

# COVID-19 EPIDEMIOLOGICAL SCENARIO IN ICAPUÍ/CE

*CENÁRIO EPIDEMIOLÓGICO DA COVID-19 EM ICAPUÍ/CE*

*ESCENARIO EPIDEMIOLÓGICO COVID-19 EN ICAPUÍ/CE*

✉ *Jamille de Oliveira Gomes*<sup>1</sup>, ✉ *Lucielmo Faustino Souza*<sup>2</sup>, ✉ *Sandy Souza do Amaral*<sup>3</sup>, ✉ *Raylka Franklin Sousa de Freitas*<sup>4</sup>, ✉ *Micael Pereira Nobre*<sup>5</sup>, ✉ *Jônatas Freitas Barros*<sup>6</sup> e ✉ *Emanuela Sousa dos Santos*<sup>7</sup>

## ABSTRACT

To analyze the epidemiological scenario of COVID-19 in the city of Icapuí, in the interior of Ceará, from 2020 to 2022. To conduct this research, epidemiological bulletins from public domains were consulted. This study showed that most COVID-19 notifications occurred in people aged 30 to 39. The number of confirmed cases of the disease increased significantly in 2021, but decreased in 2022, possibly due to the start of vaccination. It is essential that health authorities continue to promote awareness campaigns on the importance of prevention measures and vaccination to control the spread of COVID-19.

**Keywords:** *COVID-19; Vaccines; Epidemiology; Pandemic.*

## RESUMO

Analisar o cenário epidemiológico da COVID-19 na cidade de Icapuí, no interior do Ceará, nos anos de 2020 a 2022. Para a realização dessa pesquisa, foram consultados boletins epidemiológicos de domínios públicos. Este estudo mostrou que a maioria das notificações de COVID-19 ocorreu em pessoas de 30 a 39 anos. O número de casos confirmados da doença aumentou significativamente em 2021, mas diminuiu em 2022, possivelmente devido ao início da vacinação. É fundamental que as autoridades de saúde continuem a promover campanhas de conscientização sobre a importância das medidas de prevenção e da vacinação para controlar a disseminação da COVID-19.

**Descritores:** *COVID-19; Vacinas; Epidemiologia; Pandemia.*

## RESUMEN


Analizar el escenario epidemiológico del COVID-19 en la ciudad de Icapuí en el interior de Ceará entre 2020 y 2022. Para esta investigación fueron consultados boletines epidemiológicos de dominio público. Este estudio mostró que la mayoría de las notificaciones de COVID-19 ocurrió en personas entre 30 y 39 años. El número de casos confirmados de la enfermedad aumentó significativamente en 2021, pero disminuyó en 2022, posiblemente debido al inicio de la vacunación. Es fundamental que las autoridades sanitarias continúen promoviendo campañas de concienciación sobre la importancia de las medidas de prevención y la vacunación para controlar la propagación del COVID-19.


**Descritores:** *COVID-19; Vacunas; Epidemiología; Pandemia.*


<sup>1</sup> Universidade Federal do Ceará, Fortaleza/CE - Brasil. 


<sup>2</sup> Universidade Federal do Ceará, Fortaleza/CE - Brasil. 

<sup>3</sup> Escola de Saúde Pública do Ceará, Fortaleza/CE - Brasil. 

<sup>4</sup> Secretaria de Saúde de Icapuí, Icapuí/CE - Brasil. 

<sup>5</sup> Secretaria da Saúde do Estado do Ceará, Fortaleza/CE - Brasil. 

<sup>6</sup> Hospital de Doenças Tropicais, Araguaína/TO - Brasil. 

<sup>7</sup> Escola de Saúde Pública do Ceará, Fortaleza/CE - Brasil. 

## INTRODUCTION

Since the end of 2019 and the beginning of 2020, several epidemiological implications have emerged from the SARS-CoV-2 virus, also known as Coronavirus, which causes COVID-19, initially identified in China and caused humanity's largest recent pandemic<sup>1</sup>.

The Coronavirus has a very high transmission rate and causes an acute respiratory syndrome, which can range from mild to severe cases, leading to respiratory failure. The lethality of this virus varies according to the age group and associated clinical conditions of each person affected by this disease<sup>2</sup>.

The spread of SARS-CoV-2 is extremely rapid and difficult to contain because it has several means of transmission, including transmission via respiratory droplets, which is considered predominant; biological aerosols, which are droplets containing the pathogen that lose moisture and remain suspended in the air; and vertical transmission<sup>3</sup>.

The first confirmed case of Coronavirus in Brazil occurred on February 26, 2020, in the city of São Paulo. Since then, the Ministry of Health has recorded around 13 million cases, making it one of the countries most affected by the epidemic, although measures have been adopted to prevent and control its spread, such as social isolation and the mandatory use of masks<sup>4</sup>. Although every effort has been made by health teams to prevent and control the disease, data shows that more than 712,000 deaths have been recorded in the country<sup>5</sup>.

In Brazil, as a form of contingency, the Ministry of Health created the National COVID-19 Vaccine Operationalization Plan and defined it as a Public Health Emergency of International Concern. January 17th marks one year since the COVID-19 vaccination campaign began in Brazil<sup>6</sup>.

This study is extremely relevant, as it allows us to analyze the epidemiological scenario of COVID-19 in the city of Icapuí, in the interior of Ceará, in the years 2020 to 2022. The results obtained will be fundamental for the development of effective actions to combat the virus, as well as for the formulation of targeted health and care policies aimed at effective control of the disease.

## METHODS

This is a retrospective, quantitative study, which sought epidemiological data on COVID-19 for the periods from March 2020 to July 2022, from Health Surveillance, and data on vaccination in the years 2021 and 2022, referring to the first and second doses of the vaccine in the Immunization sector.

The study was carried out in the Health Surveillance and Immunization sectors of the city of Icapuí/CE, located in the Municipal Health Department, at Praça Adauto Róseo, n° 1229, Centro. Icapuí is part of the Jaguaribe mesoregion and the Aracati coastal microregion. It currently has approximately 20,183 inhabitants. The municipality has a Mixed Health Unit and 8 Basic Health Units distributed throughout its territory.

The study included the notification forms, containing all the information necessary for the study and referring to the period from March 2020 to July 2022, and the data referring to the applications of the first and second doses of the COVID-19 vaccine applied in the municipality of Icapuí/CE in the years 2021 and 2022.

Notification forms with incomplete data and outside the study period (March 2020 to July 2022) were excluded from the survey, as were vaccination data referring to booster doses of the COVID-19 vaccine.

The information for this study was obtained from epidemiological bulletins produced weekly by the municipality's epidemiological surveillance, containing information on COVID-19 epidemiological data. With regard to vaccination, the data provided by the immunization sector was used, in the form of tables produced using Word 2019®.

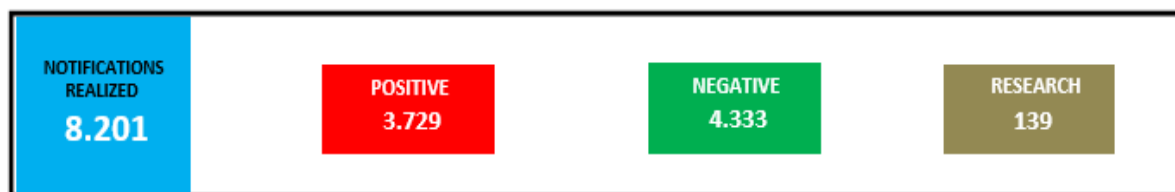
The data was analyzed using simple descriptive statistics, using a Microsoft Excel 2019® spreadsheet and presented in the form of tables and figures.

This study was exempt from assessment by the Research Ethics Committee (CEP), as it is a database study, whose information is aggregated without the possibility of identifying individual patients, in accordance with the terms of Law No. 12,527 of November 18, 2011.

## RESULTS

In the municipality of Icapuí, there were 8,201 COVID-19 notifications between March 23, 2020 and July 19, 2022, of which 3,729 were positive, 4,333 negative and 139 under investigation, distributed as shown in Figure 1.

**Figure 1 - Distribution of notified cases in the municipality up to July 19, 2022.**



Source: Epidemiological Bulletin.

Table 1 shows the data on notified and confirmed cases, the incidence rate calculated per 100,000 inhabitants, the number of deaths, the lethality rate and positivity by year until July 19, 2022. The year 2020 ended with 2,190 notified cases, 870 confirmed cases and 13 deaths. In 2021, there were 3,627 notified cases, 1,772 confirmed cases and 25 deaths. In 2022, up to the date of the study, there were 2,384 reported cases, 1,087 confirmed cases and 4 deaths. The case-fatality rate has decreased over the course of the pandemic, standing at 1.49% in 2020, 1.41% in 2021 and 0.37% in 2022, while the positivity rate has increased. In 2020 it was 39.73%, in 2021 48.86% and in 2022 45.60%, as shown in Table 1.

**Table 1 - Epidemiological aspects of COVID-19 cases, Icapuí, 01/03/2020 to 19/07/2022.**

Year	NOTIFIED CASES	CONFIRMED CASES	INCIDENCE RATE (100,000 inh)	NO. OF DEATHS	LETHALITY RATE	POSITIVITY RATE
2020	2.190	870	4.310,56	13	1,49%	39,73%
	3.627	1.772	8.779,67	25	1,41%	48,86%
	2.384	1.087	5.385,72	04	0,37%	45,60%

Source: Epidemiological Bulletin.

According to the diagnosis of COVID-19 cases in the municipality of Icapuí, it was possible to carry out spatial distribution in the 8 Primary Health Care Units (UAPS) and stratify them into positive cases (3,729) and suspected cases (139). Among the positive cases, the Mutamba UAPS had the highest number of cured cases (730), the Redonda UAPS had the highest number of patients in isolation (25) and the Morro Alto UAPS had the highest number of deaths (12). With regard to suspected cases, the Morro Alto UAPS had the highest number of isolated cases (30). There were no hospitalizations in any of the above situations, according to Table 2.

**Table 2- Spatial distribution of COVID-19 cases by UAPS, Icapuí, 01/03/2020 to 19/07/2022.**

UAPS	POSITIVOS					SUSPEITOS			
	CURADOS	ISOLAMENTO	HOSPITALIZ.	ÓBITOS	TOTAL	ISOLAMENTO	HOSPITALIZ.	ÓBITOS	TOTAL
REDONDA	391	25	0	4	420	11	0	0	11
BELÉM	171	10	0	1	182	21	0	0	21
BARREIRAS	338	2	0	4	344	6	0	0	6
MUTAMBA	730	9	0	7	746	25	0	0	25
MORRO ALTO	677	15	0	12	704	30	0	0	30
SALGADINHO	640	10	0	8	658	19	0	0	19
MORRO PINTADO	464	2	0	2	468	21	0	0	21
PEIXE GORDO	199	4	0	4	207	6	0	0	6
<b>TOTAL</b>	<b>3610</b>	<b>77</b>	<b>0</b>	<b>42</b>	<b>3729</b>	<b>139</b>	<b>0</b>	<b>0</b>	<b>139</b>

**Source:** Epidemiological Bulletin.

According to the survey of cases, we have a breakdown of confirmed cases by age group. It can be seen that the age groups with the highest incidence of notifications were people aged 30 to 39, with 1,992 (24.29%) records, followed by people aged 20 to 29, with 1,838 (22.41%) notifications. The lowest incidences were among people aged 0 to 1 (0.97%), with 74 notifications, and 2 to 4 years old, with 165 notifications (2.01%), as shown in Table 3.

**Table 3 - Breakdown of cases notified in the municipality up to July 19, 2022.**

Age group	Notifications	
	N	%
0 a 1 year	79,54	0.97
2 a 4 years	164,84	2.01
5 a 9 years	223,88	2.73
10 a 19 years	755,31	9.21
20 a 29 years	1.837,84	22.41
30 a 39 years	<b>1.992</b>	<b>24.29</b>
40 a 49 years	1.437,63	17.53
50 a 59 years	845,52	10.31
60 ou + years	865,29	10.55

**Source:** Epidemiological Bulletin.

In the municipality of Icapuí, vaccination against COVID-19 began in February 2021, when it received the first batch of doses from the state. A total of 37,501 doses were received. Of these, 18,342 were earmarked for the first doses, 18,699 for the second and 460 for single doses. With regard to the first doses administered (18,583), the municipality had vaccination coverage of 101.31%, the second doses (17,656) had

coverage of 94.42% and the single doses (467) had coverage of 101.52%, making a total of 36,706 doses administered, as shown in Table 4.

**Table 4 - Number of vaccines administered per dose in the municipality of Icapuí.**

VACCINES	N	VACCINES	N	VACCINES	N	TOTAL
D1 Received	18,342	D2 Received	18,699	SD Received	460	<b>37,501</b>
D1 Applied	18,583	D2 Applied	17,656	SD Applied	467	<b>36,706</b>
Cobertura	101.31%	<b>Cobertura</b>	<b>94.42%</b>	<b>Cobertura</b>	<b>101.52%</b>	

**Source:** Epidemiological Bulletin.

With regard to booster doses, Icapuí has received 18,075 doses so far, of which 15,109 were for the first booster and 2,966 for the second booster. In terms of the number of booster doses administered, vaccination coverage was 90.57% for the first booster doses (13,741) and 139.24% for the second booster doses (4,130), making a total of 17,871 doses administered, as shown in Table 5.

**Table 5 - Number of vaccines for booster doses administered in the municipality of Icapuí.**

VACINAS	N	VACINAS	N	TOTAL
R1 Recebidas	15.109	R2 Recebidas	2.966	<b>18.075</b>
R1 Aplicadas	13.741	R2 Aplicadas	4.130	<b>17.871</b>
Cobertura	90,57%	<b>Cobertura</b>	<b>139,24%</b>	

**Source:** Epidemiological Bulletin.

To immunize the population, the state has passed on doses of vaccine against COVID-19, with batches of the following immunizers: CoronaVac (Butantan/Sinovac), AstraZeneca (FIOCRUZ/Oxford), Pfizer and Janssen.

## DISCUSSION

After consolidating the data for analysis, it was observed that the first suspected case of COVID-19 recorded in the municipality of Icapuí was on March 23, 2020. In April, the first case and the first death were confirmed. Since then, there has been a significant increase in reported and confirmed cases in the municipality, a result that was already expected due to the virus' high transmissibility rate.

The number of confirmed cases of coronavirus disease is the most important piece of data for understanding the evolution of this disease. However, the municipality of Icapuí may have many underreported cases, due to its demographic characteristics, because due to its proximity to the state of Rio Grande do Norte, it is believed that many people may have sought medical services in neighboring municipalities, and these were not reported by the municipality itself.

In Ceará, on April 3, 2020, 627 cases of the disease were confirmed. By April 11, 2020, this number had more than doubled to around 1,582 confirmed cases<sup>7</sup>.

The incidence rate in the municipality rose sharply in 2021, decreasing considerably in 2022. It is suggested that this decrease occurred after the arrival of COVID-19 vaccines and the start of vaccination.

The number of deaths up to the date of the study was 42 (Table 1), which is considered a high number for a small municipality. It should be noted that, unlike other

diseases at other times, this time there was no time to transfer sick patients to the capitals or capacity to deal with all the demand for serious patients, which resulted in different lethality coefficients. This is why it is so necessary and important to draw up a contingency plan.

According to the study by Silva and Muniz<sup>8</sup>, Ceará had a lethality rate of 1.03% in relation to its population, which is equivalent to tenth place for deaths from the coronavirus in the country. Comparing the lethality rate in Icapuí (Table 1), which varied between 1.49% at the start of the pandemic and 0.49% up to the date of this study, with the lethality rate in the state of Ceará, it can be seen that the population living in the interior of Ceará, despite having less direct contact with someone tested positive for coronavirus, is less reclusive than individuals in the capital, making the spread of the virus greater, and with this, lethality tends to be higher.

The UAPS in Salgadinho, shown in Table 2, is located in the city center. The Centro neighborhood has the highest number of inhabitants in the city. The Morro Alto and Mutamba UAPS are located in neighborhoods close to the city center. According to IBGE demographic data, the above-mentioned neighborhoods have the highest number of residents and the highest Municipal Human Development Index (MHDI) in the municipality, which is why they tend to have more notifications and positive cases.

In the study carried out by Silva and Muniz<sup>8</sup>, it was reported that in the municipality of Fortaleza the first cases of contamination occurred in the neighborhoods with the highest MHDI. This fact corroborates the present study, suggesting that a higher MHDI can also facilitate conditions of intense viral circulation, transmissibility and recrudescence of the clinical picture of COVID-19.

In this study, there is no record of hospitalized patients because the municipal hospital in Icapuí is small and did not have adequate infrastructure for the most serious cases of COVID-19 to be hospitalized. Therefore, patients who needed to be hospitalized were transferred to the city of Aracati or to Fortaleza.

Also in this study, it was found that, despite the elderly population representing one of the most vulnerable groups to COVID-19 infection and symptoms, the majority of notifications in Icapuí were in people aged between 30 and 39 (Table 3). These data corroborate a study carried out by Carvalho *et al.*<sup>9</sup>, which showed a predominance of notified COVID-19 cases in the 30 to 39 age group. This can be explained by the addition of age to the lower rate of social isolation, as this is an economically active age group<sup>9</sup>.

Another study by Santos *et al.*<sup>10</sup> found that the age group most affected by COVID-19 was between 20 and 49 years old. The data corroborates this study, taking into account that the Brazilian population is mostly made up of young adults<sup>10</sup>.

With regard to vaccination, Icapuí started immunization in February 2021. With the arrival of the immunizers, the municipality's health professionals met to define the priority groups, the vaccination phases, the logistics procedures for distributing the doses, the training of professional applicators, the storage of vaccine supplies, as well as the means of communication between the population and the Icapuí City Hall and the Municipal Health Department to begin vaccination.

After analyzing the data, it was observed that the percentage of vaccination coverage exceeded 100% for the first and single doses (Table 4). This was due to the fact



that the municipality receives many mobile users, both because of its location on the border with another state and because of the presence of employees from companies based in the city, who travel from other states to work in Icapuí. In addition, the calculation of the percentage of vaccination coverage takes into account the population census of the Brazilian Institute of Geography and Statistics (IBGE), which is not 100% concrete.

As for the booster doses, the percentage for the first booster was 90.57%, and for the second doses it was 139.24% (Table 5). This difference was due to the fact that the municipality received many people from other cities who were only immunized with the second booster dose.

In addition, the municipality of Icapuí has generally always had good vaccination coverage. This would be no different with COVID-19 vaccination. One of the main reasons is the active search carried out by UAPS professionals, vaccination campaigns and incentives for vaccination through health education.

## CONCLUSION

The study carried out in the city of Icapuí/CE showed that the majority of COVID-19 notifications occurred in people aged between 30 and 39, which may be explained by the lower rate of social isolation in this age group, which is generally economically active. It is important to note that this study has limitations in terms of fully representing the epidemiological reality, as it is based on notification forms. The underreporting of positive COVID-19 cases, a challenge faced in various contexts, may have influenced the results, especially in groups with less access to diagnostic tests.

The number of confirmed cases of the disease increased significantly in 2021, but decreased in 2022, possibly due to the arrival of COVID-19 vaccines and the start of vaccination.

The study also highlighted that the municipality of Icapuí faced challenges due to the lack of adequate infrastructure to deal with serious cases of COVID-19, resulting in the need to transfer patients to other cities.

The lethality of COVID-19 and the importance of vaccination were addressed, with an emphasis on the need for effective health and care policies to control the spread of the disease. The importance of epidemiological surveillance, vaccination and adequate health infrastructure to face the challenges posed by COVID-19 is emphasized, especially in areas with specific demographic characteristics, such as Icapuí.

It is therefore essential that health authorities continue to promote awareness campaigns on the importance of preventive measures and vaccination.

## ACKNOWLEDGMENTS

To the Multiprofessional Residency Program with an emphasis on Collective Health at ESP/CE.

To all the employees and collaborators of the Municipal Secretariat of Icapuí and the Health Coordination of Aracati.

To all the employees and collaborators of the Ceará State Pharmaceutical Assistance Policy Coordination.

To my fellow residents Nara, Dryeli, Macário, Amanda, Thalita and Danielly.

## REFERENCES

1. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Boletim Epidemiológico Especial 14: Doença pelo Coronavírus 2019, de 26 de abril de 2020. Semana Epidemiológica 18. Brasília (DF): Ministério da Saúde; 2020 [citado 2023-10-25]. 48 p. Disponível em: <https://www.sbmfc.org.br/wp-content/uploads/2020/06/2020-04-27-18-05h-BEE14-Boletim-do-COE.pdf>.
2. Huang X, Wei F, Hu L, Wen L, Chen K. Epidemiology and clinical characteristics of COVID-19. *Arch Iran Med*. 2020;23(4):268-71. DOI: 10.34172/aim.2020.09.
3. Lauer SA, Grantz KH, Bi Q, Jones FK, Zheng Q, Meredith HR et al. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Ann Intern Med*. 2020;172(9):577-82. DOI: 10.7326/M20-0504.
4. Croda JHR, Garcia LP. Resposta imediata da Vigilância em Saúde à epidemia da COVID-19. *Epidemiol Serv Saúde*. 2020;29(1):e2020002. DOI: 10.5123/S1679-49742020000100021.
5. Sousa MAO, Sousa GJB, Teixeira MFL, Mororó RM. Desfechos de Pacientes Infectados por COVID-19 com e sem Tuberculose. *Cadernos ESP* [online]. 2023 [citado 2024-01-16]; 17(1):e1645. Disponível em: <https://cadernos.esp.ce.gov.br/index.php/cadernos/article/view/1645>.
6. Agência Nacional de Vigilância Sanitária (BR). Relatório - Bases Técnicas para Decisão do Uso Emergencial, em Caráter Experimental de Vacinas Contra a COVID-19. Brasília (DF): ANVISA; 2021 [citado 2023-10-29]. 27 p. Disponível em: <https://www.gov.br/anvisa/pt-br/assuntos/noticias-anvisa/2021/confira-materiais-da-reuniao-extraordinaria-da-dicol/relatorio-bases-tecnicas-para-decisao-do-uso-emergencial-final-4-1.pdf>.
7. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Guia de Vigilância Epidemiológica - Emergência de Saúde Pública de Importância Nacional pela Doença pelo Coronavírus 2019. Brasília (DF): Ministério da Saúde; 2022 [citado 2023-11-05]. 136 p. Disponível em: [https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/svsa/coronavirus/guia-de-vigilancia-epidemiologica-covid-19\\_2021.pdf/view](https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/svsa/coronavirus/guia-de-vigilancia-epidemiologica-covid-19_2021.pdf/view).
8. Silva JB, Muniz AMV. Pandemia do Coronavírus no Brasil: Impactos no Território Cearense. *Esp Econo*. 2020;9(17):1-20. DOI: 10.4000/espacoconomia.10501.
9. Carvalho BR, Petta CA, Izzo CR, Gusmão CC, Nakano FY, Gonçalves Nieto FG, et al. Relação entre Covid-19 e TRA. In: Sociedade Brasileira de Reprodução Assistida (ed.). *Interfaces: Reprodução humana e Covid-19*. Brasília: Lister de Lima Salgueiro, 2020. Cap. 5. p. 161-192. Disponível em: <https://sbra.com.br/wp-content/uploads/2020/05/SBRA-e-Covid-19.pdf>. Acesso em: 05 jul. 2023.
10. Santos GRAC, Gama LS, Santos AS, Nascimento VAS, Nogueira RS, Silva BAT et al. Perfil epidemiológico dos casos e óbitos por COVID-19 nos estados da Região Nordeste. *Rev Eletr Acervo Saúde*. 2020;12(12):e4251. DOI: 10.25248/reas.e4251.2020.