



Epidemiological characterization of COVID-19 cases in Maranhão: a brief analysis

Caracterização epidemiológica dos casos de COVID-19 no Maranhão: uma breve análise

Caracterización epidemiológica de los casos de COVID-19 en Maranhão: un breve análisis

Joelson dos Santos Almeida¹, Jonas Alves Cardoso², Eduardo Costa Cordeiro³, Messias Lemos⁴, Telma Maria Evangelista de Araújo⁵, Ana Hélia de Lima Sardinha¹

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¹ Federal University of Maranhão-UFMA, Department of Biological and Health Sciences, São Luís, Maranhão, Brazil.

² National Service For Commercial Education-SENAC, Teresina, Piauí, Brazil.

³ Federal University of Delta of Parnaíba-UFDP, Department of Medicine, Parnaíba, Piauí, Brazil.

⁴ Federal University of Pará-UFPA, Institute of Health Sciences, Belém, Pará, Brazil.

⁵ Federal University of Piauí-UFPI, Department of Nursing, Teresina, Piauí, Brazil.

ABSTRACT

Introduction: In this study, we analyzed the epidemiological profile of case reports of the novel coronavirus (SARS-CoV-2) in the State of Maranhão. **Outline:** It is an epidemiological survey of cases and deaths by COVID-19 reported in the state of Maranhão, from March to April 2020. The data were analyzed from the reports of the epidemiological health bulletin of the state of Maranhão, together with information made available by the state's regional health headquarters. The cases were analyzed using the variables: sex (female / male), age group (in years), origin, and presence or not of comorbidities. **Results:** 2,105 cases of COVID-19 were confirmed. The region most affected was São Luís with 89% of cases, with most of the patients being female (52%) and aged between 30 and 49 years (53.1%). The cases of male patients had a higher death rate (62%), prevalence of age 60 years or older (66%), regional origin of São Luís (60%) and various comorbidities (78%), with cardiovascular and immunological diseases standing out. **Implications:** The behavior of the pandemic is upward in the state, which highlights the need for more containment measures.

DESCRIPTORS

Coronavirus; Public Health Surveillance; Delivery of Health Care.

Corresponding author:

Joelson dos Santos Almeida
Address: Av. dos Portugueses, 1966, Vila Bacanga
CEP: 65080-805 – São Luís, Maranhão, Brazil
Telephone: + 55 (98) 3232-3837 E-mail: joelsonalmeida2011@gmail.com

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INTRODUCTION

Since the end of 2019, several epidemiological concerns have arisen regarding the novel coronavirus (SARS-CoV-2), discovered in China. Information on the incubation period, clinical manifestations, transmissibility, infectivity, prevention, treatment, and lethality are still not completely elucidated, despite great efforts in different continents.

In view of the scenario of great infectivity and the increase in lethality, which caused a collapse in health systems, several measures were recommended by health standards bodies to contain the high rates of mobility.^{1,2} Among the measures taken, we can mention: coughing etiquette and hand hygiene, use of masks, routine cleaning of environments and surfaces, social isolation (vertical and horizontal), closing of trade / industry considered non-essential, monitoring of borders and sanitary barriers.³ These measures, which are considered to be non-pharmacological, are necessary in view of the growing number of notifications of the disease, absence of previous immunity in the population and unavailability of vaccine. These factors cause the incidence rates of the disease to grow in large proportions in a short period of time.⁴

The number of cases of infection with the novel coronavirus (SARS-CoV-2) has grown worldwide and, together with global statistics, underreporting is considered to exist, which can exponentially increase the real number of sick people and deaths. According to the WHO, until April 23, 2020, there were 2,544,792 confirmed cases of the disease in the world.¹ In Brazil, until April 23, 2020, confirmed cases across the territory reached 49,492 people, with a lethality of 6.7%.²

Thus, filling the knowledge gaps about the disease is essential to start discussions about the end of the movement restriction measures adopted so far and to minimize the possibilities of report of new cases, reinfections and deaths caused by the disease. Therefore, the objective of this study is to analyze

the epidemiological profile of reported cases and deaths of patients caused by the novel coronavirus (SARS-CoV-2) in the state of Maranhão.

METHOD

This is an epidemiological survey of reported cases and deaths of COVID-19 in the state of Maranhão, from March to April 2020.

The state of Maranhão is located in the west of the Northeast Region and has a territorial extension of 331,935.507 km², which is divided into 217 municipalities, according to data from the 2010 Demographic Census, conducted by the Brazilian Institute of Geography and Statistics (IBGE), totaling 6,574,789 inhabitants.⁵

The current regionalization of the state health system was formulated in 2011, by the Bipartite Intergovernmental Commission, and divided into 19 health regions and eight macro-regions, with the purpose of providing a resolute health system to meet the organizational demands of health actions and services.⁶

In this sense, to understand the dynamics of disease transmission, it was decided to verify the distribution of the cases of COVID-19, in the state of Maranhão, by health macro-regions, of which data were obtained regarding the epidemiological bulletins of the State Department of Health (SES-MA). An evaluation of the official documents of the SES-MA was conducted, in which the rates of confirmed cases and deaths during the study period are included.

The variables studied were: sex (female / male), age group (in years), origin and presence or not of comorbidities. To this end, it was decided to include the cases of Maranhão reported from March to April 2020 to measure the beginning of the epidemic (<http://www.saude.ma.gov.br/boletins-covid-19/>).

The data were tabulated in Microsoft Excel[®] software version 19, then exported to the TABWIN software and extracted using descriptive statistics

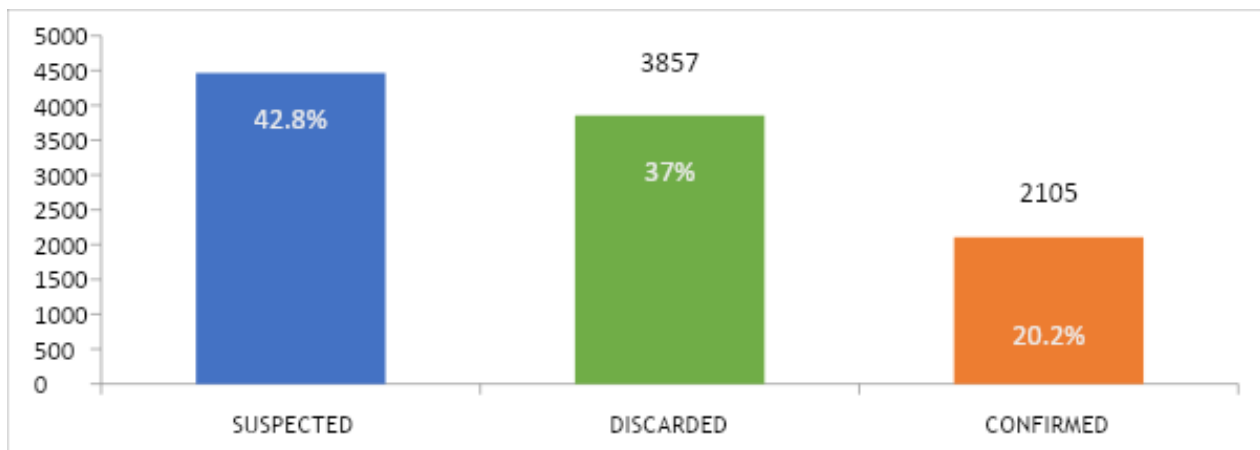
through the preparation of tables and graphs in a comparative way. For spatial analysis, data from SES-MA were used, which were plotted on thematic maps with the aid of the arcGIS 3.9 software (<https://www.esri.com/software/arcgis/index.html>). The shape file (maps) were obtained from IBGE.

This work did not require the evaluation of the Research Ethics Committee because it is an analysis of epidemiological data in the public domain, in accordance with Resolutions n° 466/2012 and 510/2016 of the National Health Council, which regulates the research conducted with human beings.

RESULTS

About the cases of COVID-19 infection, in the state of Maranhão, their investigation started on February 28, 2020, with two suspected cases. After this event, 243 cases were reported, 22 of which were discarded and 205 suspects, which were followed up until March 19, 2020. It is worth mentioning that the first confirmed case appeared on March 20, 2020. On the present date, 2,105 (20.2%) were confirmed and 3,857 (37%) cases of COVID-19 were discarded in the state of Maranhão (Graph 1).

Graph 1 – Distribution of the number of suspected, confirmed and discarded cases of COVID-19 in the state of Maranhão, Brazil, 2020.



Source: Epidemiological bulletin of the state of Maranhão / SES-MA.

Regarding the profile of patients with confirmed cases of COVID-19, there was a slight predominance of women (52%) and people in the age group of 30 to 39 years (28.4%). Regarding the

distribution of notifications by regional health centers, the city of São Luís (89.2%) had the greatest number of cases, followed by Imperatriz (3.9%) and Rosário (1.6%) (Table 1).

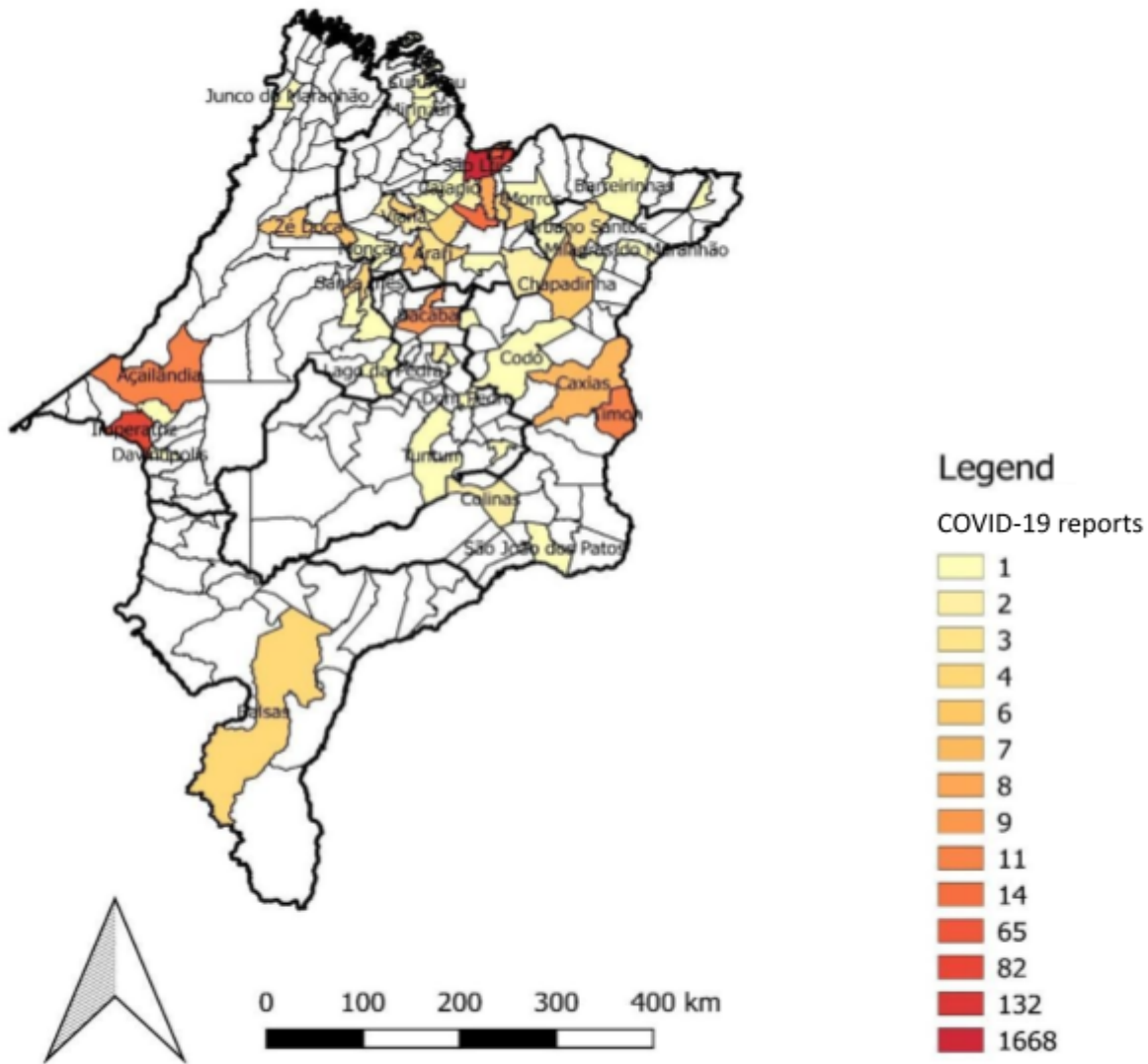
Table 1 – Distribution and epidemiological profile of patients in confirmed cases of COVID-19 in the state of Maranhão, Brazil, 2020. N= 2,105.

VARIABLE	n	%
Sex		
Male	1014	48
Female	1091	52
Age group		
0 to 9 years	13	0.6
10 to 19 years	23	1.1
20 to 29 years	235	11.2
30 to 39 years	599	28.4
40 to 49 years	520	24.7
50 to 59 years	332	15.8
60 to 70 years	198	9.4
Over 70 years	156	7.4
Not reported	29	1.4
Regional Health headquarters		
São Luís	1877	89.2
Imperatriz	83	3.9
Rosário	34	1.6
Itapecuru Mirim	24	1.2
Timon	11	0.5
Açailândia	12	0.5
Bacabal	11	0.5
Viana	8	0.4
Chapadinha	8	0.4
Zé Doca	8	0.4
Caxias	7	0.3
Santa Inês	6	0.3
Pedreiras	5	0.2
Balsas	4	0.2
Codó	1	0.1
São João dos Patos	3	0.1
Pinheiro	1	0.1
Presidente Dutra	2	0.1
Barra do Corda	0	0

Source: Epidemiological bulletin of the state of Maranhão / SES-MA.

The spatial distribution of cases of deaths by COVID-19, in the state of Maranhão, by

municipalities, had a higher incidence in São Luís in the period studied (Graph 2).

Graph 2 – Distribution of COVID-19 cases in the state of Maranhão, Brazil, 2020.

Source: Epidemiological bulletin of the state of Maranhão / SES-MA.

In relation to the profile of patients who died, there was a predominance of males (62%), aged 60 years or over (66%) and patients with various

comorbidities (78%). The municipality with the highest occurrence of deaths was São Luís (60%), followed by São José de Ribamar (5%) (Table 2).

Table 2 – Epidemiological profile of mortality due to COVID-19 in the state of Maranhão, Brazil, 2020. N= 100.

VARIABLE	n	%
Sex		
Male	62	62
Female	38	38
Age group		
Adolescent (10 to 19 years)	1	1
Adults (20 to 59 years)	33	33
Elderly (60 years or older)	66	66
Comorbidities		
Without comorbidities	22	22
With comorbidities	78	78

Municipality of origin

São Luís	60	60
São José de Ribamar	5	5
Paço do Lumiar	4	4
Imperatriz	4	4
Raposa	2	2
Anajatuba	1	1
Cururupu	1	1
Bacabal	1	1
Not reported	22	22

Source: Epidemiological bulletin of the state of Maranhão / SES-MA.

Among the associated comorbidities, there was a higher occurrence of cases of Hypertension associated with Diabetes Mellitus and other comorbidities (14.1%), followed by Systemic Arterial

Hypertension (12.8%), Hypertension and associated Diabetes Mellitus (11.5%), and hypertension associated with other comorbidities (11.5%) in patients who died during the study period (Table 3).

Table 3 – Profile of comorbidities associated with COVID-19 mortality in the state of Maranhão, Brazil, 2020. N= 78.

ASSOCIATED COMORBIDITIES	n	%
Hypertension + Diabetes Mellitus + other Comorbidities*	11	14.1
Hypertension	10	12.8
Hypertension + Diabetes Mellitus	9	11.5
Hypertension + other Comorbidities**	9	11.5
Diabetes Mellitus + other Comorbidities***	4	5.1
Cardiovascular Disease	3	3.8
Chronic Kidney Disease	3	3.8
Obesity and Psychiatric Disease	3	3.8
Neurological Disease	2	2.6
Oncological Disease	2	2.6
Respiratory disease	2	2.6
Diabetes Mellitus	1	1.3
Rheumatological Disease	1	1.3
Hepatitis C and Alzheimer's	1	1.3
Respiratory Disease and Chronic Kidney Disease and Cardiovascular Disease	1	1.3
Smoking and Alcoholism	1	1.3
Not reported	15	19.3

Source: Epidemiological bulletin of the state of Maranhão / SES-MA.

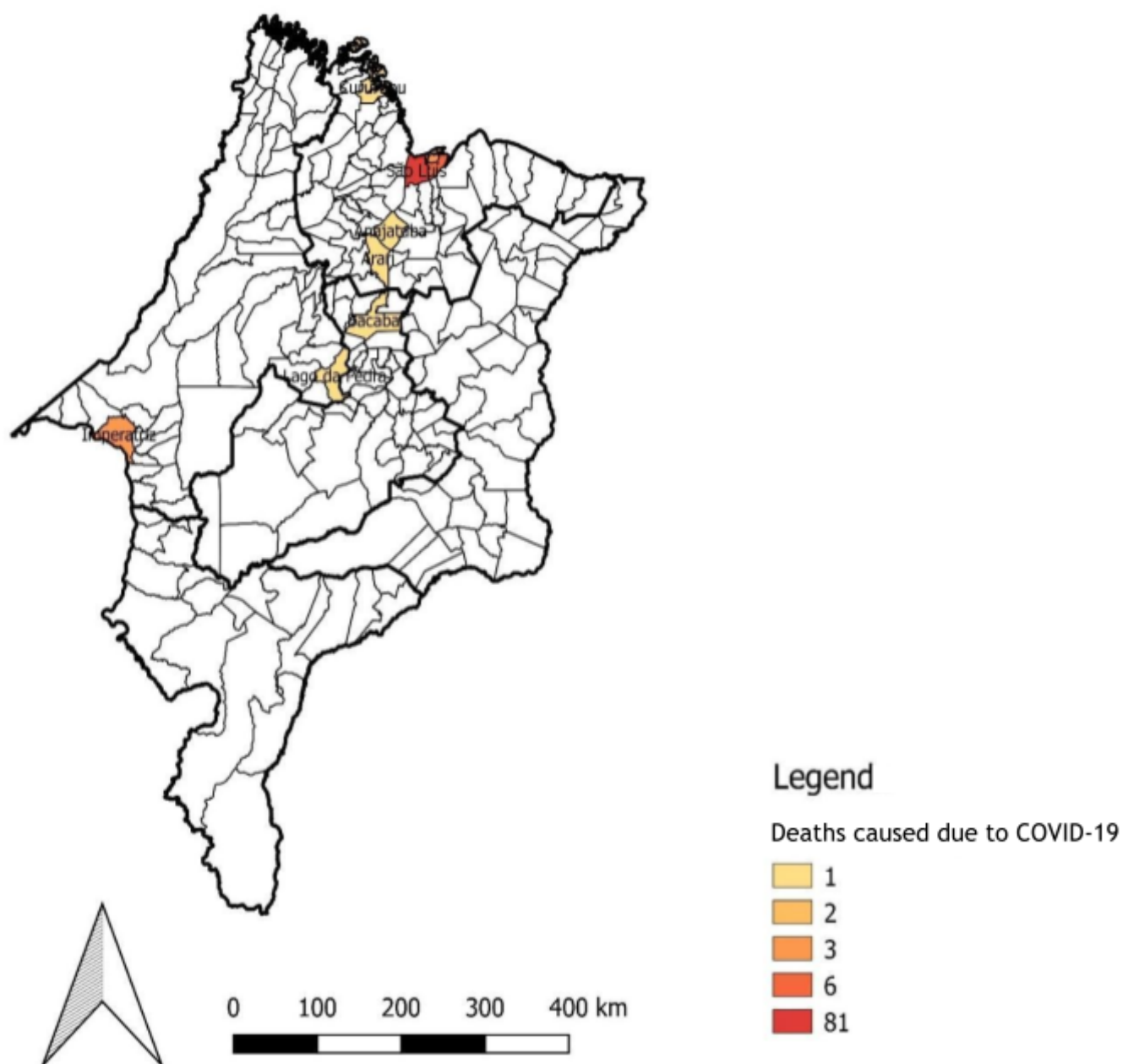
*Chronic Kidney Disease / Obesity / Parkinson's / Heart Disease

**Respiratory Disease / Cancer / Neuro-sequelae / Smoking / Heart Disease / Obesity / Chronic Kidney Disease

***Respiratory Disease / Cancer / Heart Disease / Obesity / Systemic Lupus Erythematosus / HIV

The spatial distribution of the number of COVID-19 deaths, in the state of Maranhão, by

municipalities, showed a higher incidence in São Luís, with 81 deaths, in the studied period (Graph 3).

Graph 3 – Distribution of the number COVID-19 deaths in the state of Maranhão, Brazil, 2020. N = 100.

Source: Maranhão State Epidemiological Bulletin / SES-MA.

DISCUSSION

In the state of Maranhão, the regional health headquarters most affected was São Luís. This city is a large metropolis, with greater population density and concentration of many industries. It is the main point of production flow as well, with direct influence on the state's economy, and has the highest concentration of income in the Maranhão territory.⁷

Such facts may be related to the ease of transmissibility of the disease at the regional headquarters due to the large flow of people at bus

stations, river ports, and airport, which offer mobility to nearby regions and other Brazilian states and, also, connection with other countries.⁸

In December 2019, the regional headquarters in question had 53.29% coverage of primary care. Regarding the hospital network, data from February 2020 show this regional headquarters as having the largest number of hospital beds, with 4,007 beds registered, of which 3,163 belong to the Unified Health System (SUS) and 844 do not belong.⁹ It also

has the highest concentration of beds in the Intensive Care Unit and Intermediate Unit (642 beds).

Considering the outcomes of the cases of COVID-19 and the growing increase in the number of cases of the disease, which causes greater demand for health services in all regions, it is clear that there was an increase in the number of beds. Particularly, for exclusive intensive care for the treatment of COVID-19. According to Ordinance nº 568 of the Ministry of Health, of March 26, 2020, through which 90 beds have already been enabled throughout the state of Maranhão, 60 of which are located in the regional headquarters of São Luís.

This fact is justified by the greater offer of several health services of low and high complexity, considering that this regional headquarters emerges as the main reference for the North Macroregion, which is composed of nine regional health departments and 32 municipalities.¹⁰ In addition, the São Luís regional health department presents a greater strengthening of the network of care for chronic diseases, which is one of the priority points in monitoring acute and chronic conditions.¹¹

About the analysis of the sex of the diagnosed individuals, there is a predominance of cases of females. This finding was also observed in a study conducted in the state of Mato Grosso,¹² while 56% of the cases were male¹³ in Wuhan, China. In this situation, it is assumed that women seek health services more frequently than men. Possibly, due to this, there may be underreporting of cases in the male population, as, historically, men seek less health services, which can lead to worsening of the disease, late treatment, and evolution to death.

Concerning the age group, there was a predominance of patients from 30 to 49 years. These findings are similar to the ones found in a study¹⁴ conducted in Wenzhou, China, which showed 58.9% of confirmed cases in individuals of this age group. It is worth emphasizing the importance of endorsing non-pharmacological measures in order to reduce the number of people with the disease in this age group.

It is important to note that this population is in the economically active range,¹⁵ which reinforces the adoption of socioeconomic measures to combat the novel coronavirus (SARS-CoV-2).

As to deaths, the predominant age group of patients was 60 years old or more. These data corroborate the data obtained in a study¹⁶ conducted in Italy, according to most patients who died were on average 80 years old. There was a need for health care among patients in the age group of 67 years on average. In view of this, it is possible to infer the importance of care directed to the elderly population, which must occur through the application of public protective measures that reinforce the need for social and health care.

Among the comorbidities related to COVID-19 deaths recorded, there was a higher occurrence of chronic diseases of the cardiovascular and immune system. For Vicent et al.,¹⁷ chronic non-communicable diseases, such as diabetes, cardiovascular diseases, and others, maximize the risks related to clinical complications, which makes affected patients more vulnerable. Historically, data on general mortality, in the state of Maranhão, show a predominance of cases of patients in the age group from 50 years of age and deaths related to diseases of the circulatory system,¹⁸ which can result in morbidity of vital / target organs, such as kidneys, lungs, and immune system. Among these diseases, many affect people who die due to their association with infection caused by the novel coronavirus (SARS-CoV-2).

As for deaths, the highest number occurred in regions where there are the highest numbers of reported case records. However, death records are also observed in the interior of the state, in small municipalities where the respective regional health headquarters has a still precarious structure in relation to the availability of Intensive Care beds. Such fact raises concerns about available health care, since early diagnosis is an important mechanism for detecting new cases, strengthening health

surveillance for decision-making in the investigation, confirmation and disposal of cases.¹⁹

It is emphasized that the state of Maranhão has a large concentration of rural areas with low demographic density,²⁰ and this characteristic makes it difficult to implement Health Care Networks for geographical and economic reasons. When verifying the distribution of equipment for the maintenance of life among the regional headquarters, an important variation in the number of available equipment is noticed, with a greater concentration in the regions of São Luís (61.59%) and Imperatriz (9.53%) and the lowest number in Viana, with only 0.38%.

The limitations of the study are related to the constant updating of processing data, which shows that the dynamics of transmission occurs in a changeable way. In this sense, it is necessary to continue the epidemiological studies to assess the longitudinality of the pandemic, as well as the constant changes in the epidemiological and social situations in the state of Maranhão.

RESUMO

Introdução: Neste estudo analisamos o perfil epidemiológico de notificações de casos do novo coronavírus (SARS-CoV-2) no Estado do Maranhão. **Delineamento:** Trata-se de um levantamento epidemiológico de casos e óbitos por COVID-19 notificados no estado do Maranhão, no período de março a abril de 2020. Os dados foram analisados a partir dos informes do boletim epidemiológico de saúde do estado do Maranhão, juntamente com informações disponibilizadas pelas sedes regionais de saúde do estado. Os casos foram analisados por meio das variáveis: sexo (feminino / masculino), faixa etária (em anos), procedência e presença ou não de comorbidades. **Resultados:** Foram confirmados 2.105 casos de COVID-19. A região mais acometida foi a de São Luís com 89% dos casos, sendo os pacientes, em sua maioria, do sexo feminino (52%) e de idade entre 30 e 49 anos (53,1%). Os casos de pacientes do sexo masculino apresentaram maior taxa de óbitos (62%), prevalência de idade de 60 anos ou mais (66%), procedência regional de São Luís (60%) e comorbidades diversas (78%), destacando-se as doenças cardiovasculares e imunológicas. **Implicações:** O comportamento da pandemia é ascendente no Estado, o que evidencia a necessidade de mais medidas de contenção.

DESCRITORES

Coronavírus; Vigilância em Saúde Pública; Assistência à Saúde.

RESUMEN

Introducción: En este estudio, analizamos el perfil epidemiológico de los informes de casos del nuevo coronavirus (SARS-CoV-2) en el estado de Maranhão. **Delineación:** Esta es una encuesta epidemiológica de casos y muertes realizada por COVID-19 notificada en el estado de Maranhão, de marzo a abril de 2020. Los datos se analizaron a partir de los informes del boletín epidemiológico de salud del estado de Maranhão, junto con la información proporcionada por las oficinas regionales de salud del estado. Los casos se analizaron utilizando las variables: sexo (femenino / masculino), grupo de edad (en años), origen y presencia o no de comorbidades. **Resultados:** Se confirmaron 2.105 casos de COVID-19. La región más afectada fue la de São Luís con el 89% de los casos, siendo la mayoría de los pacientes eran mujeres (52%) y con edades comprendidas entre 30 y 49 años (53,1%). Los casos de pacientes masculinos tuvieron una tasa de mortalidad más alta (62%), prevalencia de 60 años o más (66%), origen regional de São Luís (60%) y diversas comorbidades (78%), destacando enfermedades cardiovasculares e inmunológicas. **Implicaciones:** El comportamiento de la pandemia es ascendente en el estado, lo que destaca la necesidad de más medidas de contención.

CONCLUSION

Similar to the world scenario, COVID-19 infection, in the state of Maranhão, is a public health problem, requiring attention to the virus circulation in the interior of the state, alert to risk groups and effective health interventions.

As for the reported cases, the information evaluated was consistent with the expected profile. The survey of this study identified people in the age group between young adults and elderly, female and belonging to the São Luís regional health department. As for COVID-19 mortality, cases of male patients were predominant, aged over 60 years, with comorbidities and coming from São Luís and the surrounding cities.

Given the above, coping with COVID-19 is a challenge today because it is an infection that is still unknown in terms of systemic effects in the medium and long term. In view of this, public health measures are aimed at the prevention, monitoring and control of cases, which raises the need for investments in new health technologies and innovation to meet future needs.

DESCRIPTORES

Coronavirus; Vigilância em Saúde Pública; Prestação de Atenção de Saúde.

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COLLABORATIONS

JSA and JAC: Contributed to elaboration of the project, data collection, analysis, and article writing. ECC and ML: Participated in data collection, analysis, and article writing. TMEA and AHLS: Participated in correction of the article and the final version of the article. All the authors agree and take responsibility for the content of this manuscript version to be published.

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AVAILABILITY OF DATA

Not applicable.

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CONFLICTS OF INTEREST

There are no conflicts of interest to declare.