epidemiological indicators. Therefore, we took a retrospective approach of the numbers, highlighting the prevalence of COVID-19, from the confirmed cases in the year 2020 until the date of January 26, 2021. This is a study with a transversal methodology, of a qualitative and quantitative nature. Patient documents were sought in the Epidemiological Bulletin of the Public Health Secretariat (SESAP/RN), Central Laboratory (LACEN/RN), Kaggle - Coronavirus Brazil, Ministry of Health (MH) Department of Primary Care (DPC), National Registry of Health Facilities (NRHF), SUS Virtual Learning Environment at the Federal University of Rio Grande do Norte (AVASUS/UFRN), Google COVID-19 Community Mobility Reports, Inter-American Development Bank (IDB) in the Coronavirus Impact Panel. In Brazil there are already more than 9,834,513 confirmed cases and almost 239,245 thousand deaths (data collected until February 15, 2021) and in the state of Rio Grande do Norte (RN) there are 147,631 confirmed new cases and 3,381 deaths (data from February 15, 2021). The current scenario requires preventive actions of self-care and collective protection, so that, in this way, there is a reduction in the risks of the virus infecting people from the most vulnerable groups, but this requires the involvement of the mass population.

Palavras-chave: SARS-CoV-2. Public health. COVID-19. Pandemic.

INTRODUCTION

Acute Respiratory Syndrome (SARS) was first identified in November 2002 in Guangdong Province, southern China, where it infected more than 8,000 people with a fatality rate of 7% and was only containable in July 2003¹. Almost eighteen years later, in March 2020,

the world was alerted by the World Health Organization (WHO), about a pandemic on a global scale, caused by the disease known as COVID-19 (acronym for coronavirus disease 2019). This virus, caused by a coronavirus, called new SARS-CoV-2, causes severe respiratory

DOI: 10.15343/0104-7809.202145573581

*Centro Universitário Natalense – UNICEUNA. Natal/RN, Brasil.

**Universidade Federal do Rio Grande do Norte – UFRN. Natal/RN, Brasil.

***Universidade Potiguar – UnP. Natal/RN, Brasil.

E-mail: adrianomenino2016@gmail.com

infection in humans and can be fatal^{2,3}.

The symptoms of COVID-19 are similar to those of other respiratory viruses, with the presence of fever, usually dry cough, fatigue and, in more severe cases (5%) dyspnea, pulmonary bleeding, severe lymphopenia, and kidney failure. In 80% of cases, symptoms are mild. Its diagnosis is made in symptomatic patients and it is confirmed with the investigation of the virus by polymerase chain reaction (PCR) through nasal a swab⁴.

Since its appearance, research involving a detailed characterization of mortality from COVID-19 has sought to contribute to the understanding of the role of the disease in the population in different locations in Brazil and the world, which contributed to adequate interventions in order to minimize and prevent problems involving this disease. However, the pandemic had a very significant impact, especially in countries that were already facing other problems related to health care. Thus, considering that Brazil is one of the countries with the most inequalities in the world, the COVID-19 pandemic has had a greater impact on the number of cases and deaths in the poorest regions, such as the North and Northeast regions, where we find a large part of the population living in poverty, unemployment and hunger.

With specific regard to the Northeast region, it is known that it is widely characterized as being one of the poorest regions in Brazil, representing 27% of the national population and

presenting more than a third of all cases (34%) and deaths (32%) registered in the COVID-19 pandemic in the country. Within this scenario, serological surveys at the national level showed a significant variability in the prevalence of SARS-CoV-2 antibodies with extremely high rates in poorer municipalities/cities. Thus, considering this scenario, it is possible to say that the new coronavirus pandemic has been considered today as a challenge for public health at the national and international levels⁶.

When we launched our investigation into the state of Rio Grande do Norte (RN), which has a Territorial area of 52,809,602 km², a population estimated in the last census of 3,168,027 people, and a population density of 59.99 inhab/km², and specifically at the city of Natal, which has approximately 885,000 inhabitants, we came across numbers that caught our attention. Initially, we emphasize that the first death reported in the State of Rio Grande do Norte was a 61-year-old teacher. He had comorbidities with diabetes. On March 31, 2020, the municipal health secretary reported the second death caused by the new coronavirus, of a young person aged 23 years old⁷.

The objectives of this study were to explore the experience of the COVID-19 epidemic in the city of Natal, RN, in relation to age groups while associating the comorbidities that patients affected by this disease had, through the epidemiological indicators of the epidemic in that city.

MATERIALS AND METHODS

This research was carried out retrospectively to explain the prevalence of COVID-19 in the State of Rio Grande do Norte (RN) from confirmed cases in the year 2020 until January 26, 2021. We carried out a cross-sectional, descriptive, and retrospective

study, with an epidemiological, qualitative, and quantitative nature.

Patient documents were sought in the Epidemiological Bulletin of the Public Health Secretariat (SESAP/RN), Central Laboratory (LACEN/RN), Kaggle - Coronavirus Brazil,

Ministry of Health (MH) Department of Primary Care (DPC), National Registry of Health Facilities (NRHF), SUS Virtual Learning Environment at the Federal University of Rio Grande do Norte (AVASUS/UFRN), Google COVID-19 Community Mobility Reports, Inter-American Development Bank (IDB) in the Coronavirus Impact Panel.

The epidemiological data obtained were obtained and filtered by accessing the platform of the Laboratory for Technological

Innovation in Health (LTIH), Coronavirus/RN, held on January 27, 2021, and are available at: <https://covid.LTIH.ufrn.br/>. The variables examined in this study were: age group, comorbidities, and deaths. For data analysis, basic descriptive statistics were used, through absolute and/or relative frequencies.

As it is secondary data from a public domain database, it was not necessary to submit the study to the Research Ethics Committee (CEP).

RESULTS

As we can see in table 01, the age groups that presented the most cases of hospitalizations confirmed by COVID-19 in RN were those between 20 and 75 years old. Within this age group, we can discuss a little more about the number of deaths in RN. The number of confirmed cases by COVID-19 to date in this study was 73,681 females and 63,630 males, totaling 137,311 confirmed cases. The data are available in table 1.

Even though the number of confirmed female cases is 15.7% higher than that of males, we can see that the number of deaths by COVID-19 was higher in males, as can be seen in table 2 below.

When we look at Figure 1 below, we can see that the percentage of post-hospitalization deaths grew exponentially with increasing age, that is, the older the individual, the greater the probability of

post-hospitalization death by COVID-19.

According to the date mentioned above, in the methodology of this research, which represents data collection, 136,741 cases were confirmed for COVID-19. In this population, the main comorbidities presented were: 14.23% had heart problems (coronary heart disease, cerebrovascular disease, peripheral artery disease, rheumatic heart disease, heart disease, deep vein thrombosis, among others), 28.65% had diabetes, 0.55% were ex-smokers, 4.38% had some respiratory disease, 6.39% were obese, 5.29% had some chronic kidney disease, 0.18% had psychiatric problems, and 26.09% had heart disease (angina, coronary artery disease, cardiomyopathy, heart failure, acute coronary syndrome, cerebrovascular disease, among others). Data is available in Figure 2.

Table 1 – Confirmed cases for COVID-19, according to the age group of the Rio Grande do Norte population, 2021

Age Group	Female	Male	Total
0 – 4	519	523	1.042
5 – 9	543	537	1.080
10 – 14	975	822	1.797
15 – 19	2.223	1.838	4.061
20 – 24	4.959	4.492	9.451
25 – 29	7.403	6.519	13.922
30 – 34	8.668	7.769	16.437
35 – 39	9.182	8.379	17.561
40 – 44	8.026	7.269	15.295
45 – 49	6.759	5.876	12.635
50 – 54	6.326	5.027	11.353
55 – 59	5.437	4.266	9.703
60 – 64	3.952	3.201	7.153
65 – 69	2.720	2.228	4.948
70 – 74	2.224	1.833	4.057
75 – 79	1.433	1.252	2.685
80 – 84	1.192	870	2.062
85 – 89	648	520	1.168
90 – 94	327	276	603
95 - 99	127	98	225
> 100	38	35	73
Total	73.681	63.630	137.311

Fonte: LAIS, 2021.

Table 2 – Confirmed deaths for COVID-19, according to the age group of the Rio Grande do Norte population, 2021.

Age Group	Female	Male	Total
0 – 4	5	3	8
5 – 9	1	2	3
10 – 14	0	2	2
15 – 19	4	1	5
20 – 24	12	9	21
25 – 29	9	14	23
30 – 34	18	28	46
35 – 39	31	36	67
40 – 44	41	63	104
45 – 49	37	73	110
50 – 54	61	103	164
55 – 59	91	167	258
60 – 64	115	149	264
65 – 69	133	180	313
70 – 74	193	254	447
75 – 79	184	214	398
80 – 84	197	217	414
85 – 89	151	140	291
90 – 94	96	89	185
95 - 99	39	37	76
> 100	7	13	20
Total	1.425	1.794	3.219

Fonte: LAIS, 2021.

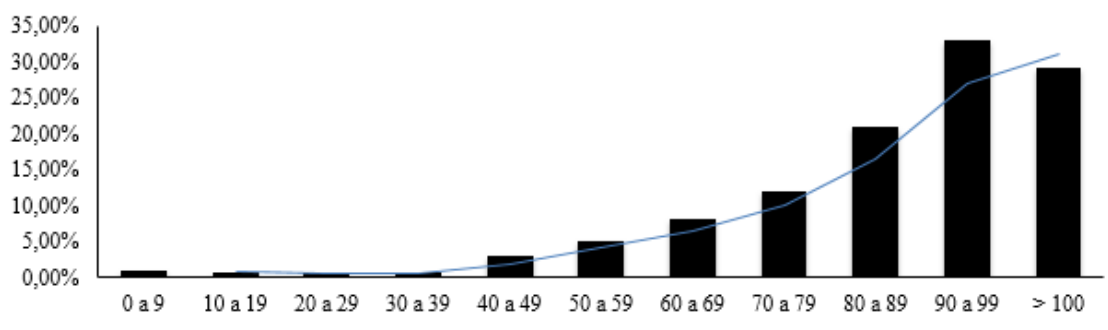


Figure 1 – Confirmed deaths for COVID-19, according to the age group of the Rio Grande do Norte population, 2021.

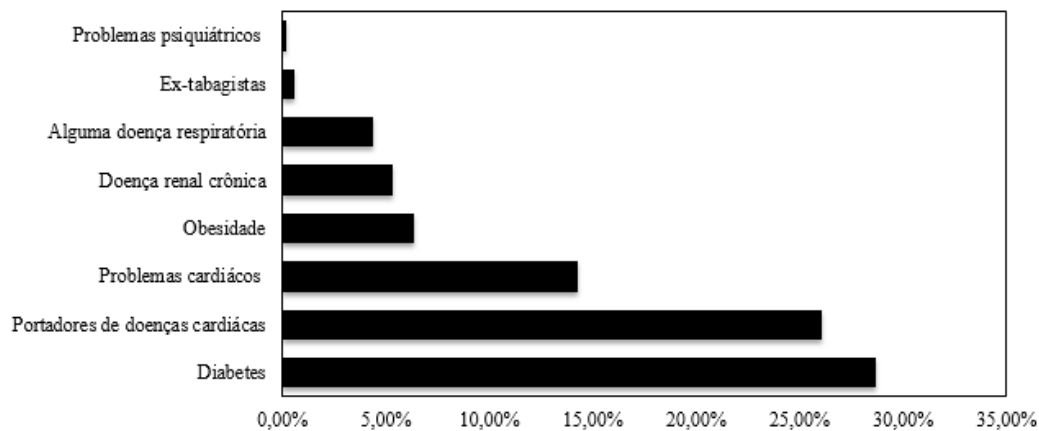


Figure 2 – Confirmed deaths for COVID-19, according to comorbidities of the Rio Grande do Norte population, 2021.

DISCUSSION

The authors Chang et al.⁸ and Jackson et al.⁹, announced through their research that the greatest number of those infected with COVID-19 was concentrated in the age group from 30 to 39 years, a finding that corroborates a study carried out in three hospitals in Beijing, where the mean age of patients was 34 years. This observation, regarding the age group, added to several factors, such as the possibility of asymptomatic infections, high transmissibility, the lack of vaccine, and lack of evidence of drug therapy efficacy are factors that have guided decision-making to minimize the spread of virus.

Also in relation to age group, it was observed that individuals aged between 0 and 9 years old had the lowest frequency of cases, similar to a study that analyzed the regional panorama of China and also, separately, of two cities: Huabei and Wuhan. According to the literature, children are less susceptible to infection by COVID-19. This lower susceptibility can be justified for several reasons, from the reduction of activities outside the home environment, such as less time outdoors and less traveling¹⁰.

Analyzing the work of Batista et al.¹¹, the number of reported deaths is practically similar, but as the age group increases, the cases of COVID-19 also increase; consequently, among the elderly, the lethality of the virus is higher, this because the patient's immune system is weakened by the high viral load. Also in this study, it was concluded that most patients who died from COVID-19 were aged over 60 years old and had black or brown skin color.

According to Maciel et al.¹², a survey carried out in hospitals in the state of Espírito Santo until May 14, 2020, shows that of the 889 people hospitalized with COVID-19, 220 died. Of this total, the largest number of hospitalized people who died were over 50 years of age. This study demonstrates that disease lethality is closely linked to comorbidities, as the study suggests that regardless of whether it is a public or private hospital, the data are similar when compared.

Up to the date of collection, the lethality rate in young Potigues people from 0 to 19 years old was 0.51%, the lethality rate in adults between 20 and 59 years old

was 0.75%, while the elderly had a higher rate when compared with the others. Thus, elderly people over 60 years of age had an infection rate of 10.49%. This same group increases six-fold in confirmed deaths. During this period of the research, 107,783 people were tested in the LACEN/RN laboratory. Of this total, 67,197 tested negative and 40,586 were diagnosed with the presence of infection caused by the new coronavirus.

Malta *et al.*² revealed in their studies that data collected throughout Brazil showed that 45,161 individuals from the Brazilian population were smokers. The study highlights that of the people interviewed, about 34% of them increased their cigarette consumption, reaching up to 10 cigarettes a day. This increase may be related to social isolation protocols proposed by epidemiological surveillance. This is because, since the beginning of the pandemic, nicotine consumption has tripled, and this increase may be directly related to the deterioration of mental health in these people. During this same period, there were also manifestations of anxiety, depression, and insomnia, which were significant contributors to the increase in nicotine consumption^{13,14}. This finding is important because, in agreement with the literature, the symptoms presented by COVID-19 can worsen when the patient is a smoker or when there is a pre-existence of other diseases, such as diabetes mellitus, hypertension, obesity, among others. This may corroborate the outcomes of death¹².

Frequently, the presence of CVD (Cardiovascular Diseases) also accentuates the lethal potential of COVID-19. Notably, it is one of the main drivers of severity and admission to ICUs (Intensive Care Units) causing complications and the need for invasive procedures. Concomitantly, other studies have shown that patients with CVD or risk factors for CVD tend to suffer greater damage and worse outcomes over the course of the disease. These same studies

highlight that the increased length of hospital stay with the need for invasive procedures increases the risk of infections related to healthcare, sepsis, and worsening of the clinical condition^{15,16}.

Thus, as noted in different studies, the existence of comorbidities proved to be one of the factors with the greatest effect on the occurrence of deaths due to COVID-19. This presence of comorbidities maximizes the risk of death by 10.44 times more compared to individuals who do not have comorbidities. Although the fatality rate for COVID-19 is lower than that observed in disease epidemics caused by other coronaviruses, such as SARS and MERS, it is possible to observe a high lethality rate in specific population groups. In this context, when analyzing only the data on deaths due to COVID-19, a search in the specialized literature showed that 31.5% of the cases found were older than 60 years old and/or had comorbidities. Considering all the data, it was observed that the highest risk of death from COVID-19 was found in elderly individuals, especially those aged over 80 years old, and patients with comorbidities¹⁸.

When analyzing the distribution of cases of the disease and deaths by age group, in Brazil and in the world, it is observed that there is a higher incidence of the disease in the adult population; however, the lethality is higher in the elderly population. The presence of associated comorbidities significantly contributes to the expansion of this rate, and in Brazil it appears that 69.3% of deaths occurred in individuals over 60 years of age, and of these, 64% had at least one risk factor. A situation similar to this has already been reported by patients infected with the Severe Acute Respiratory Syndrome coronavirus (SARS-CoV) and by the Middle East Respiratory Syndrome coronavirus (MERS-CoV)¹⁹.

Another important finding of the present study is the higher incidence and mortality by COVID-19 among elderly people in

the poorest states of Brazil. There are several variables that make the low-income population more prone to infection by the new Coronavirus. Examples are: the use of public transport, the largest number of residents per household, lack of basic sanitation, and the difficulty of the elderly and their families to maintain social isolation without significant loss of income or work²⁰.

When comparing patients who developed severe acute respiratory syndrome (SARS) as a result of COVID-19 with patients who did not, it is observed that the elderly are also the majority. Furthermore, there were more deaths in patients with moderate or severe SARS²¹.

A large study of 1099 patients with COVID-19 in China showed that among the 173 who developed severe disease, 23.7% had hypertension, 16.2% had diabetes mellitus, 5.8% had coronary heart disease, and 2.3% had cerebrovascular disease²³. Another study in the same country showed that out of 140 patients admitted to a hospital and were diagnosed with COVID-19, 30% had hypertension and 12% had diabetes²⁴.

In Brazil, since the beginning of the pandemic, it has been observed that elderly individuals represent the highest percentage among deaths by COVID-19. Moreover, they have higher accumulated mortality rates than those found in the general population. The influence of contextual sociodemographic factors related to race and income on mortality rates from COVID-19 in the elderly population was also observed¹⁹.

It is worth noting that having chronic diseases is known to confer a greater risk of organ failure and, in this case, diabetes and hypertension may not appear as independent predictors because the mediator between these chronic diseases and mortality, which would be organ failure, might stand out in

the statistical analyses, underestimating the real effect of these pathologies²⁵.

A study published by the Chinese Centers for Disease Control and Prevention, with data from 44,672 confirmed cases of COVID-19, reported a mortality rate of 2.3%. The most frequent comorbidities in patients who died were hypertension, diabetes mellitus, cardiovascular disease, and being aged over 70 years old²⁶.

The Brazilian Society of Endocrinology and Metabology²⁷ states that people with diabetes possibly do not have an increased risk of contracting the new coronavirus, but, once infected, they have a greater chance of serious complications from COVID-19, including the risk of death; this is possible for both type 1 (DM1) and type 2 (DM2) diabetes.

Zhu *et al.*²⁸ and Zhang *et al.*²⁴ state that type 2 DM (diabetes mellitus) provokes a deregulated immune response and reduces the functions of neutrophils, macrophages, and lymphocytes, which causes damage to the humoral immune system and an increase in susceptibility of diabetic people to infectious diseases. Such immunological alterations are also responsible for the increased severity of COVID-19 in patients.

Some individuals are more likely to develop a more serious infection with COVID-19. Within this group are elderly patients, those with important chronic diseases, such as diabetes mellitus, systemic arterial hypertension, pulmonary disease, heart disease, as well as those with chronic kidney disease (CKD) stand out²⁹.

Although the impact of COVID-19 infection in patients with CKD (chronic kidney disease) has not yet been widely studied, innate and adaptive immunities are diminished in people with CKD, and are further reduced as the disease progresses²⁹.

CONCLUSION

The current scenario requires preventive actions of self-care and collective protection. So that, in this way, there is a reduction in the risks of the virus infecting people from the most vulnerable groups, but for that, the mass population needs to be involved. Emphasis is also given to government responsibilities, so that they offer the populational support for actions to prevent and fight COVID-19. Therefore, the State must be more committed to the population, especially the most vulnerable. In a critical situation, such as the current pandemic, the government needs, among other measures, to embrace its population, because it is a disease that affects not only those at risk, but the entire community. Therefore, offering support to the population is essential.

Through the results of this study, the

occurrence of a progression in the number of cases is noticeable with a prevalence among the economically active age group and the largest number of deaths occurring among the elderly. Therefore, preventive care is an essential measure to try to control the number of cases and deaths from COVID-19. Since there is no treatment for this disease and the vaccination process in Brazil, especially, proceeds at a slow pace, the importance of further research on this topic is emphasized so that there is the capacity for increasingly robust and consistent data, to help fight the pandemic.

Thus, it is necessary to increasingly emphasize prophylactic measures to prevent the contagion of the new coronavirus, such as the proper use of masks, hand washing, and social distancing.

REFERENCES

1. Peeri NC, Shrestha N., Rahman MS, Zaki R., Tan Z., Bibi S., Haque U. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned? *Int J Epidemiol.* 2020; 49(3): 717-726. Disponível em: [10.1093/ije/dyaa033](https://doi.org/10.1093/ije/dyaa033).
2. Malta DC, Szwarcwald CL, Barros MBDA, Gomes, CS, Machado ÍE, Souza Júnior, PRBD, Gracie R. A pandemia da COVID-19 e as mudanças no estilo de vida dos brasileiros adultos: um estudo transversal, 2020. *Epidemiol Serv Saúde.* 2020; 29(4): 1-13. Disponível em: <https://doi.org/10.1590/S1679-49742020000400026>.
3. Lai, CC, Shih, TP, Ko, WC, Tang, HJ e Hsueh, PR. Síndrome respiratória aguda grave coronavírus 2 (SARS-CoV-2) e doença coronavírus-2019 (COVID-19): A epidemia e os desafios. *JIAA.* 2020, 55(3), 1-9. Disponível em: <https://doi.org/10.1016/j.ijantimicag.2020.105924>.
4. Strabelli TMV, Uip DE. COVID-19 e o Coração. *Arq Bras Cardiol.* 2020; 114(4). Disponível <https://doi.org/10.36660/abc.20200209>.
5. Escobar AL, Rodriguez TDM, Monteiro JC. Letalidade e características dos óbitos por COVID-19 em Rondônia: estudo observacional. *Epidemiol Serv Saúde.* 2021, 30(1), 1-10. Disponível em: <https://doi.org/10.1590/S1679-49742021000100019>.
7. Kerr Ligia, Kendall Carl, Silva Antônio Augusto Moura da, Aquino Estela Maria L, Pescarini Julia M, Almeida Rosa Lívia Freitas de et al. COVID-19 no Nordeste brasileiro: sucessos e limitações nas respostas dos governos dos estados. *Ciênc saúde coletiva.* 2020, 25(2). Disponível em: <https://doi.org/10.1590/1413-812320202510.2.28642020>.
8. IBGE. Instituto Brasileiro De Geografia e Estatística. Disponível em: <https://cidades.ibge.gov.br/brasil/rn/panorama>. Acesso em: 28 de janeiro de 2021.
9. Chang D, Lin M, Wei L, Xie L, Zhu G, Dela-Cruz CS, et al. Epidemiologic and Clinical Characteristics of Novel Coronavirus Infections Involving 13 Patients Outside Wuhan, China. *JAMA.* 2020; 323(11): 1092-1093. Disponível em: <https://doi.org/10.1001/jama.2020.16236>.
10. Jackson Filho JM, Assunção AA, Algranti E, Garcia EG, Saito CA, Maeno M. A saúde do trabalhador e o enfrentamento da COVID-19. *Rev. bras. saúde ocup.* 2020; 45: 14. Disponível em: <https://doi.org/10.1590/2317-6369ed00001207>.
11. Araujo AAC et al. COVID-19: Análise De Casos Confirmados Em Teresina, Piauí, Brasil. *Rev. Prev. e Infec. e Saúde.* 2020, 6(1), 1-8. Disponível em: <https://revistas.ufpi.br/index.php/nupcis/article/view/10569>. Acesso em: 30/07/2020.
12. Batista A, Antunes B., Faveret G, Peres I, Marchesi J, Cunha JP, Bozza F. (2020). Análise socioeconômica da taxa de letalidade da COVID-19 no Brasil. *Núcleo de Operações e Inteligência em Saúde (NOIS).*

13. Maciel EL, Jabor P, Goncalves Júnior E, Tristão-Sá R, Lima RDCD, Reis-Santos B, & Zandonade E. Fatores associados ao óbito hospitalar por COVID-19 no Espírito Santo. *Epidem. Serv. Saúde*, 2020, 29 (4), 1-11. Disponível em: <https://doi.org/10.1590/S1679-49742020000400022>.
14. Silva Grossi FR, de Araújo FRF., Rêgo NM, Santos Souza R. fatores influenciadores e às consequências sobre o uso do tabaco na adolescência: uma revisão sistemática. *Rev. Ciên Saúde Oeste Baiano - Higia*, 2017, 2(1): 62-85. Disponível em: <http://noar.fasb.edu.br/revista/index.php/higia/article/view/169/206>.
15. Meneghetti VAJ. Navegar é preciso, mas fumar, é? Análise dos fatores que motivam jovens universitários portugueses a consumir tabaco. 2020. Disponível em: <http://clyde.dr.ufu.br/handle/123456789/29902>.
16. Bansal M. Cardiovascular disease and COVID-19. *Diabetes Metab Syndr*. 2020, 14(3): 247-250.
17. Wu Z., & McGoogan JM. Outbreak in China: summary of a report of 72314 cases from the Chinese center for disease control and prevention. *JAMA*, 2020, 323(10.10), 1001.
18. Li L quan, Huang T, Wang Y qing, et al.covid-19 patients' clinical characteristics, discharge rate, and fatality rateof meta-analysis. *J Med Virol*. 2020; 92(6): 577-583. Disponível em: <https://doi.org/doi:10.1002/jmv.25757>
19. Galvão MHR, Roncalli AG. Fatores associados a maior risco de ocorrência de óbito por COVID- 19: análise de sobrevivência com base em casos confirmados. *Rev. bras. epidemiol.*, 2020, 23. Disponível em: <https://doi.org/10.1590/1980-549720200106>.
20. Barbosa IR, Galvão MHR, Souza TA, Gomes SM, Medeiros A de A, Lima KC. Incidência e mortalidade por covid-19 na população idosa brasileira e sua relação com indicadores contextuais: um estudo ecológico. *Rev Bras Geriatr Gerontol*. 2020, 23(1). <http://doi.org/10.1590/1981-22562020023.20017121.Mendonça FD, Rocha SS, Pinheiro DLP>,
21. Oliveira SV. Região Norte do Brasil e a pandemia de COVID-19: análise socioeconômica e epidemiológica/ North region of Brazil and the COVID-19 pandemic: socioeconomic and epidemiologic analysis/ Región Norte de Brasil y la pandemia de COVID-19: análisis. *J. H. NPEPS*. 2020, 5(1), 20-37. Disponível em: <https://periodicos.unemat.br/index.php/jhnpeps/article/view/4535>.
22. Liu Y, Sun W, Li J, Chen L, Wang Y, Zhang L, et al. Clinical features and progression of acute respiratory distress syndrome in coronavirus disease 2019. *medRxiv* 2020: 2020.02.17.20024166. <http://doi.org/10.1101/2020.02.17.20024166>
23. Bastos LS, Niquini RP, Lana RM, Villela Daniel AM, Cruz Oswaldo G, Coelho Flávio C. et al. COVID-19 e hospitalizações por SRAG no Brasil: uma comparação até a 12ª semana epidemiológica de 2020. *Cad. Saúde Públ.* 2020, 36(4). Disponível em: <https://doi.org/10.1590/0102-311X00070120>.
24. Guan W, Ni Z, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*, 2020. Disponível em: <https://doi.org/10.1056/NEJMoa2002032>.
25. Zhang JJ, Dong X, Cao YY, et al. Clinical characteristics of 140 patients infected bySARS-CoV- 2 in Wuhan, China. 2020; published online Feb 19. Disponível em: <https://doi.org/10.1111/all.14238>.
26. Fei Zhou, Ting Yu, Ronghui Du, Guohui Fan, Ying Liu, Zhibo Liu, Jie Xiang, Yeming Wang, Bin Song, Xiaoying Gu, Lulu Guan, Yuan Wei, Hui Li, Xudong Wu, Jiuyang Xu, Shengjin Tu, Yi Zhang HC, Bin C. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study [published correction appears in *Lancet*. 2020 Mar 28; 395 (10229): 1038] *Lancet*. 2020; 395(10229), 1054-1062.
27. <http://www.het-vl.com.tw/system/files/1090327.pdf>The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China. *Zhonghua Liu Xing Bing Xue Za Zhi*, 41(2), 145-51, 2020. Disponível em: <http://www.het-vl.com.tw/system/files/1090327.pdf>.
28. Sociedade Brasileira de Endocrinologia e Metabologia (SBEM). Diabetes e a pandemia de Covid-19. Disponível em: <https://www.endocrino.org.br/diabetes-e-pandemia-de-covid-19/>. Acesso em: 28 Jan. 2021.
29. Zhu L, She ZG, Cheng X, Qin JJ, Zhang XJ, Cai J, & Li H. Association of blood glucose control and outcomes in patients with COVID-19 and pre-existing type 2 diabetes. *Cell metabolism*. 2020, 31(6), 1068-1077. Disponível em: <https://doi.org/10.1016/j.cmet.2020.04.021>
30. Delfino VDA, Nascimento MM, Barros NJR. Informações para pacientes com doença renal crônica pré-dialítica sobre Covid-19 (infecção pelo SARS-CoV-2). *Braz. J. Nephrol*. 2020, 42(2 Suppl 1): 12-14. Disponível em: <https://doi.org/10.1590/2175-8239-jbn-2020-s1>

Received in april de 2021.
Accepted in november de 2021.