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ORIGINAL ARTICLE

Mortality and case fatality rates of COVID-19 in the State of Goiás, Brazil

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Abstract

Introduction: the initial spread of the pandemic in Brazil was mainly affected by patterns of socioeconomic vulnerability. It should be noted that the Central-West region of Brazil is one of the regions with the lowest number of cases, but the states of this region together have the highest mortality rate of COVID-19 in the country. Goiás was the most affected state of this region, with the highest number of deaths in the area.

Objective: to assess the incidence of mortality and lethality caused by COVID-19 from March 2020 to June 2021 in the State of Goiás, Brazil.

Methods: an ecological study, using a series of time series of public and official data of the Department of Health of the State of Goiás, Brazil. Information was collected on cases and deaths from COVID-19 from March 2020 to June 2021. Mortality, case fatality, and incidence rates were calculated. The Prais-Wisten regression model was used to build time series. The daily percent change (DPC) and the effective reproductive number (Rt) were estimated.

Results: Goiás had a predominance of a greater viral spread during the first and the beginning of the second wave, with Rt higher than 1. The second wave from December 2020 to June 2021 was more lethal and had higher mortality rates than the first wave. It was observed, higher scores of case fatality and mortality belonged to males and the elderly.

Conclusion: an analysis of mortality and case fatality rates helps understand the COVID-19 pandemic behavior in Goiás. It is essential to monitor epidemiological indicators and strengthen intervention strategies to contain the pandemic in this state.

Keywords: case fatality rate, COVID-19, epidemiology, mortality, trends.

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Authors summary

Why was this study done?
The scientific literature has gaps on the evolution of COVID-19 in the Midwest Brazil region. Then, describing the temporal evolution of epidemiological indicators of incidence, mortality, and lethality is essential for policymakers to design strategies to mitigate the impact of the pandemic and estimate the proportion of future repercussions arising from the scenario experienced by COVID-19.

What did the researchers do and find?
The researchers analyzed important epidemiological indicators of transmissibility, incidence, mortality, and lethality of COVID-19 in the state of Goiás, Midwest Brazil. The authors found in the period from March 2020 to June 2021 the characteristic profile of two waves, the second wave presented a more aggravating scenario with high mortality and lethality.

What do these findings mean?
Given that the pandemic scenario is in continuous change, the epidemiological indicators of incidence, mortality, and lethality suffer temporal fluctuations so it is necessary to monitor these indicators regularly.

INTRODUCTION

Since the initial outbreak of pneumonia of unknown etiology in Wuhan, China, at the end of 2019, the COVID-19 disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), has become a complex global Public Health problem[1]. According to the Center for Systems Science and Engineering of Johns Hopkins University[2], until July 05, 2021, worldwide, the COVID-19 was responsible for more than 180 million confirmed cases and approximately 4 million deaths. Within this scenario, Brazil accounted for 18,769,808 cases and 524,417 obits, highlighting second place in the ranking of deaths by COVID-19, only behind the United States of America accounting for 605,551 deaths.

It was believed that Brazil, being a country with a population of over 200 million that has a universal, comprehensive health system, would have good tools to mitigate the COVID-19 pandemic. However, Latin America became the pandemic epicenter, mainly due to the high spread of the disease in Brazil[3].

Despite the benefits arising from the Unified Health System in Brazil (SUS), many structural problems hamper the quality of how this system works, including gaps in organization and governance and low public funding. Furthermore, there are numerous regional disparities in access to health services, in which the most impoverished regions and the most disadvantaged socioeconomic population groups are the most impacted[4].

It is noteworthy that the initial spread of the Pandemic in Brazil was mainly affected by patterns of socioeconomic vulnerability; this occasioned a more significant impact than the effects of age and health status. It is known that deaths from COVID-19 are directly associated with socioeconomic vulnerability indices and negatively correlated with the levels of hospital resources. Thus, understanding the dissemination pattern of COVID-19 in a region marked by significant socioeconomic inequalities is essential to containing the spread of the pandemic in the country[5].

Measures to contain the disease are indispensable; the viral dissemination can contribute to the formation of new waves even more lethal, given that the population is tired of the virus and mostly deprived of education on health measures[6].

The country's different regions were impacted with varying intensities; it should be noted that, until mid-2021, the Brazilian Midwest was one with the lowest number of cases (1,910,873). However, it has the highest mortality rate by COVID-19 in the country, with 301 deaths per 100 thousand inhabitants. This average is higher than the gross national mortality (249,9 deaths per 100,000 inhabitants)[7].

Among the states that make up the Midwest, Goiás is the most populous, with an estimated 7.1 million for 2020[8]. Between 2000 and 2017, it had a population growth of 1.75%, above the national average (1.22%). Despite its population growth, the state is below the provision of health services in the Central West and Brazil. Urban sanitary sewerage is still very precarious, and just over half the population benefits[9].

The State of Goiás has significantly been affected by the pandemic. Its first fatal victim from COVID-19 was reported on March 26, 2020, and until early July 2021, it counted almost 20,000 deaths and more than 680,000 cases of COVID-19, the state with the highest number of deaths in the region[7].

Under these circumstances, it is necessary to produce epidemiological studies on COVID-19 in this region. Therefore, this research objective is to evaluate the incidence, mortality, and case-fatality of COVID-19 from March 2020 to June 2021 in Goiás State, Brazil.

METHODS

It is an ecological study, using a time series of public and official data available on the Health Department of the State of Goiás, Brazil[10]. The database was updated on July l7, 2021, including the cases and deaths of COVID-19 from March 2020 to June 2021. Time-series studies are helpful to analyze the pandemic behavior curves[11].

The selected data revealed 694,955 cases and 19,448 deaths of COVID-19 reported by the municipalities of Goiás. The cases were classified according to the date of symptom onset and the deaths according to death date.

All notifications of cases and deaths referred to COVID-19 were considered, using the International Classification of Diseases, 10th edition (ICD-10), of "U07.1 COVID-19, identified virus", or "U07.2 COVID-19, virus not identified"[12] associated with the disease, with clinical, laboratory or epidemiological confirmation of COVID-19.

Two researchers extracted the data independently to minimize collection bias and guarantee the quality and reliability of the data obtained, then the selected data were distributed in an Excel spreadsheet.

The effective reproductive number (Rt) was estimated using R studio software EpiEstim package[13], version 2.2.4, a previously time-varying reproduction number for epidemics model developed by Thompson and colleagues[14]. Our model used a mean serial interval of 2.97 days with a mean, standard deviation of 3.29 days, as described in previous studies[15,16].

Were calculated the incidence (1) and mortality rates (2) expressed per 100,000 inhabitants, and case-fatality (3), expressed as a percentage as the following equations:

$$(1)\ \text{Incidence} = \frac{\text{number of cases}}{\text{population}} \times 100.000$$

$$(2)\ \text{Mortality} = \frac{\text{number of deaths}}{\text{population}} \times 100.000$$

$$(3)\ \text{Case-fatality} = \frac{\text{number of deaths}}{\text{number of cases}} \times 100$$

Mortality rates in the entire period stratified by sex and age were also calculated. The projection of the Federation Units for the year 2020 indicates a population of 7,017,496 inhabitants for Goiás[17]. Its distribution by sex and age group is described in figure 1.

The examined period was divided into first wave (March to November 2020) and second wave (December 2020 to June 2021). To define the end of the first wave, the month with the lowest mortality rate was considered, which suggested the end of a first wave in the curve.

Age group (years old)	POPULATION OF THE STATE OF GOIAS, BRAZIL		
	Male	Female	Total
0 – 19	1,027,868	983,639	2,011,507
20 – 29	611,614	581,431	1,193,045
30 – 39	595,659	575,586	1,171,245
40 – 49	502,780	511,584	1,014,364
50 – 59	382,447	404,238	786,685
60 – 69	234,885	262,266	497,151
70 – 79	111,520	130,598	242,118
80 or more	44,122	57,259	101,381
Total	**3,510,895**	**3,506,601**	**7,017,496**

Figure 1: Number of inhabitants according to sex and age group for the state of Goiás.
Source: DATASUS (2021) - Population Projection of Federation Units by sex and age groups: 2000-2030[17].

The trend analysis the methodological guidelines by Antunes and Cardoso[18] were adopted. The Prais-Winsten regression model for population mortality rates were used to build time series, as well as to determine incidence, case-fatality and mortality trends.

Probability (p) and Daily Percent Change (DPC) were estimated considering a 95% level significance, according to equations (1), (2), and (3):

$$(1)\ DPC = (10^{\beta} - 1) \times 100\%$$

$$(2)\ (IC95\%)_{ul} = (10^{\beta\_max} - 1) \times 100\%$$

$$(3)\ (IC95\%)_{u} = (10^{\beta\_min} - 1) \times 100\%)$$

In these equations, we considered β as the angular coefficient from the linear regression, the indexes ul as the upper limit, and ll as the lower limit of the confidence level.

The incidence, mortality and case-fatality trends were classified as increased, decreased, or was flat. Was considered flat trends when p>0,05.

Statistical analyzes were performed using the STATA 14.0 software (College Station, TX, U.S. 2013).

RESULTS

Goiás, consists of 246 municipalities and has a territorial extension of 340,242.854 km². It has available 2,290 infirmary beds and 1,058 Intensive Care Unit beds to COVID-19. Table 2 shows a summary of its main sociodemographic characteristics (table 1).

Figure 2, split into two parts (A and B), shows the cases and deaths by COVID-19 in the studied period. From March 2020 to June 2021, 694,955 cases (A) and 19,448 deaths (B) were reported.

Table 1: Sociodemographic characteristics of the state of Goiás, Brazil

Estate of Goiás	Description
Region*	Midwestern Brazil
Number of municipalities*	246 municipalities
State's capital*	Goiânia
Territorial extension*	340,242.854 km²
Demographic density*	17.65 inhabitants /km²
Total Population (2020)**	7,017,496 inhabitants

Continuation - Table 1: Sociodemographic characteristics of the state of Goiás, Brazil

Estate of Goiás	Description
Monthly household income per capita*	1,258 reais
Human Development Index (HDI), according last census, 2010)*	0.735
Average number of people per household***(2019)	2.8 people
Number of basic health units#	1297 units
Hospital Beds## (data updated on June 2, 2021)	
Total number of infirmary beds	8,293 infirmary beds
Total number of beds in the Intensive Care Unit (ICU)	1,801 ICU beds
Number of COVID infirmary beds	2,290 COVID infirmary beds
Number of COVID ICU beds	1,058 COVID ICU beds

Source: *Brazilian Institute of Geography and Statistics[8]. **DATASUS - Population projection of Federation Units by sex and age groups: 2000-2030[17]; ***IBGE Automatic Recovery System – SIDRA[19]; #National Register of Health Establishments – CNESNet – Ministry of Health, Brazil[20]; ##State Secretary of Health of the state of Goiás (2021)[10].

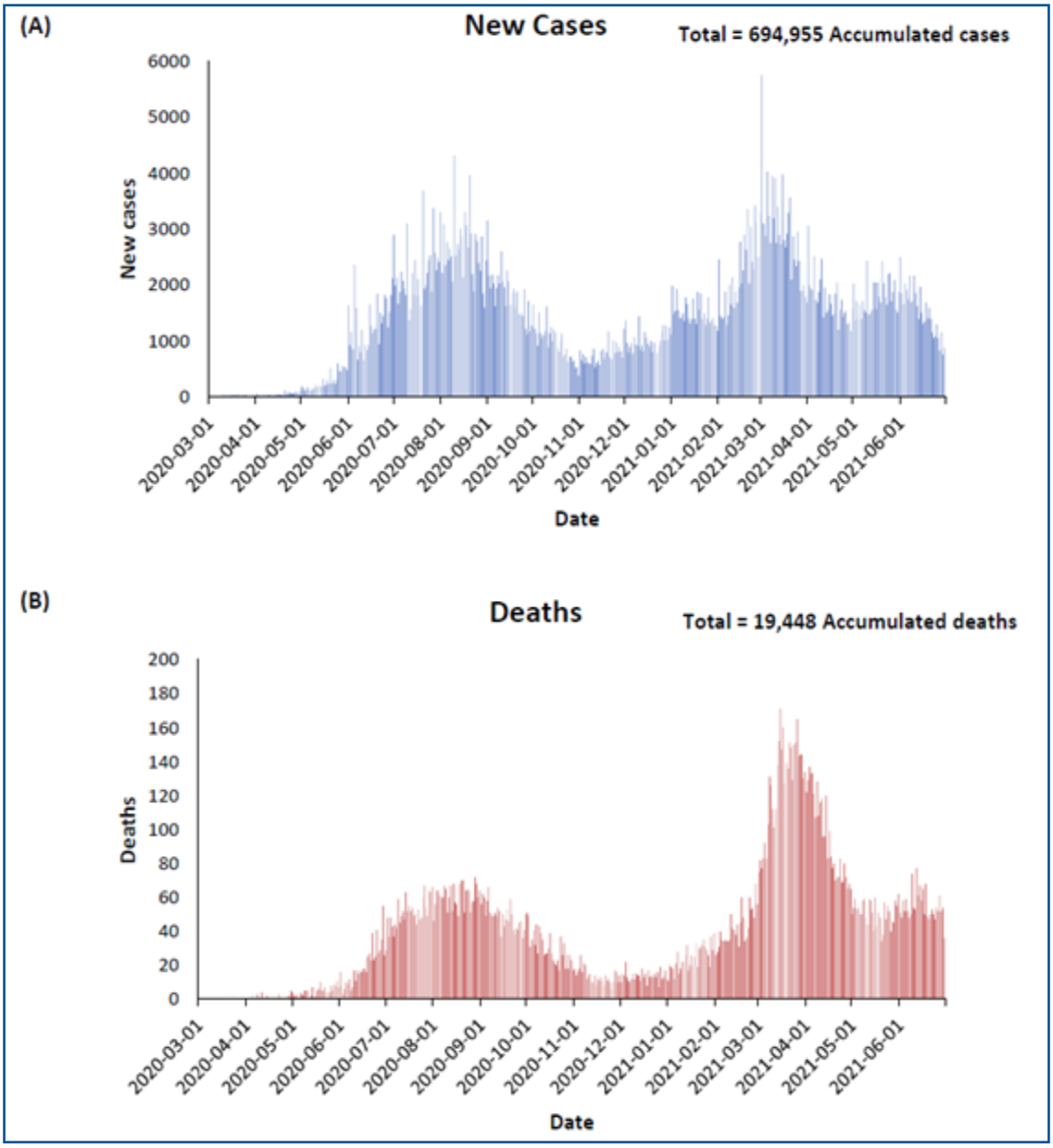


Figure 2: Number of new cases and daily deaths due to COVID-19 in the state of Goiás since the beginning of the Pandemic until the end of June 2021

Source: Cases, deaths and population were extracted from Secretary of Health of the State of Goiás, Brazil[10].

The effective reproductive number (Rt) of COVID-19 in the state of Goiás from March 5st 2020 to June 30st 2021, is shown in figure 3.

The onset of the Pandemic in Goiás revealed a vaster viral spread, with Rt higher than 1, especially from March to July 2020. Then, September and October showed a controlled viral spread, with Rt values lower to 1, increasing in later months, with rates indicating a predominance of low viral transmission from Jun 2021 (Rt < 1) (figure 3).

The crude incidence rates of COVID-19 in Goiás, considering the period examined (A) and trend analyses (B), are illustrated in figure 4.

The state of Goiás had the highest incidence rate in August 2020 (1177.91 new cases per 100,000 inhabitants), indicating the peak of the first wave of the disease in the region. A possible second wave formation from November onwards recorded an incidence peak in March 2021 (1299.95 new cases per 100,000 inhabitants). Distinct trends in the incidence rate were observed during the period, fluctuating from "increasing" during the first wave, with a percentage of daily change (DPC) of 1.53% ($p<0.05$) to "flat" during the second wave ($p>0.05$) (figure 4).

The case fatality percentual of COVID-19 is shown in figure 5.

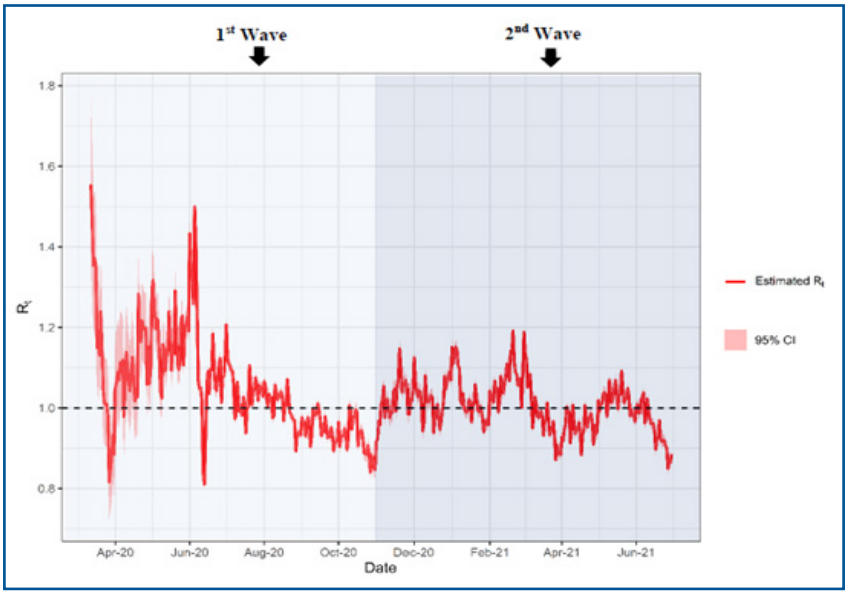
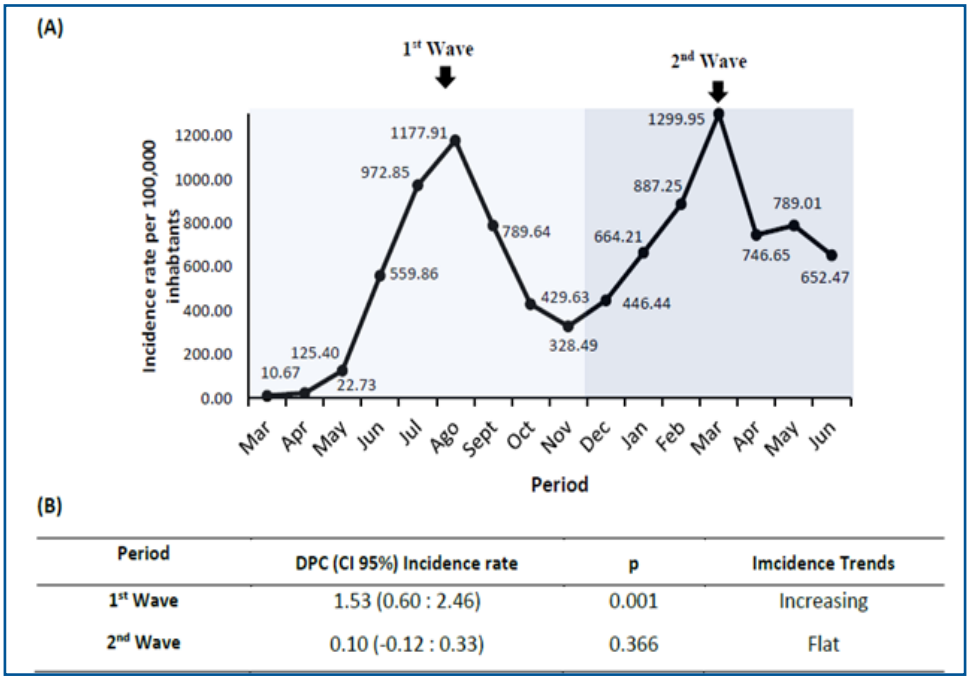


Figure 3: The effective reproductive number (Rt) during 2020, March 5st to 2021, June 30st period to the state of Goiás

CI = Confident Interval. Rt = Effective Reproductive Number.



(B)

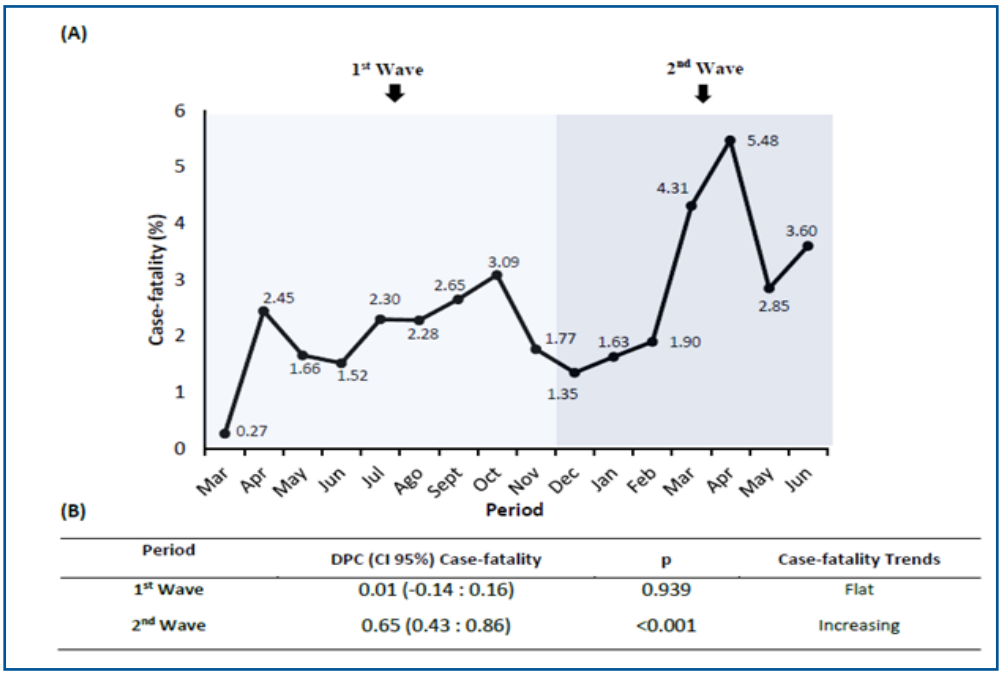
Period	DPC (CI 95%) Incidence rate	p	Imcidence Trends
1st Wave	1.53 (0.60 : 2.46)	0.001	Increasing
2nd Wave	0.10 (-0.12 : 0.33)	0.366	Flat

Figure 4: Incidence rate per 100,000 inhabitants (A) and Prais-Winsten regression estimates and Daily Percent Change (DPC) of incidence rates due to COVID-19 in the State of Goiás, during the 1st wave (March to November 2020) and the 2nd wave (December 2020 to June 2021)

DPC – Daily Percent Change (%); CI 95% – Confidence interval 95%; p value – probability of statistical significance - Prais-Winsten regression test. Source: Cases, deaths and population were extracted from the from Secretary of Health of the State of Goiás, Brazil[10].

The second wave was more lethal than the first wave, the highest caste-fatality values were observed in March 2021 (4.31%), April (5,48%) and June (3,60%) with an increasing trend, with a DPC of 0.65% ($p<0.05$) (figure 6).

The mortality rate and Prais-Winsten regression estimates were illustrated in figure 6.

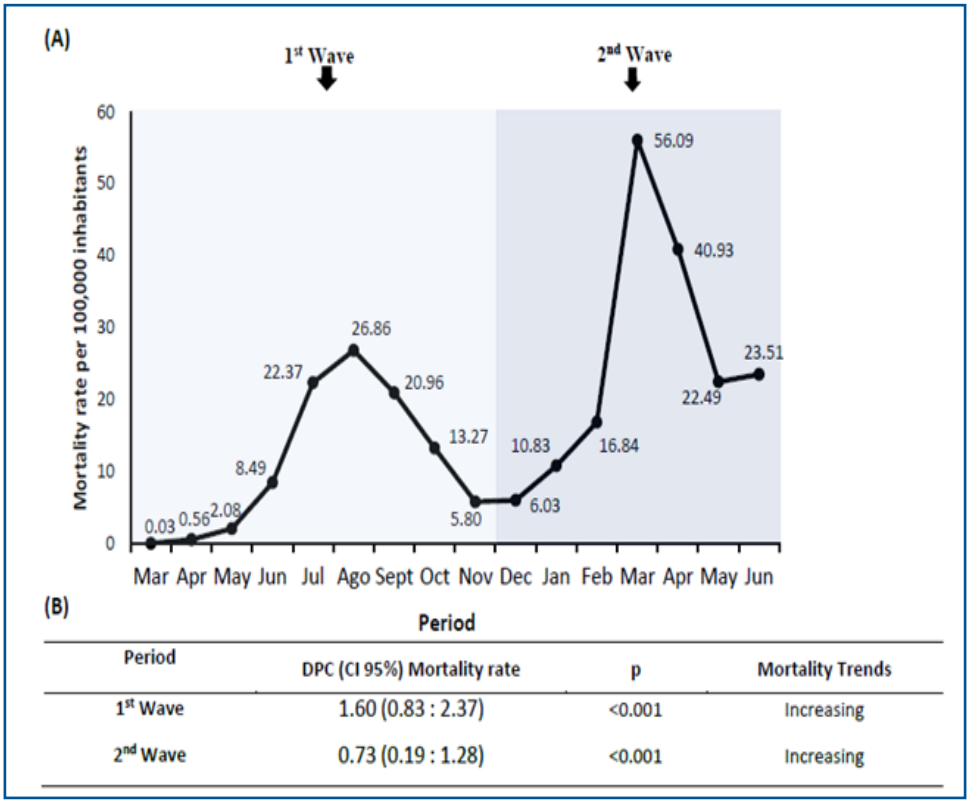


(B)

Period	DPC (CI 95%) Case-fatality	p	Case-fatality Trends
1st Wave	0.01 (-0.14 : 0.16)	0.939	Flat
2nd Wave	0.65 (0.43 : 0.86)	<0.001	Increasing

Figure 5: (A) Case-fatality (%) and (B) Prais-Winsten regression estimates and Daily Percent Change (DPC) of case-fatality due to COVID-19 in the State of Goiás, during the 1st wave (March to November 2020) and the 2nd wave (December 2020 to June 2021)

DPC – Daily Percent Change (%); CI 95% – Confidence interval 95%; p value – probability of statistical significance - Prais-Winsten regression test. Source: Cases, deaths and population were extracted from the from Secretary of Health of the State of Goiás, Brazil[10].



(B)

Period	DPC (CI 95%) Mortality rate	p	Mortality Trends
1st Wave	1.60 (0.83 : 2.37)	<0.001	Increasing
2nd Wave	0.73 (0.19 : 1.28)	<0.001	Increasing

Figure 6: (A) Mortality rate (per 100,000 inhabitants) and (B) Prais-Winsten regression estimates and Daily Percent Change (DPC) of mortality rates due to COVID-19 in the State of Goiás, according to the 1st wave (March to November 2020) and the 2nd wave (December 2020 to June 2021)

DPC – Daily Percent Change (%); CI 95% – Confidence interval 95%; p value – probability of statistical significance - Prais-Winsten regression test. Source: Cases, deaths and population were extracted from the from Secretary of Health of the State of Goiás, Brazil.

The second wave also had the highest mortality rate of the entire period, with a rate of 56.09 deaths per 100,000 inhabitants in March 2021. There was an increasing trend in the mortality rate in both the first wave and the second wave, with respective DPC: 1.60% and 0.73% (figure 6).

Figure 7 illustrates the case-fatality (%) and the mortality rate (per 100,000 inhabitants) by age group and sex.

Considering the period analyzed, higher percentage lethality and mortality (per 100,000 inhabitants) were observed in males and older adults (figure 7).

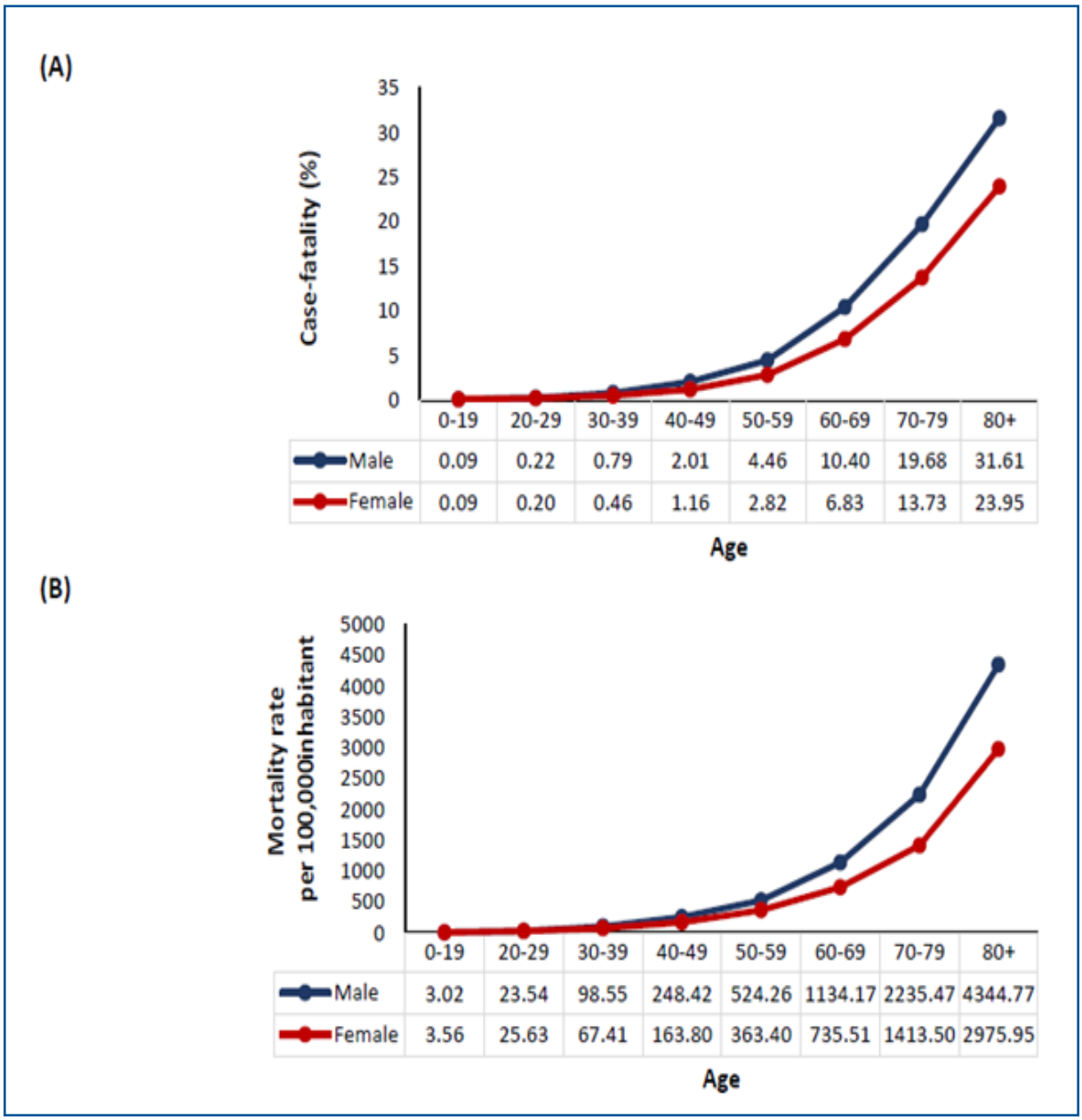


Figure 7: Case-fatality (%) (A) and (B) mortality rate (per 100,000 inhabitants) by sex and age group of COVID 19 in the State of Goiás from March 2020 to June 2021

DISCUSSION

The state of Goiás has suffered from the pandemic, with 694,955 cases and 19,448 deaths by COVID-19 from March 2020 to June 2021. A more aggravating disease scenario during a possible second wave, from December 2020 to June 2021, increased mortality and case-fatality trends, with maximum peaks observed in March and April 2021, respectively.

The authorities of Goiás adopted measures to contain the spread of COVID-19 and avoid overloading the Health system. Initiatives to provide care throughout the state were implemented, such as commerce closing, social distancing, investment in tracking infected people and their contacts, expansion of RT-PCR testing[21]. However, those efforts were insufficient to contain the virus; the Rt value remains above 1 in most of the period analyzed. A high rise in deaths, mortality, and lethality rates remained during the early months of 2021.

According to the Extraordinary Bulletin of the COVID-19 Observatory of the Oswaldo Cruz Foundation[22], the epidemiological week from March 28 to April 3, 2021, had an acceleration in the spreading of SARS-CoV-2 in Brazil, reaching deaths number records, with continued increment in positive COVID-19 tests and ICU bed

occupancy rates. The epidemiological curve of COVID-19 in Goiás, from March 2020 to June 2021, registered the formation of two possible waves. Although the first wave (March to November 2020) exhibited increasing incidence and mortality rates per 100,000 inhabitants, the second wave (December 2020 to June 2021) had a more alarming profile, growing lethality and mortality trends. Besides having a DPC of 0.73% in COVID-19 mortality, the second wave was more lethal, with a DPC of 0,65% for the disease lethality. Furthermore, during the second wave, March 2021 reached the highest mortality rate (56.09 deaths per 100,000 inhabitants) of the entire period and a high score of case-fatality observed in March (4.31%) and April 2021 (5,48%). In that period, the state had a hospital bed occupancy rate above 90%[10].

It is noteworthy that the stationary incidence of COVID-19 observed during the second wave, with the increased mortality and lethality rate, may indicate that the state's number of tests was not enough to keep up with the actual number of new cases in the region. Mainly because Brazil was, for the most part, experiencing an increment in the spread of the virus, reporting records in cases and deaths from COVID-19 during March 2021 compared to previous months[7].

Mortality and lethality observed in the second wave may be due to the impacts caused by the spread of new variants of SARS-CoV-2. In March 2021, the Department of Health of Goiás, through the Center for Strategic Information and Response in Health Surveillance, stated their concern due to the dissemination of new viral variants identified in that region, such as the P.1 variant (strain B.1.1.28.1-Manaus) and VOC 202012/01 (strain B1.1.7-UK) of SARS-CoV223. Furthermore, in June 2021, the State Government[24] informed the detection of the delta variant (line B.1,617.2) in a sample of an 18-year-old patient in Goiânia city. The Municipal Health Department of the capital promoted surveillance actions because SARS-CoV-2 underwent numerous mutations over time to improve viral adaptation to environmental factors, climate, and population. It is highlighted that specific viral mutations are not random; this fact indicates that the virus has a vast capacity for change and survival, making it more transmissible and even more aggressive[25].

It is noteworthy that the strains detected in the state of Goiás were responsible for increasing the speed of viral transmission. It caused a sudden jump in the number of cases and deaths, which impacted the sanitary crises. It was similar to what happened with the P1 variant in the state of Amazonas, Brazil; the VOC 202012/01 variant (B.1.1.7) in the United Kingdom[26], and the delta variant (lineage B.1.617.2) in India[27].

The spread of those SARS-CoV-2 variants in the United Kingdom and Brazil[28] and the delta variant in India can also present an escape mechanism to the immune response to Anti-SARS-CoV-2 antibodies, which has important implications for the efforts to contain COVID-19[27,28]. However, it is emphasized that vaccination reduces the risk of developing disease symptoms, especially in fully vaccinated individuals (two doses or a single dose)[27].

The state of Goiás, until early June 2021, received 3,276,290 vaccine doses (1,358.880 CoronaVac, 1,720.850 AstraZeneca, and 196,560 from Pfizer), 1,656,665 were applied throughout the state, and 668,964 people immunized with the two doses[29]. The number of people vaccinated is still tiny, given the estimated size of the population of inhabitants in this state. Efforts must be made to increase the number of vaccines in Goiás to avoid the delta variant's arrival triggering the third wave. Thus, the promotion of vaccination associated with non-pharmacological measures, such as masks and hand hygiene, must be strongly developed to contain the advance of the pandemic[27,30].

Many countries accelerate vaccine coverage and observe reductions in the number of cases and deaths from COVID-19. However, Brazil still lags, and the consequences are measured in human lives, with sociodemographic impacts marked by regional inequalities and losses in significant advances achieved over the years, such as reducing population longevity. In Goiás, population longevity regressed to values similar to those observed before 2000; that is, the pandemic impacted a setback of approximately 20 years[31]. In addition, the disease has also caused more significant impacts on older adults and male individuals, as verified in the current study.

The findings of this study reveal higher mortality and lethality rates in older adults and male subjects; these results agree with the scientific literature. According to Goiás Government data, lethality on January 12, 2021, was higher for individuals aged 80 years or older, corresponding to a mortality of 28%, values similar to those found in this study (31.66 % and 24.13% for males and females aged 80 and over, respectively). The group of older people had a higher incidence, severity, mortality, and lethality rate of COVID-19, mainly due to the presence of more comorbidities[32]. Another factor contributing to the increase in COVID-19 rates is hospitalization. The percentage of hospitalization is higher among men. Overall, the lethality rate is relatively high (41.28%) among hospitalized patients, especially the elderly[33].

It is noteworthy that vaccination can contribute to changes in this scenario. During critical months, such as in March 2021, Goiás followed the plan of the National Health Authorities, started vaccination against COVID-19 with the people over 70 years, intending to complete the first vaccine doses in all individuals aged 60 years or older by April 2021[34,35]. Thus, studies at different periods should be carried out to understand the impacts of COVID-19 on the population and protect vulnerable groups. Although men are not considered as priority groups, indeed, they represent vulnerable groups to COVID-19.

A study that evaluated the differences arising from biological sex by age in the mortality of COVID-19 in seven countries found that the fatality rates were higher for men of all age groups. These higher rates in males suggest that sex-related factors affect the natural history of the disease[36].

Similar evidence was also described in a meta-analysis that evaluated 3,111,714 cases of COVID-19 worldwide. The authors reported no difference in the proportion of men and women infected with SARS-CoV-2.

Still, male individuals are approximately three times more likely to need an intensive care unit on admission to the hospital (OR = 2.84) and a greater chance of death (OR = 1.39) than women; the sexual bias observed in COVID-19 is a worldwide phenomenon. Thus, there is a need to analyze the influences of biological sex for the clinical management of the disease and develop strategies to contain the spread of the pandemic[37]. This knowledge can help identify risk factors for COVID-19 and support decision-making for implementing early and appropriate measures to avoid a more aggravating prognosis[33].

It is essential to monitor epidemiological indicators and intervention strategies to contain the pandemic throughout Goiás and across the country until incidence, mortality, and lethality rates show decreasing trends. Therefore, constant surveillance and the development of Public Health strategies are necessary to restrict the advance of COVID-19 and the impacts caused by this pandemic, considering mass testing, detection of variants, and vaccination of the population.

Study limitation

The study is subject to limitations arising from ecological studies and analysis of secondary databases, such as underreporting disease cases and low case testing.

CONCLUSION

In Goiás, Midwest Brazil region, from March 2020 to June 2021, there were 694,955 cases and 19,448 deaths from COVID-19. During the first wave, from March to November 2020, both the incidence and mortality rates showed a growing trend. However, during the 2nd wave, from December to June, a more aggravating scenario was observed, with increasing trends in the mortality rate and case fatality.

Author Contributions

Conceptualization, R.A.T., T.C.M., B.E.G.D., M.P.E. and L.C.A.; methodology, R.A.T., T.C.M., J.O.E., L.C.J., R.D.R., K.E., C.E.S. and L.C.A.; software, J.O.E., L.C.J.; validation, T.C.M., J.O.E., C.E.S. and L.C.A.; data curation, R.A.T., T.C.M., L.C.A.; writing-review and editing, all the authors; visualization, all the authors; supervision, K.E., C.E.S. and L.C.A.; project administration, C.E.S. and L.C.A. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement

Data were extracted from a population database in a COVID-19 dashboard, freely accessible on the Health Department of the State of Goiás website: https://indicadores.saude.go.gov.br/pentaho/api/repos/:coronavirus:paineis:painel.wcdf/generatedContent.

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Conflicts of Interest

The authors declare no conflict of interest.

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Resumo

Introdução: a propagação inicial da pandemia no Brasil foi afetada principalmente por padrões de vulnerabilidade socioeconômica. Ressalta-se que a região Centro-Oeste do Brasil é uma das regiões com menor número de casos, mas os estados dessa região juntos apresentaram a maior taxa de mortalidade por COVID-19 do país. Goiás foi o estado mais afetado da região, com o maior número de óbitos.

Objetivo: avaliar a incidência, mortalidade e letalidade por COVID-19 no Estado de Goiás, Brasil, no período de março de 2020 a junho de 2021.

Método: estudo ecológico, utilizando séries temporais de dados públicos e oficiais da Secretaria de Saúde do Estado de Goiás, Brasil. As informações foram coletadas sobre casos e óbitos de COVID-19 de março de 2020 a junho de 2021. Mortalidade, letalidade e taxas de incidência foram calculadas. O modelo de regressão Prais-Wisten foi usado para construir séries temporais. A mudança percentual diária (DPC) e o número reprodutivo efetivo (Rt) foram estimados.

Resultados: Goiás teve predomínio de maior disseminação viral durante a primeira onda e o início da segunda onda, com Rt maior que 1. A segunda onda, dezembro de 2020 a junho de 2021, foi mais letal e apresentou taxas de mortalidade maiores que a primeira onda. Observou-se que os maiores escores de letalidade e mortalidade pertenciam ao sexo masculino e aos idosos.

Conclusão: uma análise das taxas de mortalidade e letalidade ajuda a entender o comportamento da pandemia do COVID-19 em Goiás. É fundamental monitorar indicadores epidemiológicos e fortalecer estratégias de intervenção para conter a pandemia neste estado.

Palavras-chave: COVID-19, letalidade, epidemiologia, mortalidade, tendências.