

Epidemiological data of patients diagnosed with COVID-19 in the municipality of Gurupi, Tocantins

Vanderson Ramos Mafra

Pharmacist. Master teacher. Regional University of Gurupi - Gurupi, TO, Brazil. E-mail:

vandersonekesya@yahoo.com.br

ORCID: <https://orcid.org/0000-0001-7909-4975>

Angra Alves Varanda Bezerra

Regional University of Pharmaceuticals of Gurupi - Gurupi, TO, Brazil.

Lorrayne Alves Carvalho e Silva

Regional Pharmaceutical University of Gurupi - Gurupi, TO, Brazil.

Natallia Moreira Lopes Leão

Pharmacists. Master teacher. Regional University of Gurupi - Gurupi, TO, Brazil.

Christiane Rodrigues de Paula Marques

Pharmacists. Teacher. Regional University of Gurupi - Gurupi, TO, Brazil.

Hédipo José Ribeiro e Silva

Graduated in Mechatronics Engineering - UnB, Graduated in Electrical Engineering - UFG, Master in Biomedical Engineering - UnB (University of Brasília), Graduating Medicine, Regional University of Gurupi - Gurupi, TO, Brazil.

Silvania Rosa de Souza

Biomedical. Master teacher. Regional University of Gurupi - Gurupi, TO, Brazil.

Patrícia Oliveira Vellano

Pharmacists. Master Professor at the University UNITPAC, Araguaína, Tocantins, Brazil.

Luís Felipe Morais Barros

Regional University of Gurupi - Gurupi, TO, Brazil. Education: Medicine

Lucas Cardoso Santos

Gurupi Regional University - Gurupi, TO, Brazil Education: Medicine

José Antônio Pereira

Chemical. Doctoral student in Chemistry at the Federal University of Mato Grosso do Sul, Brazil.

Thalita Melo França Costa

Pharmacists. Specialist in Clinical Pharmacology with an emphasis on Medical Prescription.
Teacher. Regional University of Gurupi - Gurupi, TO, Brazil.

Yara Silveira

Pharmacists. Teacher. Regional University of Gurupi - Gurupi, TO, Brazil.

Larilla Veruska Arrates Pires Tozzatti

Teacher. Regional University of Gurupi - Gurupi, TO, Brazil. Specialization: Public Health.
Specialization: Micropolitics of Management and Health Work. Specialization: Clinical Hematology.
Education: Biomedicine

Abstract

According to the World Health Organization (WHO), COVID-19 is a viral disease transmitted from person to person, which has the fastest spread in the world. OBJECTIVE: This project aimed to analyze epidemiological aspects of COVID-19 in the municipality of Gurupi/TO. METHODOLOGY: The research was conducted by consulting the epidemiological bulletin of COVID-19 made available daily by VISAE, from March 16, 2020, to May 15, 2021, where we identified the evolution of positive cases, deaths, and gender identification of this population, and analysis of literature review on the subject. RESULTS: Of the 10,336 positive cases, 5,570 (53.89%) of the cases are female, 194 (7.13%) evolved to deaths, of these 70 (36.08%) were female and 124 (63.92%) were male. FINAL CONSIDERATIONS: From the results, it is visible the reduction in the numbers of positive cases for COVID-19 from April 2021, which can be taken into consideration the measures adopted through the Municipal Decrees, and in part to the beginning of the immunization process. Thus, the continuity of prophylaxis measures is essential for the control of the high chain of transmission in the municipality.

Keywords: Pandemic. SARS-CoV-2. COVID-19. Epidemiology.

1. Introduction

COVID-19 disease caused by SARS-CoV-2 which was discovered on December 31, 2019 in Wuhan (Hubei Province - China). It is a viral disease, transmitted from person to person. It has the fastest spread in the world (WHO, 2020). It is estimated that there are about 560 thousand cases of the disease every day in the world and that in Brazil there are 72.7 thousand cases every 24 hours. (MINISTRY, 2021; GAZETA, 2021). Thus, it constitutes one of the main public health problems today (BEZERRA *et al.* 2020, SINHA, 2020)

Transmission of the disease occurs mainly through the air or personal contact with contaminated secretions,

such as saliva droplets; sneezing; coughing; phlegm; close personal contacts, such as touching and shaking hands, contact with previously contaminated objects or surfaces, followed by touching the mouth, nose, or eyes. (WONG, LUI, SUNG, 2020)

The virus is of the beta coronavirus genus, is part of the Coronaviridae family, is composed of single-stranded RNA and divided into alpha, beta, gamma, and delta, and generally causes infections in humans and also in a variety of animals, but without developing the disease (BEZERRA *et al.* 2020; Sinha, Balayla, 2020). It has a rapid transmission and its clinical features can range from asymptomatic to symptomatic patients (SOUSA, *et al.* 2020).

Clinically it manifests as an acute febrile illness, presenting as signs and symptoms: high fever (around 39° to 40°), tiredness, and dry cough. In some cases, headaches, body aches, nasal congestion, severe headache, conjunctivitis, sore throat, diarrhea, loss of taste or smell, skin rash, or discoloration of the fingers or toes may occur. The symptoms are usually mild and start gradually. However, they can evolve into moderate and/or severe cases (DOLCE, NECHAR, RIBEIRO, 2020).

In the state of Tocantins, according to the Sistema de Informação de Agravos de Notificação (SINAN) (2020) and Secretaria de Estado da Saúde (2020), the first recorded cases of the disease were on March 18, 2020, in the state capital, Palmas (TOCANTINS, 2020).

In the city of Gurupi Tocantins on March 16, 2020, a Public Health Emergency was declared through Decree No. 0448, which provided for measures to deal with the pandemic caused by the coronavirus. On April 7th 2,020 through the release of COVID-19's epidemiological bulletin, the first case of the disease in the municipality was confirmed (MUNICIPALITY, 2020).

The surveillance of COVID-19 allows monitoring the distribution, dissemination of the disease, and discovery of cases of reinfection throughout the pandemic period, detecting signs and anticipating treatment actions and total social isolation. There is then the need to accelerate the vaccination process, to reduce the possibility of circulation of possible future strains, where accumulating mutations, can become more infectious, even for individuals who have already had the disease (SOUSA, *et al.* 2020; FREITAS, GIOVANETTI, ALCANTARA, 2021)

Therefore, this documentary and descriptive research aimed to show the evolution of positive cases since the beginning of the pandemic in March of 2020, the evolution of deaths, and gender identification of this population infected by COVID-19. From the analysis of the epidemiological bulletin available on the website of Gurupi Tocantins City Hall.

2. Methodology

This is documental, descriptive research, performed from the consultation of the epidemiological bulletin of COVID-19 made available daily by the Epidemiological Surveillance of the municipality of Gurupi Tocantins. Starting from April 7, 020 to March 31, 020, where the evolution of the positive cases, the evolution of the deaths, and gender identification of this population infected by (COVID-19) were identified, and the analysis of the literature review on the theme was later carried out. All available data from confirmed patients were included and discarded cases were excluded.

The research data were tabulated using *Excel for Windows*® and *Word for Windows*® software tools for

descriptive analysis through text and graphics.

3. Results and Discussion

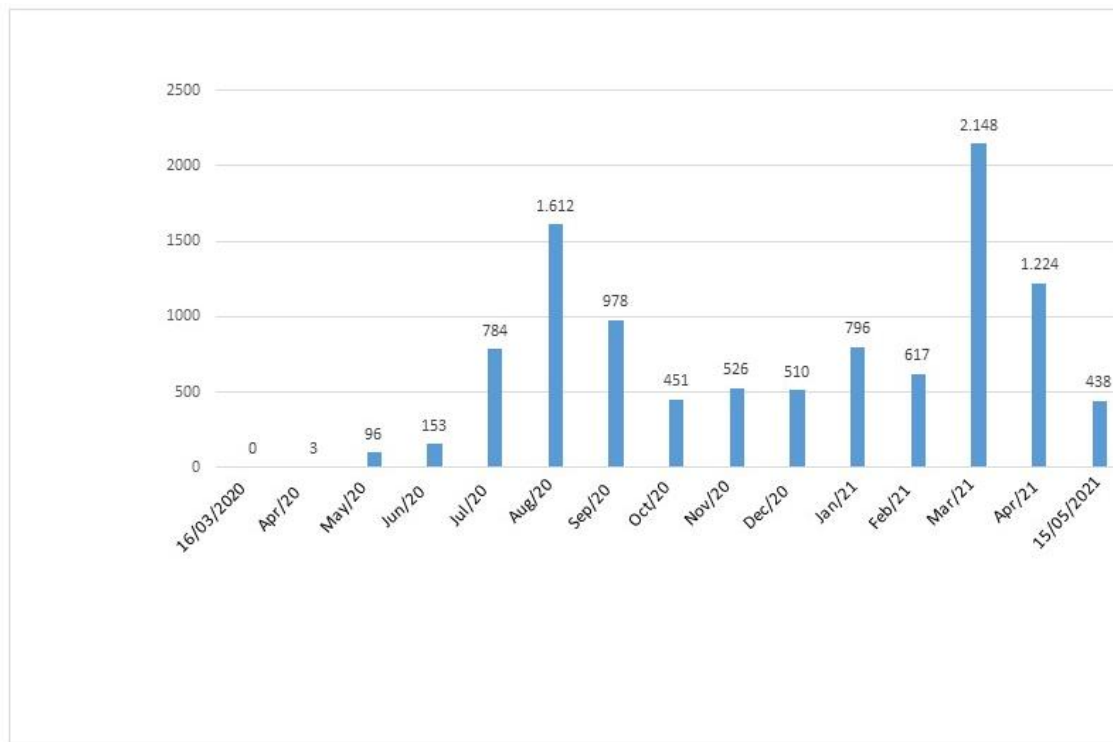
The municipality of Gurupi in the state of Tocantins has a population of about 87,545,000 according to data from the Brazilian Institute of Geography and Statistics (IBGE), the third most populous municipality in the state. According to the Coronavirus Epidemiological Bulletin, the results found showed that from March 16, 2020, in Gurupi until May 15, 2020, there were 10,336 confirmed cases of COVID-19. Of the total number of confirmed cases, 9,608 thousand cases presented recovery from the disease, about 92.95%. Of the 72,700 new cases in Brazil, some states stand out, such as São Paulo with the highest number of cases, a total of 3,085,290 (1st position), Minas Gerais with a total of 1,459,402 (2nd position), and the state of Tocantins with a total of 168,268 (24th position) of confirmed cases in the period March 16, 2020, to May 15, 2021 (JUSTEN, 2021).

As of May 15, 2002, Brazil ranked second in absolute numbers of confirmed cases (14,369,423), and second in confirmed deaths (391,936,000). The country with the highest number of confirmed cases in the United States of America (USA) with 32,125,549 as of May 15, 2021. The highest numbers of deaths were found in the United States with (569,646,000) in the first position, Brazil with (391,936,000) in the second position, Mexico with (215,113,000) in the third position, India with (197,894,000) in the fourth position, the United Kingdom with (127,688,000) in the fifth position (TRT, 2021).

The largest number of confirmed cases was concentrated in the southeastern region of the country, but the northern region had the highest incidence rate. In the North of the country, there were several obstacles to the population's adherence to the social isolation recommended by the health authorities (RIO, 2020). Another reason that can justify this result is that the hospital network in the North region is smaller when compared to the other regions of the country. It has the lowest number of beds, which in the long run is unable to meet the demand, both in the public and private sectors (MINISTRY, 2020). The state of Amazonas presented the highest incidence and mortality rates, reported a collapse in the health system and a crisis in the funeral system (CARVALHO, 2021).

The municipality of Gurupi, in the classification of confirmed cases, is in third place with 10,336 thousand cases, second only to the capital Palmas with 39,999 thousand cases, and the city of Araguaína 28,400 thousand cases (KRIEGER, CHEN, WATERMAN PD, 2020).

Graph 1: Evolution of positive cases in the municipality of Gurupi - too in the period from March 2020 to May 2021.



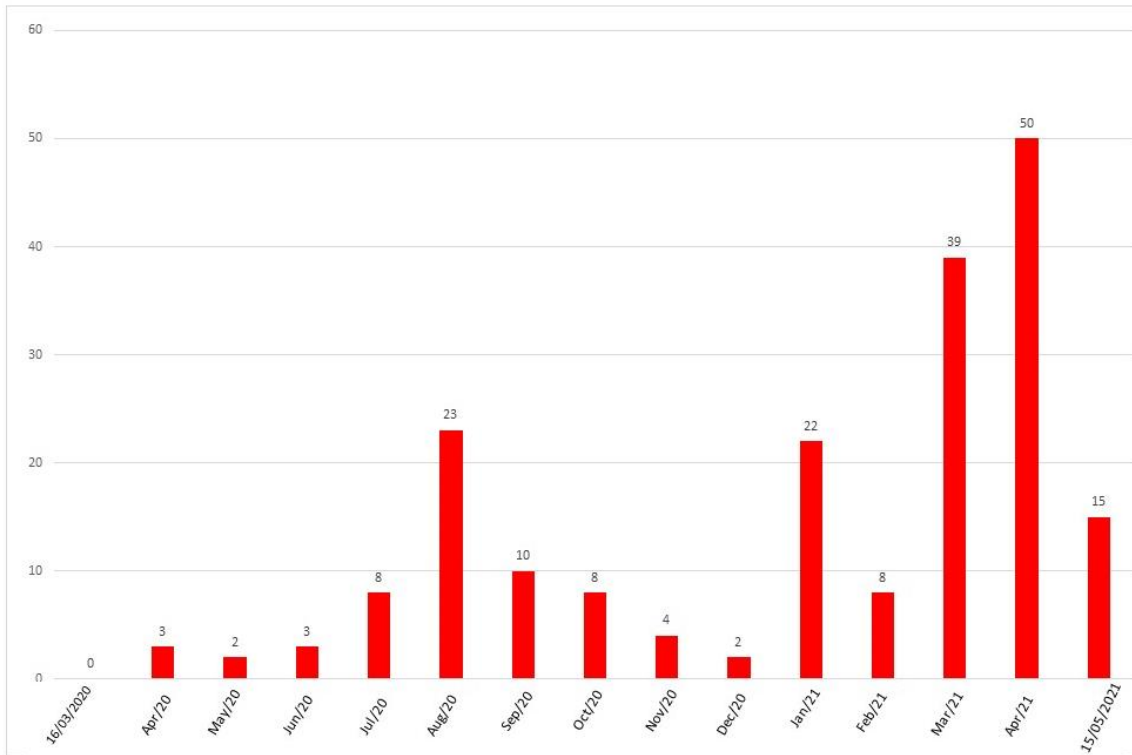
Source: Created by the authors, 2021.

Through the data analyzed in Graph 1, it is possible to observe the evolution of positive cases of COVID-19 in the municipality of Gurupi, Tocantins State, where the highest incidences were in August 2020 with 1,588 cases and March 2020 with 2,210 cases of positive patients for COVID-19.

The ranking of states with the most COVID-19 deaths is led by São Paulo with a total of 103,493, followed by the state of Rio de Janeiro with 47,699, Minas Gerais 37,005 thousand, Rio Grande do Sul with 26,250 thousand, and Paraná with 24,330 thousand. The Federation Units with fewer deaths are the state of Roraima with 1,568 thousand, Acre with 1,608 thousand, Amapá with 1,610 thousand, the Tocantins with 2,704 thousand, and Alagoas with 4,462 thousand (JUSTEN, 2021).

The lethality rate of the disease in the city of Gurupi is (1.70%) with a total of 194 deaths from March 16, 2020, to May 15, 2021 (BRAZIL, 2020). As shown in the graph, the months that there were more deaths were the months of August 2020 with coronavirus, 2021 deaths, March 2021 with 39 deaths, and April 2021 with 50 deaths. Thus, the month with the most deaths in Gurupi – TO, to date. Data presented in **Graph 2**.

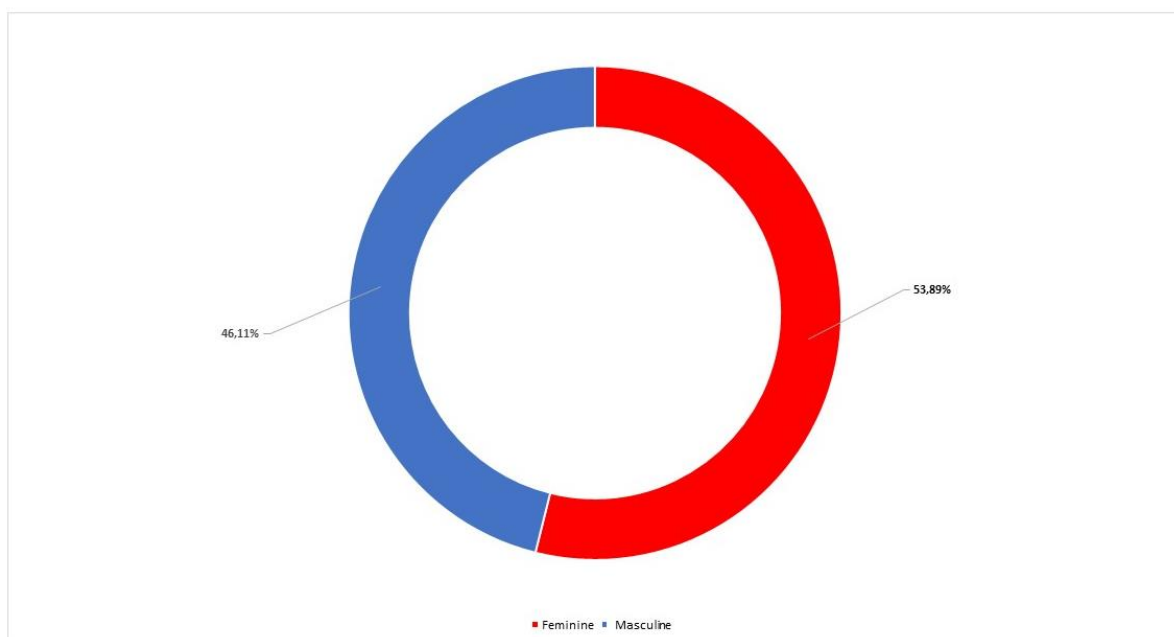
Graph 2: Evolution of deaths from COVID-19 in the municipality of Gurupi, Tocantins, from March 2020 to May 2021.



Source: Created by the authors, 2021

The confirmed cases of COVID-19, according to gender, registered in the municipality of Gurupi, between the tenth week of 2020 and the nineteenth week of 2020, according to the Ministry of Health's epidemiological calendar, (EPIDEMIOLOGICAL, 2020) are shown in **Graph 3**.

Graph 3. Confirmed cases according to gender by COVID-19 in the municipality from March 2020 to May 2020.

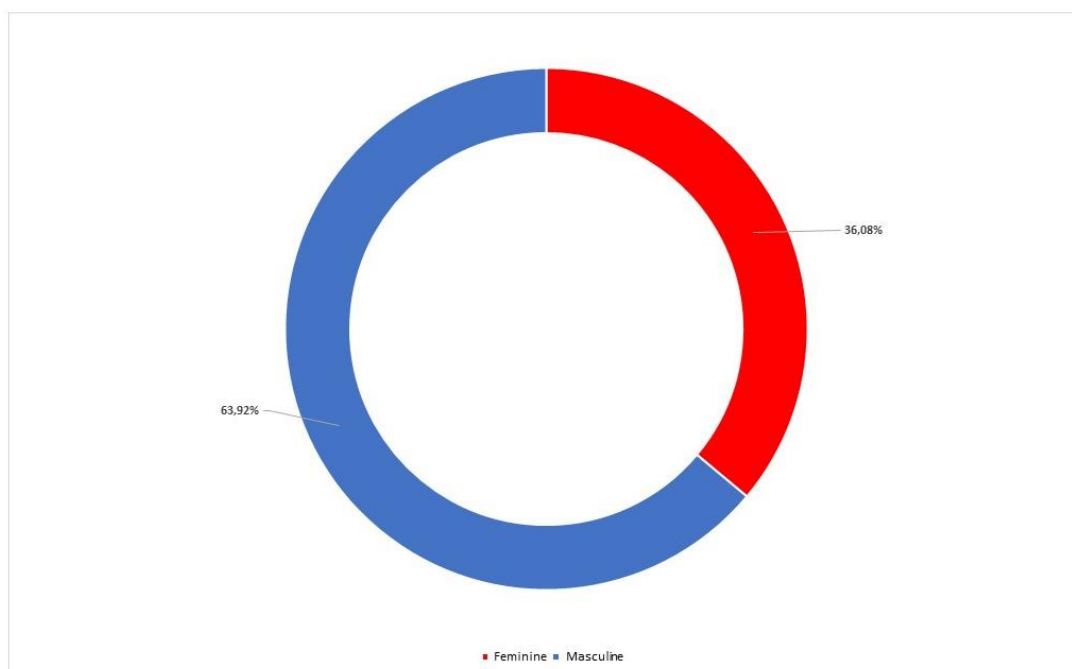


Source: Created by the authors, 2021.

Regarding the gender analysis of the individuals diagnosed and confirmed in Gurupi, Tocantins state, female cases are predominant with 5,570 thousand (53.89%) and 36.08% of the deaths, and men with 4,766 thousand (46.11%) and 63.92% of the deaths (Rezer, Faustino, Maia. 2020). In Porto Alegre, in the south of the country, the scenario is the same, women account for 54% of the cases and 48% of the deaths, while men account for 46% of the cases and 52% of the deaths (JOURNAL, 2020). In São Paulo, in the Southeast region, one of the states most affected by the health crisis in Brazil, women were also the majority, representing 53% of the positive cases and 42% of the deaths. Men are 47% of the positive cases, and 58% of the deaths (COMPLETE, 2021). In Rio Grande do Sul, south region, women were the majority of the positive cases with 52.8%, however, they were the minority when analyzing the deaths caused by the pandemic in the state, representing 44.9% of the deaths, with men being responsible for 47.2% of the positive cases and 55.1% of the disease-related deaths. (CORONAVIRUS, 2021; RIO,2020)

The difference between the lethality of the confirmed cases of COVID-19 about the non-confirmed ones is very evident, demonstrating its higher lethality when compared to the other influenza diseases of the notified individuals. In Brazil, the mortality rate was 207 deaths per 100,000 inhabitants by the nineteenth epidemiological week of 2021, while Gurupi had a rate of 200 deaths per 100,000 inhabitants (BRAZIL, 2021)

Regarding the profile of patients who died in the municipality of Gurupi, Tocantins state, there was a predominance of males (63.92%). As shown in (Graph 4). When comparing the lethality between men and women, a statistically significant difference was observed regarding gender, with a higher probability of death in males than in females, with a mortality rate of 63.92% in males and 36.08% in females, respectively. **Graph 4.** Deaths according to gender by COVID-19 in the municipality in the period March 2020 to May 2021.



Source: Created by the authors, 2021.

The capital of the state of Tocantins, Palmas, also showed, in the same period of this study, a higher number

of male deaths, 297 (59.05%) than female, 206 (49.95%); in the municipality of Araguaína, the same pattern was repeated, with 237 male deaths (62.70%) and 141 female deaths (37.30%) (Brazil, 2020) This pattern was also repeated in countries such as Italy, with 36,805 thousand cases, 21,052 thousand (57.2%) males and 15,753 (42.8%) females; Ecuador, with 12,181 thousand cases, 8,088,000 (66.4%) male and 4,093,000 (33.6%) female deaths, and in Mexico with 89,171,000 cases, 57,069,000 (64%) male and 32,102,000 (36%) female deaths (LIVE, 2021). Scientists still can't say for sure why this has been happening. But they bet that the answer lies not in a single factor, but possibly in a combination of them: biology, lifestyle, and behavior could explain the "sexist" character of covid-19 (BIZNEWS/BR, 2021).

Although many countries do not collect or report death tolls by sex, this pattern appears consistent throughout the world (Krieger, Chen, 2020; GULNAR A., *et al.* 2020). The greater tendency for clinical worsening and death among men is not believed to be related to a single cause. A set of genetic, hormonal, lifestyle, and comorbidity prevalence characteristics seem to explain the higher number of severe and fatal cases among individuals in this group (REZER, FAUSTINO, MAIA. 2020; GULNAR A., *et al.* 2020). However, it has not yet been possible to precisely establish the determinants responsible for the disparity in clinical outcomes, according to gender, in patients with COVID-19.

The findings of this study identified an excess of deaths among men, compared to what was observed among women, which is in the same direction as has been reported in the literature (KRIEGER, CHEN, WATERMAN, 2020). However, attention is drawn to the need to analyze more robust estimates, evaluating the absolute and relative differences to better understand this issue (GULNAR, SILVA, JARDIM, SANTOS).

There is still no clear reason why men die more than women from COVID-19. Studies are incipient on the issue but point to some possibilities that may or may not be confirmed with further scientific analysis. In this scenario, it is assumed that women seek health services more frequently than men (ROMEU *et al.* 2007). Possibly, due to this, there may be underreporting of cases in the male population, because, historically, men seek health services less often. This can lead to worsening of the disease, delayed treatment, and death (LI, 2020).

Given the rapid spread and number of deaths from COVID-19 on all continents, the WHO has recommended accelerated vaccines, therapeutic measures, and diagnostics (WHO, 2019). To date, two vaccines are in use. Both are approved for emergency use by the Institute of Immunobiological Technology of the Oswaldo Cruz Foundation (Bio-Manguinhos / Fiocruz), the Ministry of Health, and the AstraZeneca, Fiocruz Portal, 2020laboratory, which cooperates with the University of Oxford (UK), and the other is from Butantan, São Paulo. The research institute collaborates with the China Sinovac Company (Coronavac) (BUTANTAN INSTITUTE, 2020). The following are the effective rate and dose range in Brazil: CoronaVac: (Efficacy: 50%), range: 2 to 4 weeks. Oxford/AstraZeneca: (Efficacy: 76%), range: 8 to 12 weeks (WHO, 2021). Pfizer's vaccine also has use authorized by the National Health Surveillance Agency (Anvisa). The federal government has ordered 100 million doses of the immunizer. The first batch is expected from April to June this year. Two other vaccines await authorization for emergency use: Suptnik V and Janssen. Together, the 2 laboratories have committed to supply 48 million doses to Brazil, where about 52,419,388 million people with complete vaccination schedules (16,864,368 million) have already been vaccinated by May 15, 2021 (RADIO, 2021).

In the city of Gurupi, State of Tocantins, by May 15, 2021, 237.29 million doses, the total dose (19.44 million doses), and the percentage of the population fully vaccinated (13.87%) were vaccinated. In this sense, it is necessary to follow up on epidemiological studies to evaluate the longitudinal character of the pandemic, as well as the constant changes in the epidemiological and social situation in the Tocantins.

The capital of the state of Tocantins, Palmas, also showed, in the same period of this study, a higher number of male deaths, 297 (59.05%) than female, 206 (49.95%); in the municipality of Araguaína, the same pattern was repeated, with 237 male deaths (62.70%) and 141 female deaths (37.30%) (Brazil. 2020) This pattern was also repeated in countries such as Italy, with 36,805 thousand cases, 21,052 thousand (57.2%) males and 15,753 (42.8%) females; Ecuador, with 12,181 thousand cases, 8,088,000 (66.4%) male and 4,093,000 (33.6%) female deaths, and in Mexico with 89,171,000 cases, 57,069,000 (64%) male and 32,102,000 (36%) female deaths (LIVE, 2021). Scientists still can't say for sure why this has been happening. But they bet that the answer lies not in a single factor, but possibly in a combination of them: biology, lifestyle, and behavior could explain the "sexist" character of covid-19 (BIZNEWS/BR, 2021).

Although many countries do not collect or report death tolls by sex, this pattern appears consistent throughout the world (Krieger, Chen, 2020; GULNAR A., et al. 2020). The greater tendency for clinical worsening and death among men is not believed to be related to a single cause. A set of genetic, hormonal, lifestyle, and comorbidity prevalence characteristics seem to explain the higher number of severe and fatal cases among individuals in this group (REZER, FAUSTINO, MAIA. 2020; GULNAR A., et al. 2020). However, it has not yet been possible to precisely establish the determinants responsible for the disparity in clinical outcomes, according to gender, in patients with COVID-19.

The findings of this study identified an excess of deaths among men, compared to what was observed among women, which is in the same direction as has been reported in the literature (KRIEGER, CHEN, WATERMAN, 2020). However, attention is drawn to the need to analyze more robust estimates, evaluating the absolute and relative differences to better understand this issue (GULNAR, SILVA, JARDIM, SANTOS).

There is still no clear reason why men die more than women from COVID-19. Studies are incipient on the issue but point to some possibilities that may or may not be confirmed with further scientific analysis. In this scenario, it is assumed that women seek health services more frequently than men (ROMEU et al. 2007). Possibly, due to this, there may be underreporting of cases in the male population, because, historically, men seek health services less often. This can lead to worsening of the disease, delayed treatment, and death (LI, 2020).

Given the rapid spread and number of deaths from COVID-19 on all continents, the WHO has recommended accelerated vaccines, therapeutic measures, and diagnostics (WHO, 2019). To date, two vaccines are in use. Both are approved for emergency use by the Institute of Immunobiological Technology of the Oswaldo Cruz Foundation (Bio-Manguinhos / Fiocruz), the Ministry of Health, and the AstraZeneca, Fiocruz Portal, 2020laboratory, which cooperates with the University of Oxford (UK), and the other is from Butantan, São Paulo. The research institute collaborates with the China Sinovac Company (Coronavac) (BUTANTAN INSTITUTE, 2020). The following are the effective rate and dose range in Brazil: CoronaVac: (Efficacy: 50%), range: 2 to 4 weeks. Oxford/AstraZeneca: (Efficacy: 76%), range: 8 to 12 weeks (WHO, 2021). Pfizer's vaccine also has use authorized by the National Health Surveillance Agency

(Anvisa). The federal government has ordered 100 million doses of the immunizer. The first batch is expected from April to June this year. Two other vaccines await authorization for emergency use: Suptnik V and Janssen. Together, the 2 laboratories have committed to supply 48 million doses to Brazil, where about 52,419,388 million people with complete vaccination schedules (16,864,368 million) have already been vaccinated by May 15, 2021 (RADIO, 2021).

In the city of Gurupi, State of Tocantins, by May 15, 2021, 237.29 million doses, the total dose (19.44 million doses), and the percentage of the population fully vaccinated (13.87%) were vaccinated. In this sense, it is necessary to follow up on epidemiological studies to evaluate the longitudinal character of the pandemic, as well as the constant changes in the epidemiological and social situation in the Tocantins.

4. Conclusion

From the results, the reduction in the number of positive cases for COVID-19 is visible as of April 2021, which can be considered the measures adopted through the Municipal Decrees, and in part to the beginning of the immunization process. Thus, the continuity of prophylaxis measures is essential for the control of the high chain of transmission in the municipality.

It is necessary to increasingly increase the prevention strategies for the disease, increase the screening of new cases to start treatment at an early stage, improving the control of the evolution of cases. More important than treating is prevention, to prevent the disease from taking hold, and social isolation measures are a determining factor in driving the pandemic of COVID-19.

7. References

BEZERRA, VL, ANJOS, TB, SOUZA, LESS, VIDAL AM, JUNIOR AAS. SARS-CoV-2 as the causative agent of COVID-19: Epidemiology, genetic characteristics, clinical manifestations, diagnosis, and possible treatments. *Brazilian Journal of Health Review*, 2020;Bezerra et al. 2020(3): 8452-8467.

BIZNEWS/BR, Why does coronavirus affect the elderly more and kill more men than women? 2020. Available at: <https://www.biznews.com.br/por-que-o-coronavirus-affects-more-the-old-and-kills-more-men-than-women/>. Accessed March 16, 2021.

BRAZIL. Covid-19. Integra Saúde Gurupi. [online publication]; 2020. [accessed on Epidemiological, 2020April. 2021. Available at:< <http://integra.saude.to.gov.br/covid19>>.

BRAZIL. Covid-19. Integra Saúde Gurupi. [online publication]; 2020. [accessed March 16. 2021] Available at:< <http://integra.saude.to.gov.br/covid19>>.

BRAZIL. Ministry of Health. COVID-19 in BRAZIL, 2021. Available at: https://susanalitico.saude.gov.br/extensions/covid-19_html/covid-19_html.html. Accessed on: 16, March 2021.

BUTANTAN Institute. COVID-19 vaccine. [online publication]; 2020. [accessed 03 Dec. 2020]. Diponible at: < <https://vacinacovid.butantan.gov.br/vacinas> >.

CARVALHO R. Amazonas presents health system collapse because of coronavirus. *Estadão*. [online publication]; 2020. [acesso em Epidemiological, 2020maio. 2021]. Available at: <<https://saude.estadao.com.br/noticias/geral,amazonas-apresenta-collapse-in-the-health-system-by>

cause-of-coronavirus,70003272136>.

COMPLETE BULLETIN. SP Against the new coronavirus,2021. Available at: <https://www.seade.gov.br/coronavirus/>. Accessed and: March 16, 2021.

CORONAVIRUS, 2021. Life expectancy at birth: mortality differentials, by sex and cause, in Rio Grande do Sul. Available at: <https://dee-admin.rs.gov.br/upload/archives/202009/23115217-nt-dee-28-expectation-of-life-to-birth-differentials-of-mortality-by-sex-and-cause-in-the-rio-grande-do-sul-2010-18.pdf>. Accessed on: March 16, 2021.

CoV-2 and its public health implications. *Interamerican Journal Medicine and Health*, v. 4:181, 2021.

do men seek health services less than women? The explanations of men with low education and men with higher education. *SciELO*. Rio de Janeiro, 2007. Municipality of Gurupi, 2020p. Available at: <https://www.scielo.br/j/csp/a/rQC6QzHKh9RCH5C7zLWNMvJ/?lang=pt&format=pdf>. Accessed on: Carvalho R. 2020 March 2021.

DOLCE FILHO R, NECHAR RC, RIBEIRO FILHO A. Preliminary study of prevalent symptoms and drugs of the covid-19 pandemic epidemic genius in brazil. 2020;

EPIDEMIOLOGICAL Calendar 2021. SINAN-System of Information on Notifiable Diseases, 2021. Available at: <http://portalsinan.saude.gov.br/calendario-epidemiologico-2020/43-institucional/171-calendario-epidemiologico-2021>. Accessed on: 16, March 2021.

FIOCRUZ Portal. Covid-19: Fiocruz will sign agreement to produce Oxford University vaccine. [online publication]; 2020. [accessed 03 Dec. 2020]. Available at: < <https://portal.fiocruz.br/noticia/covid-19-fiocruz-firm-agreement-to-produce-oxford-university-vaccine>>.

FREITAS, ARR, GIOVANETTI, M, ALCANTARA, LCJ. Emerging variants of SARS-

GAZETA do Povo. Special. Coronavirus numbers - understand the advance of Covid-19 in Brazil and the world. [online publication]; 2020. [access on Carvalho R. 2020 Mar. 2021]. Available at: <<https://especiais.gazetadopovo.com.br/coronavirus/numeros/>>

GULNAR A., SILVA; BEATRIZ C., JARDIM; CLEBER VINICIUS BRITO, SANTOS. Excess mortality in Brazil in times of COVID-19. *SciELO*. Rio de Janeiro, 2020. Municipality of Gurupi, 2020p. Available at: <https://www.scielo.br/j/csc/a/znnzkJyv6VyCsmzN4RByddy/?lang=pt&format=pdf>. Accessed March 16, 2021.

JOURNAL OF COMMERCE, Why do men die more from Covid-19 than women? 2020. Available at: https://www.jornaldocomercio.com/_conteudo/especiais/coronavirus/2020/12/771247-why-men-die-more-by-covid-19-than-women.html. Accessed and: March 16, 2021.

JUSTEN, Alvaro. COVID-19 Panel. Congress in focus, 2021. Available at: <https://congressoemfoco.uol.com.br/covid19/> Accessed on: 16, March 2021.

KRIEGER N, CHEN JT, WATERMAN PD. Excess mortality in men and women in Massachusetts during the COVID-19 pandemic. *Lancet*. 2020; 395(10240):1829.

LI Q, Guan X, Wu P, Wang X, Zhou L, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*. 2020;Brazil. 2020(382):1199-1207.

LIVE WELL. Coronavirus., 2021. Available at: <https://www.uol.com.br/vivabem/saude/coronavirus>. Accessed March 16, 2021.

MINISTRY of Health (Brazil). Cadastro nacional de estabelecimentos de saúde (CNES) - physical

resources - hospital - inpatient beds - Brazil. Brasília: Ministry of Health. [online publication]; 2020. [accessed Epidemiological, 2020 May. 2021]. Available from: <<http://tabnet.datasus.gov.br/cgi/tabcgi.exe?cnes/cnv/leiintbr.def>>.

MINISTRY of Health (Brazil). Secretariat of Health Surveillance. Coronavirus Panel. [online publication]; 2020. [accessed on: Brazil, 2020 December 2021]. Available at: <<https://covid.saude.gov.br/>>.

MUNICIPALITY of Gurupi. Note - Covid-19. 8/04/2020. [online publication]; 2020. [accessed Municipality of Gurupi, 2020 Oct. 2020]. Available at: <<http://www.gurupi.to.gov>>.

RADIO Agência Nacional, More than 6.4 million vaccines against covid-19 will be distributed. RADIO Agência Nacional, 2021. Available at: <https://agenciabrasil.ebc.com.br/radioagencia-Nacional/geral/audio/2021-05/more-than-64-million-vaccines-against-covid-19-will-be-distributed>.

Accessed on: Carvalho R. 2020 March 2021.

REZER F, FAUSTINO WR, MAIA CS. Incidence of COVID-19 in the mesoregions of the state of Mato Grosso: confirmed and notified cases. *Rev Pre Infec e Saúde* [Internet]. 2020;6:10317. Available from: <http://www.ojs.ufpi.br/index.php/nuptials/article/view/10317>.

RIO de Janeiro State University - UERJ. The study shows the efficiency of social isolation against new coronavirus. [online publication]; 2020. [accessed May 19, 2021]. Available from: <<https://www.uerj.br/noticia/11078/>>.

RIO GRANDE DO SUL. Secretariat of Health. Coronavirus RS panel. Porto Alegre: SS/RS, [online publication]; 2020. [accessed March 16. 2021]. Available at: <https://ti.saude.rs.gov.br/covid19/>.

ROMEU, GOMES; ELAINE F., DO NASCIMENTO; FÁBIO C., DE ARAÚJO. Why SINHA N, BALAYLA G. Sequential battery of tests for COVID-19 to maximize negative predictive value before operations. *Revista do Colégio Brasileiro de Cirurgiões*, v.47 e20202534, 2020.

SOUSA MRN, BARROS SS, SILVA M, OLIVEIRA APM, ROCHA GM, OLIVEIRA GAL. Pathogenesis and treatment perspectives of Covid-19: a review. *Research, Society and Development*, 2020; v.9(7): e05973730-e05973730.

TOCANTINS State. Secretariat of Health. Situational Report on Confronting Covid-19 by the Secretary of Health of the State of Tocantins. 16/04/2020. [online publication]; 2020. [accessed Tocantins State, 2020 Oct. 2020]. Available at: <<https://central3.to.gov.br/arquivo/507701>>. Accessed: Tocantins State, 2020 Oct. 2020.

TRT, Coronavirus latest situation (Covid-19). Portuguese TRT, 2021. Available at: <https://www.trt.net.tr/portuguese/covid19>. Accessed on: 16, March 2021.

WHO, World Health Organization. Draft landscape of COVID-19 candidate vaccines -Ministry of Health (Brazil), 2021 December 2020. [publication online]; 2020. [accessed Ministry of Health (Brazil), 2021 December 2020]. Available at: <<https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidatevaccines>>.

WHO, World Health Organization. Timeline. response COVID-19. [online publication]; 2020. [accessed 02 Dec. 2020]. Available at: <<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline>>.

WHO. World Health Organization. (2020). Pan American Health Organization. Fact sheet - COVID-19 (a disease caused by new coronavirus). [online publication] ;2020 [accessed: Ministry, 2020 May. 2021].

Available at <https://www.paho.org/pt/covid19>.

WONG SH, LUI RNS, SUNG JJY. Covid-19 and the digestive system. *Journal of gastroenterology and pathology*, 2020; 35(5): 744-748.

Copyright Disclaimer

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).