



MORBIDITY INDICATORS OF COVID-19 IN SMALL MUNICIPALITY OF THE STATE OF BAHIA

INDICADORES DE MORBIMORTALIDADE DA COVID-19 EM MUNICÍPIO DE PEQUENO PORTE DO ESTADO DA BAHIA

Ana Luisa Macedo de Amorim ¹
Everton da Silva Santos ²
Luiza Rios Goncalves Silva ³
Renilza Jesus dos Santos ⁴
Cátia Vanessa Rodrigues dos Santos ⁵
Cleuma Sueli Santos Suto ⁶

Manuscript received on: October 21, 2021.

Approved on: March 8, 2022.

Published: March 26, 2022.

Abstract

Objective: Analyzing morbidity and mortality data on COVID-19 in the city of Pindobaçu, Bahia, in the period of March August 2021. **Methods:** This is an epidemiological study, with aggregated data, collected in two periods, in the GEOCOVID 19 and transparency Bahia portals, presented through indicators of morbidity and mortality, disease progression rate, effective reproduction rate and vaccination. **Results:** The moving average grew from 1 to 1.43; the cases accumulated in five months set a growth percentage of 16.2%. Mortality per 100,000 inhabitants from 134.34 rose to 154.24 and the lethality rate increased by 11.16%. The rate of evolution of deaths is negative (-100%) and only 18.93% of the population is vaccinated with two doses. The projection of cases for one month after the analyzed period, in relation to cases per day and moving average, indicates that the city will not have any new cases. **Conclusion:** The indicators point to a stabilization in new cases and deaths. As decisions related to coping with the pandemic were adopted late by city management through the implementation of social isolation measures and immunization actions require intensification for the effective control of COVID-19. It is suggested that further studies can be conducted using the GEOCOVID Portal and, thus, other epidemiological situations are evidenced in the state.

¹ Nursing student at the State University of Bahia. Member of the Research Group on Immunology and Atherosclerosis.

ORCID: <https://orcid.org/0000-0001-8463-2109> E-mail: a.luisa.amorim8@gmail.com.

² Graduating in Nursing at the University of the State of Bahia. Member of the Study Group on Gender and Care.

ORCID: <https://orcid.org/0000-0003-2144-0016> E-mail: evertonuneb@gmail.com

³ Nursing student at the State University of Bahia.

ORCID: <https://orcid.org/0000-0003-0150-8386> E-mail: luizarios1990@gmail.com.

⁴ Nursing student at the State University of Bahia. Community health worker at the Municipality of Senhor do Bonfim.

ORCID: <https://orcid.org/0000-0001-9845-4390> E-mail: renilzaajesuss@gmail.com

⁵ Nursing student at the State University of Bahia. Member of the Research Group on Nursing Care.

ORCID: <https://orcid.org/0000-0002-8693-647X> E-mail: catiavanessa11@live.com

⁶ Doctor in Nursing and Health at the Federal University of Bahia. Professor at the Professional Master's in Nursing at the State University of Feira de Santana. Professor at the State University of Bahia. Member of the Research Group on Women's Health, Gender and Comprehensive Care, of the Quality of Life and Healthy Aging Group and of the Research Group on Representations, Care Practices and Health Safety of Vulnerable Groups.

ORCID: <https://orcid.org/0000-0002-6427-5535> E-mail: csuto@uneb.



Keywords: COVID-19; Epidemiology, Descriptive; Indicators of Morbidity and Mortality; Vaccination.

Resumo

Objetivo: Analisar dados de morbimortalidade sobre a COVID-19 do Município de Pindobaçu, Bahia, no período de março a agosto de 2021. **Métodos:** Trata-se de um estudo epidemiológico, com dados agregados, coletados em dois períodos, nos portais GEOCOVID 19 e Transparência Bahia, apresentados por meio de indicadores da morbimortalidade, taxa de evolução da doença, taxa de reprodução efetiva e vacinação. **Resultados:** A média móvel cresceu, saindo de 1 para 1,43; os casos acumulados em cinco meses configuraram um percentual de crescimento de 16,2%. A mortalidade por cem mil habitantes que era de 134,34 subiu para 154,24 e a taxa de letalidade apresentou crescimento de 11,16%. A taxa de evolução de óbitos encontra-se negativa (-100%) e apenas 18,93% da população encontra-se vacinada com duas doses. A projeção de casos para um mês após o período analisado, em relação aos casos por dia e média móvel, indica que o município não terá nenhum caso novo. **Conclusão:** Os indicadores apontam para uma estabilização nos casos novos e óbitos. As decisões relacionadas ao enfrentamento da pandemia foram adotadas tardiamente pela gestão municipal por meio da implementação de medidas de isolamento social e as ações de imunização necessitam de intensificação para o efetivo controle da COVID-19. Sugere-se que novos estudos possam ser realizados utilizando-se o Portal GEOCOVID e, assim, outras situações epidemiológicas sejam evidenciadas no estado.

Palavras-chave: COVID-19; Epidemiologia Descritiva; Indicadores de Morbimortalidade; Vacinação

INTRODUCTION

Pandemic crises are known for high morbidity and mortality, which forces governments to establish sanitary measures, among these, those involving new rules and habits of life. Pandemic crises are known for high morbidity and mortality, which forces governments to establish sanitary measures, among these, those that involve new rules and habits of life to the population¹. Since March 2020, infection with the new coronavirus has been recognized by the World Health Organization (WHO) as the most recent pandemic², which has affected 211 million people, causing various impacts in several countries and requiring the adoption of various health measures³.

In Brazil, the first case of COVID-19 was confirmed in February 2020. As of August 22, 2021, the country recorded 20,556,487 cases and 574,209 deaths from the disease. In the state of Bahia, the first case was confirmed in March 2020 and so far there are a total of 1,215,040 cases, representing 5.91% of the country's total cases⁴⁵. The high diffusion of the disease is related to the mode of transmission of the etiological agent that occurs through direct contact with respiratory droplets, sneezing, cough, oral mucosa, nasal and eyes².



The Unified Health System (UHS) was conceived and conceived just over 30 years ago by the Brazilian Health Reform Movement. In the COVID-19 pandemic, the UHS acted as a protagonist at different care levels⁶. In this context, it is worth mentioning the production of development and innovation research, opening of intensive care unit (ICU) beds in record time, reorganization of Primary Health Care (PHC) and acquisition of respirators, Personal Protective Equipment (PPE) and diagnostic tests⁷.

However, in this pandemic scenario, small municipalities with few resources and low access to technologies presented the greatest difficulties to face the chaos that the pandemic installed⁸. The municipality of Pindobaçu, located in the North Center of Bahia, with a population of 20,048 inhabitants⁹ and classified as small, since the confirmation of the first case of COVID-19 in May 2020, has been experiencing difficulties in dealing with the high incidence of cases, when compared to the neighboring municipalities that make up the Microregion of Senhor do Bonfim¹⁰.

According to the Municipal Health Department, Pindobaçu has a health network that has a hospital (Professor Edgard Santos Hospital) with 36 sick beds, with 8 exclusive for patients affected with COVID-19. With regard to primary care, it has 8 Family Health Strategies (FHS) with coverage of 100% of its population¹¹.

Despite the limitations of care networks, small municipalities that presented an increasing incidence curve and difficulties in implementing effective strategies to prevent COVID-19 were able to use technological resources such as the analysis of projections based on different scenarios¹². The projections of a pandemic can help in the visualization of a future situation, allowing the rulers a longer period in the execution of protective measures and pandemic attenuation⁸.

In addition, after approval by the National Health Surveillance Agency, vaccination against COVID-19 seems to be effectively contributing to changes in the pandemic panorama¹³. Until September 19, 2021, 62.73% of the Brazilian population was vaccinated with the first dose. In Pindobaçu, vaccination was started on February 8 with a 103-year-old and in the first half of September, 11,142 people had already been vaccinated with the first dose and 4,249 with the second⁸.



The disease is responsible for thousands of deaths worldwide, with Brazil being one of the most affected countries¹⁴. Therefore, seeking to understand coping measures, perform and discuss the projection of cases in inland municipalities is necessary, as it will help managers to plan, monitor and evaluate the health of the population¹⁰. Thus, investigating characteristics and/or reasons that contributed to the significant increase in the number of cases that occurred made it possible to bring out how the disease behaves¹⁵.

Thus, in order to help understand the epidemiological scenario of the disease, as well as, contribute to developing strategies directed to modifiable factors, on the part of health management in small municipalities that strengthen the implementation of control measures, this study aimed to analyze morbidity and mortality data on COVID-19 in the municipality of Pindobaçu, Bahia, from March to August 2021.

METHOD

This is an epidemiological study, of descriptive character, with aggregated data, carried out through the analysis of data collected on COVID-19, in two periods, and presented, through absolute and relative values, indicators of morbidity and mortality, disease evolution rate, effective reproduction rate, vaccination and case projection in the municipality of Pindobaçu, Bahia.

Data collection was collected from secondary data aggregated and collected at GEOCOVID 19 Portals (mapbiomas.org) of the State University of Feira de Santana (UEFS), in partnership with the State University of Bahia and other Brazilian institutions, and Transparency Bahia of the Health Bureau of the State of Bahia (<http://www.transparencia.ba.gov.br/>).

GEOCOVID 19 portal uses the Brasil.io database, which has information on cases and deaths due to COVID-19 nationwide by the 27 State Health Bureaus (<https://brasil.io/home/>). Volunteer researchers update the database daily, being a fundamental strategy to obtain information that approaches the reality of the evolution of the pandemic, in the context of constant changes in the morbidity and mortality data of the disease.



In addition, in order to expand the information, a search was carried out on sites with local news and municipal decrees published during the pandemic on sanitary measures implemented in the municipality.

Data were collected at different times. For the first period of analysis, the time cutoff was used on April 23, 2021. And for the second period of analysis, August 23, with the projection for 30 days later (September 23, 2021). This allowed evaluating a period of 180 days of occurrence of the disease in the municipality.

For the organization of the database, the Microsoft Excel software was used. The graphs used have been prepared and are available on UEFS GEOCOVID-19 platform.

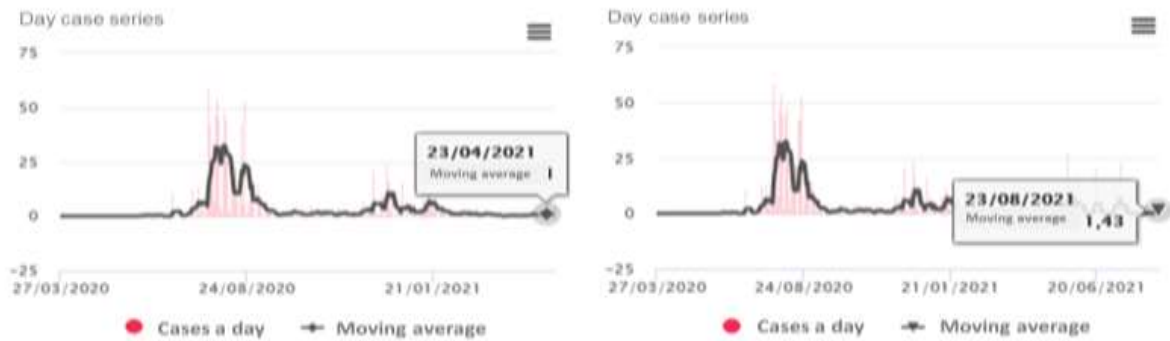
Descriptive statistical measures (simple and relative frequency) were used and lethality rates were calculated for the two periods studied using the formula: number of deaths per COVID-19 divided by the total number of apparent cases of the disease in the studied period, multiplied by 100.

This analysis used only secondary data available from a public domain database, so there was no need for submission to the Research Ethics Committee (REC).

RESULTS

The analysis of morbidity and mortality data from COVID-19 in the municipality of Pindobaçu-BA allowed identifying number of cases, moving average, incidence, evolution rate, deaths, lethality, vaccination and case projection.

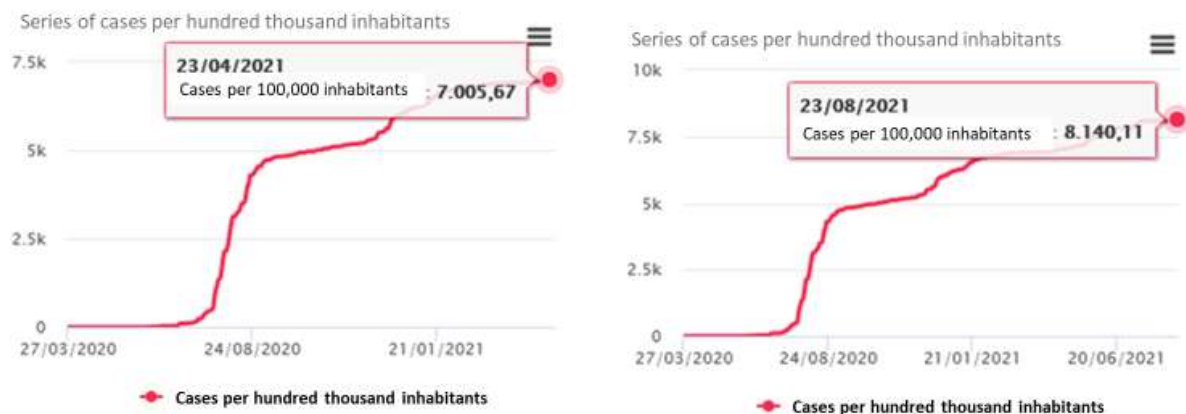
The first case of COVID-19, in the municipality, happened on May 1, 2020, since then, confirmed cases have grown daily. From April 23 to August 23, 2021, the moving average grew from 1 to 1.43, as shown in graphs 01 and 02.



Graphs 01 and 02 – Moving average of COVID-19 cases in Pindobaçu, Bahia, Brazil, 2021

Source: Geocovid Portal, 2021.

In the period analyzed, the number of accumulated cases increased. The municipality had 1,408 cases accumulated and five months later, 1,636 cases had already been registered, with a growth percentage of 16.2%. Regarding the incidence of cases, there was growth in the municipality of Pindobaçu, on April 23, 2021 the rate was 7,005.67 per 100,000 inhabitants. On August 23 of the same year, it totaled 8,140.11 per 100,000 inhabitants, as shown in graphs 03 and 04.



Graphs 03 and 04 – Incidence of COVID-19 in Pindobaçu, Bahia, Brazil, 2021

Source: Geocovid Portal, 2021.

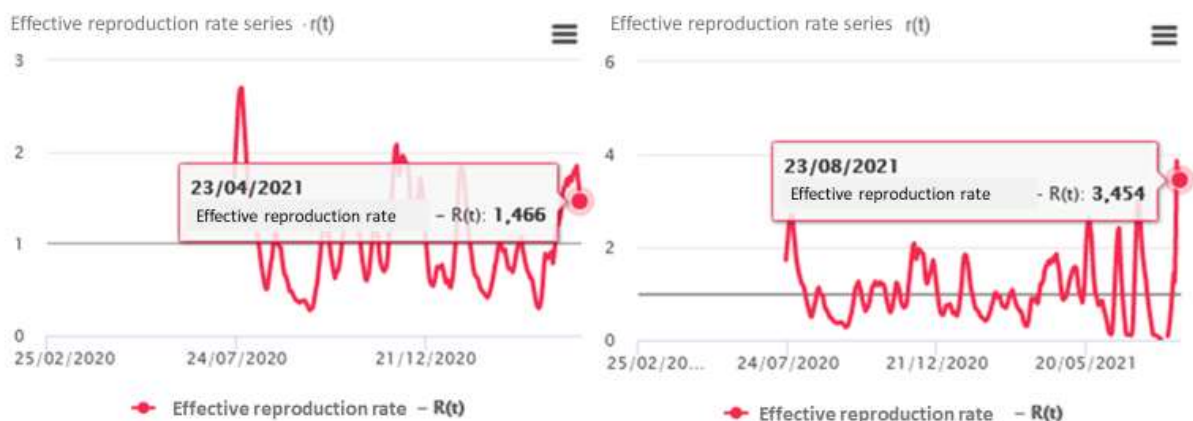
With the daily increase of new cases, it was observed in the municipality that the rate of evolution of cases went from 132.5% to 921.43%, as shown in graphs 05 and 06.



Graphs 05 and 06 – Evolution rate of COVID-19 cases in Pindobaçu, Bahia, Brazil, 2021

Source: Geocovid Portal, 2021.

Regarding deaths in the municipality of Pindobaçu, there was an increase from 27 to 31 cases in the period analyzed. Consequently, the mortality per 100,000 inhabitants, which was 134.34, rose to 154.24. However, despite the increase in deaths in the period, the rate of evolution of deaths is negative (-100%). However, the effective reproduction rate, which showed a downward trend in April, it was observed that it represented values greater than double in August, from 1.46% to 3.45%, as evidenced in graphs 07 and 08.



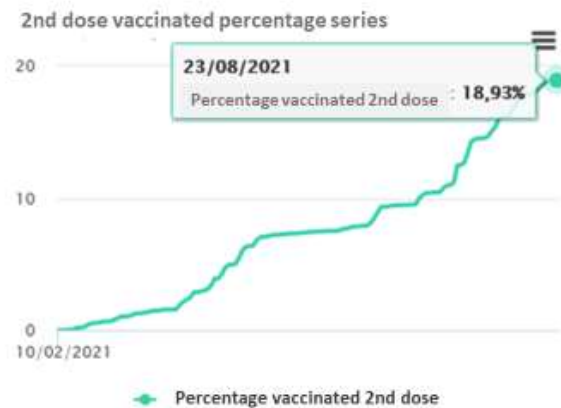
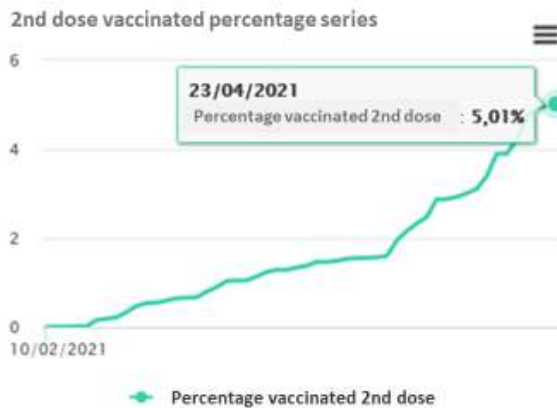
Graphs 07 and 08 – Effective reproduction rate of COVID-19 in Pindobaçu, Bahia, Brazil, 2021

Source: Geocovid Portal, 2021.

On April 23, 2021 Pindobaçu recorded a lethality rate of 1.70%. On August 23 of the same year, the lethality rate was 1.89%, with an increase of 11.16%, according to data from the Geocovid Portal.



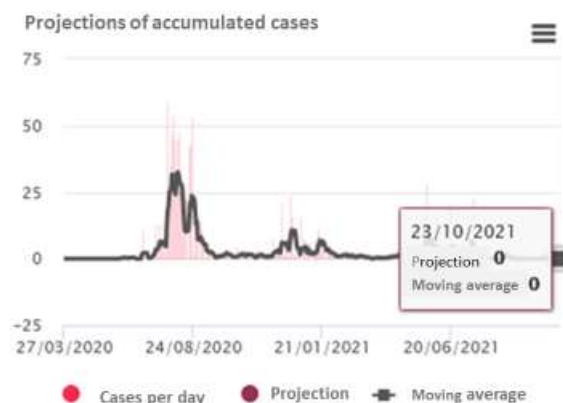
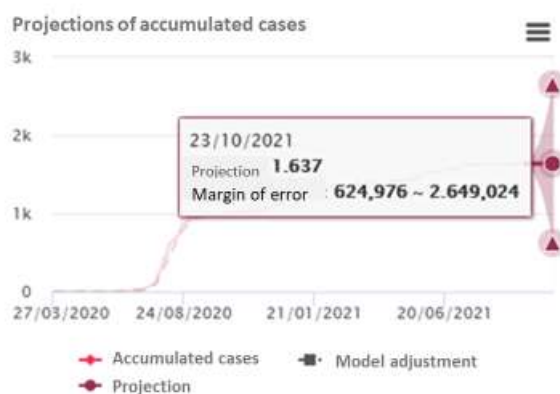
Regarding vaccination, in the first period analyzed, the municipality had 5.01% of the population vaccinated with two doses of vaccines, as shown in graph 09. In the second period, 18.93% of the individuals had complete immunization (graph 10).



Graphs 09 and 10 – Percentage of population vaccinated against COVID-19 in Pindobaçu, Bahia, Brazil, 2021

Source: Geocovid Portal, 2021.

Case projection was carried out for one month after the analyzed period. The projected accumulated cases (graph 11) will be 1,637. In relation to cases per day and moving average, there will be no case on 10/23/2021 (graph 12).



Graphs 11 and 12 - Projection of accumulated cases and cases per day of COVID-19 in Pindobaçu, Bahia, Brazil, 2021

Source: Geocovid Portal, 2021.



DISCUSSION

In the territorial space studied, it was observed that the moving average of cases, which was 1 on April 23, was 1.43 in August¹⁶. This increase in the average may have occurred due to the non-adherence to the measures of restriction and social distancing. Despite the existence of the municipal decree with measures to confront the COVID-19 of n. 242, religious, sporting and leisure events, such as processions, *vaquejadas* and parties, continued to be held. However, the population did not stop reporting the agglomerations in events¹⁷⁻¹⁸.

The moving average is a technique that consists of calculating the arithmetic mean of the most recent observations of a series of temporal data and fulfills the role of correcting distortions by smoothing the extreme values reported at the beginning of the week because, each period, the oldest observation is replaced by the most recent observation, and thus, a new average is calculated¹⁹. A study conducted in the cities of Petrolina-PE and Juazeiro-BA concluded that the significant increase in the number of cases and the moving average of confirmed cases occurred on the 14th day after the first opening of trade²⁰.

Referring to the incidence rate, the municipality of Pindobaçu initially presented a rate 49.06% higher than that of Senhor do Bonfim, headquarters of the health microregion, where the incidence rate also increased in the period studied, from 4,669.87/100,000 inhabitants to 6,370.87/100,000 inhabitants¹⁶. However, a decrease in this percentage was observed, because currently this number is only 27.77% higher.

In the state of Bahia, the incidence rate in the same period increased from 5,877.07/100,000 inhabitants to 8,137.90/100,000 inhabitants. Comparatively, the municipality of Pindobaçu had a rate 19.20% higher than the data of the state of Bahia, in April 2021. In August, where there was a considerable decrease in cases, this number corresponded to 0.02%, with very close values. When comparing incidence rates with those in Brazil, the municipality studied had a 4.19% higher incidence and started to have a negative percentage (-16.25%) in relation to the country, that is, there were important reductions in the incidence rate in Pindobaçu¹⁶.



Situations of incidence reduction, according to Aquino and other authors²¹, can be attributed to the isolation of suspected and confirmed cases, to the incentive to sanitize the hands, to the use of masks, to the suspension of classes (in order to comply with the measures of social distancing), to the prohibition of events that can promote agglomerations and to the awareness of the population so that it remains at home.

Nevertheless, it is recommended that even in situations of stabilization in the number of cases, the population should be monitored remotely through instant messaging and telemedicine as a measure of disease control²².

A study conducted in Pernambuco to understand whether the number of cases or deaths was constant or if there was a decrease in May 2020, when using the statistical analysis of the moving average, showed a daily increase in the number of cases, when observing only this variable. However, the daily increase in the number of deaths showed different behavior, because it showed a growth and then a decrease in the variable. The authors believe that part of the State is responsible for the trend of decrease in deaths, since there is an improvement in the treatment of the disease²³. Situation very similar to that presented in Pindobaçu in 2021.

Between April and August 2021, the number of deaths in the municipality was 53.94% lower than in the previous quarter and 38.83% lower than in the state of Bahia¹⁶. This decrease may be justified due to the increase in the number of beds in Intensive Care Units that provide coverage to the region, the prioritization of the elderly in vaccination regimens and may be associated with underreporting¹¹⁻²⁴.

It is estimated that the number of cases related to the disease is about 11 times higher than that currently recorded²⁵. The delay in performing the population testing, the delay in the dissemination of test results and the guidelines for testing only severe cases are examples of reasons behind these under-expected notifications²⁶.

Between January 2020 and February 2021, the mortality rate in Brazil was 119.9 per 100,000 inhabitants. In the same period, in the state of Roraima it reached 410.5 among males. High mortality rates were found in the North and the lowest in the Northeast region²⁷. The mortality rate in Pindobaçu reached 154.24 per 100,000 inhabitants, but the rate of death evolution is negative (- 100%).



A study by the COVID-19 Observatory showed that the mortality rate in Brazil decreased by 0.9% per day, and the incidence was reduced by 1.5%. However, the circulation of the virus remains high and the Delta variant has already been detected in several municipalities, which implies greater transmissibility and the possibility of increasing cases²⁸.

The municipality of Pindobaçu in this period of time studied had growth in its lethality rate. A similar situation occurred in the state of Bahia where the lethality rate went from 2.02% to 2.16%. Conversely, the municipality of Senhor do Bonfim had a lethality rate of 1.61% at the end of April and in the third week of August this lethality had reduced to 1.58%.

A study conducted in the first half of 2020 in Ceará observed a trend of increased incidence and mortality due to COVID-19, at the same time as there was a decrease in the occupation of wards and an increasing increase in the occupation of intensive care beds. The authors observed that the rigid effect of social isolation during the pandemic and early implementation, with other public health actions, proved relevant in the state²⁹.

COVID-19 mortality has varied among countries, being influenced by underreporting and epidemiological peaks. In Brazil, deaths from coronavirus demonstrate the importance of monitoring the disease in the assessment of severity and should be used as a tool for decision-making³⁰.

Concomitantly with vaccination, cases of the disease were reduced in the population, as was expected by researchers in the area¹⁶. Regarding vaccination in Pindobaçu, which was initiated in February 2021, 55.4% of the general population received the first dose and 21.1%, the second. These findings lead us to believe that the distribution of immunobiologicals reached a low vaccination coverage, compared to the vaccination coverage of the state of Bahia and the municipality of Senhor do Bonfim.

The city of Serrana, in the state of São Paulo, is an example of the interference of mass vaccination in the control of the pandemic. With 97% of the immunized population, it was possible to evaluate a reduction of 80% symptomatic cases, 86% of hospitalizations and 95% of deaths of the adult population in the first quarter of 2021. It was noticed that there was a reduction of cases even in children under 18 years of age who had not yet received the vaccine, which indicates a reduction in the circulation of the virus. Thus, it is concluded that good vaccination coverage is essential³¹.



Based on projection data from the GEOCOVID Portal in January 2021, a study conducted in the microregion of Senhor do Bonfim concluded that Pindobaçu was one of the four municipalities in the region that would not have an impact on projections when comparing curves with or without flow suppression measures¹⁰. That is, there was a trend to increase cases and this projection was consumption. For the current time, projection data as of October 23, 2021 indicate a downward trend in the number of cases.

However, the municipality studied has a large circulation of people from many parts of the world, because it is a region where there is mineral activity and extraction of precious stones (mainly emeralds)³²⁻³³, thus having a higher risk of housing individuals contaminated with Sars-CoV-19.

In view of the arguments presented, it is observed that the decisions related to the confrontation of the pandemic were adopted late by the municipal management. Despite the publicizing of epidemiological data, adoption of measures of social isolation and non-agglomeration instituted by municipal decree, the necessary impact on the reduction of cases was not evident.

The limitations of the study include a low number of publications related to the analysis of the disease in small municipalities in the country. There were difficulties regarding the use of data published by the municipality itself due to the absence of an official portal, since they use the social network Instagram to disseminate the publications and do not present them regularly.

CONCLUSION

In relation to the present study, the results indicate that the incidence rate remains high in the municipality, as well as the lethality rates and moving average of cases. There was a reduction in the number of deaths following the national trend. However, the low percentage of vaccination presented, if it remains as is, will have a negative impact on the reduction of cases and deaths, besides influencing the projection of cases that indicate the nullity of new cases as of September 23, 2021.



The findings exposed in this study may contribute to the knowledge and conduction of strategies that address the real coping needs of COVID-19 in small municipalities. Further studies should be conducted using the GEOCOVID Portal and, thus, other epidemiological situations are evidenced in the state. In addition, municipalities will be able to establish partnerships for the implementation of information and communication technologies seeking speed and effectiveness in the care of the population in pandemic times.

REFERENCES

1. Santos BS. A Cruel Pedagogia do Vírus. Coimbra: Almedina; 2020. [acesso em 10 mar 2020]. Disponível em: https://www.abennacional.org.br/site/wp-content/uploads/2020/04/Livro_Boaventura.pdf
2. Ministério da Saúde (Brasil). Boletim Epidemiológico Especial. [Internet] Brasília: Ministério da Saúde; 2021a. [citado em 09 mar 2020]. Disponível em: https://www.gov.br/saude/pt-br/media/pdf/2021/marco/25/boletim_epidemiologico_covid_55_atualizado.pdf
3. Ministério da Saúde (Brasil). Portal do COVID-19. Brasília: Ministério da Saúde, 2021b. [citado em 09 mar 2020]. Disponível em: <https://covid.saude.gov.br>
4. Oliveira WK, Duarte E, França GVA, et. Al. Como o Brasil pode deter a COVID-19. Epidemiol. Serv. Saúde 2020; 29(2): 1-8. doi: 10.5123/S1679-49742020000200023
5. SESAB - Secretaria da Saúde do Estado da Bahia (Bahia) . Boletim Epidemiológico. [Internet]. Salvador; Secretaria do Estado; 2020. [citado em 30 abr 2020]. Disponível em: http://www.saude.ba.gov.br/wp-content/uploads/2020/04/BOLETIM_ELETRONICO_N_35_30.04.2020.pdf
6. Paim JS. Thirty years of the Unified Health System (SUS). Ciênc. Saúde Colet. 2018;23(6): 1723-28. doi: 10.1590/1413-81232018236.0917201.
7. Roubicek M. Porque a pandemia evoca uma economia de guerra [Internet]. NEXO. 2020 mar 31 [citado em 10 abr 2020]. Disponível em: <https://www.nexojornal.com.br/expresso/2020/03/31/Por-que-a-pandemia-evoca-uma-economia-de-guerra>
8. Cavalcante JR, Cardoso-dos-Santos AC, Bremm JM, et al. COVID-19 no Brasil: evolução da epidemia até a semana epidemiológica 20 de 2020. Epidemiol. Serv. Saúde 2020; 29(4):1-8. doi: 10.5123/S1679-49742020000400010



9. IBGE. Instituto Brasileiro de Geografia e Estatística (Brasil). Pindobaçu. [Internet]. 2021. [citado em 30 mar 2020]. Disponível em: <https://www.ibge.gov.br/cidades-e-estados/ba/pindobacu.html>
10. Silva MCS, Santos EA, Conceição AJ, et al. Análise epidemiológica da COVID-19 em uma região de saúde da Bahia, 6 de abril a 7 de outubro, 2020. Rev Saúde Col Uefs (Impr). 2021; 11(1):1-9. doi: 10.13102/rsc da uefs.v11i1.6612
11. Ministério da Saúde (Brasil), Cadastro de Estabelecimento de Saúde. DATASUS, 2021c. [citado 09 mar 2021]. Disponível em: <http://cnes.datasus.gov.br/pages/estabelecimentos/consulta.jsp>
12. Martins CM, Gomes RZ, Muller EV, et al. Modelo preditivo da ocorrência de COVID-19 em município de médio porte no Brasil (Ponta Grossa-Paraná). Texto & Contexto - Enferm. 2020; 29: 1-13. doi: <https://doi.org/10.1590/1980-265X-TCE-2020-0154>
13. Domingues, CMAS. Desafios para a realização da campanha de vacinação contra a COVID-19 no Brasil. Cad Saúde Pública. [Internet] 2021; [citado em 08 mar 2021]; 37 (1): 1-5. Disponível em: <https://www.scielo.br/j/csp/a/KzYXRtNwy4fZjTXsgwSZvPr/?format=pdf&lang=pt>. doi: 10.1590/0102-311X00344620
14. Ministério da Saúde (Brasil). Informe Técnico Campanha Nacional de Vacinação contra a COVID-19. [Internet]. Brasília: Ministério da Saúde; 2021d. [citado em 08 mar 2021]. Disponível em: https://www.conasems.org.br/wp-content/uploads/2021/01/Informe_Tecnico_Vacina_COVID-19.pdf
15. Silva RR, Guilhermino GMS, Neto BLO, et al. A Interiorização da COVID-19 nos municípios do Estado de Pernambuco, Nordeste do Brasil. 2021. Rev Bras Saúde Mater Infant (Online) [Internet]. 2021; 21(1): 121-32. [citado em 10 mar 2021]. Disponível em: <https://www.scielo.br/j/rbsmi/a/npZtDS7YrsK77RpPRBRcQfD/?lang=pt>. doi: <https://doi.org/10.1590/1806-9304202100S100006>
16. Portal Geocovid [Internet]. Feira de Santana (FS): Universidade Estadual de Feira de Santana, 2021. [citado 09 mar 2021]. Disponível em: <https://portalcovid19.uefs.br/>
17. Após denúncias de aglomeração, prefeitos de Pindobaçu e Filadélfia devem impedir eventos com mais de 200 pessoas [Internet]. À Tarde. 2020 dez 09. [citado em 10 mar 2021]. Disponível em: <https://coronavirus.atarde.com.br/apos-denuncias-de-aglomeracao-prefeitos-de-pindobacu-e-filadelfia-devem-impedir-eventos-com-mais-de-200-pessoas/>
18. Decreto nº. 242, de 15 de março de 2021 (Pindobaçu). Institui, em todo o território do Município de Pindobaçu, as restrições indicadas, como medidas de enfrentamento ao novo coronavírus, causador da COVID-19, e dá outras providências [Internet]. Pindobaçu: Diário Oficial do Município; 2020. [citado em 09 mar 2021].



Disponível em:
<https://sai.io.org.br/Handler.ashx?f=diario&query=97&c=601&m=0#:~:text=1%C2%BA%20%2D%20Fica%20determinada%20a%20restri%C3%A7%C3%A3o,territ%C3%B3rio%20do%20Munic%C3%ADpio%20de%20Pindoba%C3%A7u>

19. Rodrigues CK, Ferreira AJG, Carrara AMC, et al. Educação estatística: o conceito de média móvel no ensino fundamental na pandemia da Covid-19 no Brasil. Educação Matemática em Pesq.: Perspectivas e Tendências. [Internet]. 2021 [citado em 10 mar 2021]; 3(1):185-204. Disponível em:
<https://downloads.editoracientifica.org/articles/210504510.pdf>.
DOI:10.34119/bjhrv4n2-338

20. Passos AVCO, Carvalho AJA, Santos DAL, et al. Impacto do fechamento e reabertura do comércio na incidência e mortalidade pela COVID-19 em Juazeiro/BA e Petrolina/PE. BJHR [Internet]. 2021 [citado em 09 mar 2021]; 4(2):8056-75. Disponível em: <https://www.brazilianjournals.com/index.php/BJHR/article/view/28058/22628>

21. Aquino EML, Silveira HS, Pescarini, JM, et al. Medidas de distanciamento social no controle da pandemia de COVID-19: potenciais impactos e desafios no Brasil. Cien. Saúde Colet. 2020;25(1):2423-2446. doi: 10.1590/1413-81232020256.1.10502020

22. Santana VR, Santana, TR, Brito BM, et al. COVID-19: Telemonitoramento como proposta de educação, cuidado e enfrentamento na atenção primária. Relato de experiência. Práticas e Cuidado: Revista de Saúde Coletiva, Salvador, v.1, n.e9967 p.1 -12, 2021

23. Soares APA. Covid-19 e sua evolução: chegou-se ao Platô? UFRPE. 2020;1-4. Disponível em: http://decon.ufrpe.br/sites/ww4.deinfo.ufrpe.br/files/COVID-19.Plat%C3%B4.def_ana_paula_julho_2020.pdf

24. SESAB - Secretaria de Saúde do Estado da Bahia (Bahia). Abertos 20 novos leitos para atendimento a pacientes com Covid-19 na região norte da Bahia [Internet]. Salvador:2021. [citado em 15 mar 2021]. Disponível em: <http://www.saude.ba3.gov.br/2021/04/13/abertos-20-novos-leitos-para-atendimento-a-pacientes-com-covid-19-na-regiao-norte-da-bahia/>

25. Prado MF, Antunes BB, Bastos LS, et al. Análise da subnotificação de COVID-19 no Brasil. Rev Bras Ter Intensiva. 2020; 32(2): 224-8

26. Pinheiro L. Testes para Covid-19: entenda a situação no Brasil e tire dúvidas sobre os exames diagnósticos. [Internet]. G1. 2020 abr 08 [citado em 10 mar 2021]. Disponível em:
<https://g1.globo.com/bemestar/coronavirus/noticia/2020/04/08/testespara-covid-19-entenda-a-situacao-no-brasil-e-tire-duvidas-sobre-osexames-diagnosticos.ghtml>

27. Sanchez M, Moura E, Moreira J, et al. Mortalidade por COVID-19 no Brasil: uma análise do Registro Civil de óbitos de janeiro de 2020 a fevereiro de 2021. doi.org/10.1590/SciELOPreprints.2012



28. Corrêa D. Covid-19: país tem redução de casos e mortes; exceção é estado do Rio. [Internet]. Agência Brasil. 2021 ago 19 [citado em 09 mar 2021]. Acesso em 10 set 2021. Disponível em: <https://agenciabrasil.ebc.com.br/saude/noticia/2021-08/covid-19-pais-tem-reducao-de-casos-e-mortes-excecao-e-estado-do-rio>
29. Almeida IL, Garces TS, Sousa GJ, et al. Isolamento social rígido durante a pandemia de COVID-19 em um estado do nordeste brasileiro. Acta Paul Enferm. 2021;34(eAPE02531):1-6.
30. Sousa GJ, Garces TS, Cestari VR, et al. Estimation and prediction of COVID-19 cases in Brazilian metropolises. Rev Lat Am Enfermagem. 2020;28(e3345):1-8. doi.org/10.1590/1518-8345.4501.3345.
31. Projeto S [Internet]. São Paulo: Instituto Butantan. 2021. [citado em 20 mar. 2021]. Disponível em: <https://projeto-s.butantan.gov.br/projeto.php>.
32. CETEM - Centro de Tecnologia Mineral. Exploração de esmeraldas na Serra da Carnaíba (BA) causa danos ambientais [Internet]. 2013. [citado em 08 mar 2021]. Disponível em: <http://verbetes.cetem.gov.br/verbetes/ExibeVerbete.aspx?verid=163>
33. Pádua WR. As dinâmicas socioespaciais no garimpo de esmeraldas em Campos Verdes/GO - (1981-2017). [dissertação] [Internet]. Goiânia: Universidade Federal de Goiás; 2020. [citado em 15 mar 2021]. Disponível em: <https://repositorio.bc.ufg.br/tede/handle/tede/10732>.