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# Epidemiological profile of Coronavirus (COVID -19) deaths in Mato Grosso

Perfil epidemiológico de muertes por Coronavirus (COVID-19) en Mato Grosso

Perfil epidemiológico dos óbitos por Coronavírus (COVID -19) em Mato Grosso

## ABSTRACT

**Objective:** Analyze the epidemiological profile of deaths due to COVID-19 in Mato Grosso, from April-June 2020, according to pre-existing demographic and disease variables (DPE). **Methods:** Is a cross-sectional and ecological study with data from Information Bulletins of the Secretary of State for Health of Mato Grosso. Deaths, number, type of pre-existing disease, mortality rate and lethality were considered for the construction of thematic maps. **Results:** Of the confirmed cases, 3.8% (661 deaths) died, of these, 61.0% were men, 63.3% were 61 or older, and 72.9% had pre-existing disease, 39.3% of whom were hypertension, 27.9% diabetes and 12.1% circulatory disorders. The highest mortality rate occurred in municipality of Ponte Branca (63.5 / 100 thousand inhab.), And in Nova Xavantina (57.1%) the highest lethality. **Conclusion:** A higher frequency of deaths from COVID-19 was observed in men, the elderly and those with pre-existing disease, in the Center-South and Southwest regions of the state.

**DESCRIPTORS:** COVID-19; Demographic data; Pre-existing condition; Spatial Analysis.

## RESUMEN

**Objetivo:** Analizar el perfil epidemiológico de las muertes por COVID-19 en Mato Grosso, desde abril-junio 2020, de acuerdo con las variables demográficas y de enfermedades preexistentes (DPE). **Métodos:** Es un estudio transversal y ecológico con datos de Boletines de Información del Secretario de Estado de Salud de Mato Grosso. Muertes, número, tipo de enfermedad preexistente, tasa de mortalidad y letalidad se consideraron para la construcción de mapas temáticos. **Resultados:** De los casos confirmados, el 3,8% (661 defunciones) fallecieron, de estos, el 61,0% fueron hombres, el 63,3% tenían 61 años o más y el 72,9% tenían enfermedad preexistente, de los cuales el 39,3% eran hipertensos, 27,9% diabetes y 12,1% patologías del sistema circulatorio. La mayor tasa de mortalidad hubo en el municipio Ponte Branca (63.5 / 100 mil hab.), y en Nova Xavantina (57.1%) la mayor letalidad. **Conclusión:** Se observó mayor frecuencia de muertes por COVID-19 en hombres, ancianos y personas con enfermedades preexistentes, en regiones Centro-Sur y Sudoeste del estado.

**DESCRIPTORES:** COVID-19; Datos demográficos; Condición preexistente; Análisis espacial.

## RESUMO

**Objetivo:** Analisar o perfil epidemiológico os óbitos por COVID-19 em Mato Grosso, de abril a junho de 2020, segundo variáveis demográficas e de doenças pré-existentes (DPE). **Métodos:** Trata-se de um estudo transversal e ecológico com dados dos Boletins Informativos da Secretária do Estado de Saúde de Mato Grosso. Consideraram-se os óbitos, número e tipo de doença pré-existente, taxa de mortalidade e letalidade para a construção de mapas temáticos. **Resultados:** Dos casos confirmados, 3,8% (661 óbitos) morreram, destes, 61,0% eram homens, 63,3% tinha 61 anos ou mais, e 72,9% apresentavam doença pré-existente, sendo 39,3% hipertensão, 27,9% diabetes e 12,1% patologias do aparelho circulatório. A maior taxa de mortalidade ocorreu no município de Ponte Branca (63,5/100 mil hab.), e em Nova Xavantina (57,1%) a maior letalidade. **Conclusão:** Foi observada maior frequência dos óbitos por COVID-19 nos homens, idosos e com doença pré-existente, nas regiões Centro-Sul e Sudoeste do estado.

**DESCRIPTORES:** COVID-19; Dados Demográficos; Condição Pré-Existente; Análise Espacial.

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**INTRODUCTION**

On December 31st, 2019, an outbreak of pneumonia occurred in the city of Wuhan, Hubei province, China. Soon after, the etiologic agent was identified: a new coronavirus (SARS-COV-2), which causes severe acute respiratory syndrome. This disease is officially called by the World Health Organization (WHO) COVID-19 (COroNA VIRUS Disease).<sup>1</sup> On January 30th, 2020, WHO established the outbreak on behalf of COVID-19 as a Public Health Emergency of International Importance and on March 11th, 2020 it was characterized as a pandemic.<sup>2</sup>

The first identified case of COVID-19 in South America occurred in Brazil, in São Paulo, on February 26th, 2020.<sup>4</sup> On March 20th, community broadcasting across the country was declared. The data made available by the Ministry of Health, Brazil in July 2020, recorded 2.483.191 confirmed cases of COVID-19 and 88.539 deaths.

In studies, they observed the rapid spread of COVID-19 throughout Brazil, with more populous municipalities. The most prevalent comorbidities

in studies conducted recently in Brazil were cardiovascular disease (23.085 (66,5%) of 34.693 without missing data) and diabetes (17.271 (54,5%) of 31.672), the proportions of the general Brazilian population with cardiovascular diseases and diabetes are 4,2 and 6,2%, respectively.<sup>3</sup> Among patients with COVID-19, older age groups tend to have a higher proportion of comorbidities than younger age groups with different outcomes.<sup>3</sup>

The Midwest region, on the other hand, had 230.351 cases, 4.861 deaths from COVID-19, and the state of Mato Grosso on July 29, 2020 registered 46.545 cases confirmed by COVID-19 and 1.669 deaths from the disease on its surveillance system.<sup>5</sup>

Mato Grosso had its first case confirmed in Epidemiological Week (EW) 12, and its first death in EW 14. In Epidemiological Week 28 the state already totaled 629 deaths.<sup>6</sup>

In view of the epidemiological situation that was established in Brazil, with an increasing number of cases and deaths from the disease.<sup>2</sup>

How do these deaths occur in the state of MT, in relation to pre-existing

diseases, with over 80% of deaths by covid-19 in Brazil, presenting other comorbidities? In this sense, studies that characterize these deaths by COVID-19 in different national spheres are pertinent, in order to contribute to the planning of regionalized strategies, actions and policies aimed at coping with the disease.

Thus, the objective of this study is to analyze the epidemiological profile of confirmed deaths from COVID-19 that occurred in the state of Mato Grosso, from April to June 2020, according to demographic variables and pre-existing diseases (PED), as well as analyzing the spatial distribution of cases, mortality rate and lethality.

**METHODS**

This is an ecological and cross-sectional epidemiological study. The study population was composed of deaths confirmed by COVID-19, whose municipality of residence belonged to the state of Mato Grosso (MT), in the period from April 3rd (date of the first confirmed death) to June 30th, 2020.

The data referring to the deaths came

from the Information Bulletins released by the Mato Grosso State Department of Health (SES-MT), produced daily by the State Public Health Emergency Operations Center.

The following variables were considered: sex (male and female), age group ( $\leq 5$ , 06 to 10, 11 to 20, 21 to 30, 31 to 40, 41 to 50, 51 to 60, 61 to 70, 71 to 80 and  $> 80$  years), number of PED (none, one, two, three or more and under investigation), type of pre-existing disease, municipality of residence, mortality rate (MR) and lethality.

MR was calculated as the ratio between the number of deaths from COVID-19 and the resident population and was expressed per 100.000 inhabitants and lethality as the ratio between the number of deaths from COVID-19 and the number of confirmed cases of the disease, both indicators considering the location of interest. To calculate the MR, the 2019 population estimated by the TCU (Tribunal de Contas da União) was used. 10 The other results presented in absolute and relative frequencies (expressed in percentages) or

means and standard deviation (SD).

The chi-square test was used to analyze the association between PED and sex, and the Student's t test to compare the mean ages between the PED groups. The level of significance adopted was 5.0%. The analysis was performed using the Statistical Package for the Social Sciences (SPSS Statistics), version 23.0.

For the construction of maps of the spatial distribution of deaths, MR and lethality, the Quantum Geographic Information System (QGIS) program, version 2.14.8, was used, and the cartographic bases obtained from the Brazilian Institute of Geography and Statistics (available at: <https://mapas.ibge.gov.br/bases-e-referenciais/bases-cartograficas/malhas-digitais>). For the construction of the categories, the geometric range of 6 classes was adopted (Method Natural Breaks-Jenks).

As this is a study with secondary data, available for public consultation and without the possibility of identifying individuals, there was no need for approval by the Research Ethics Committee.

## RESULTS

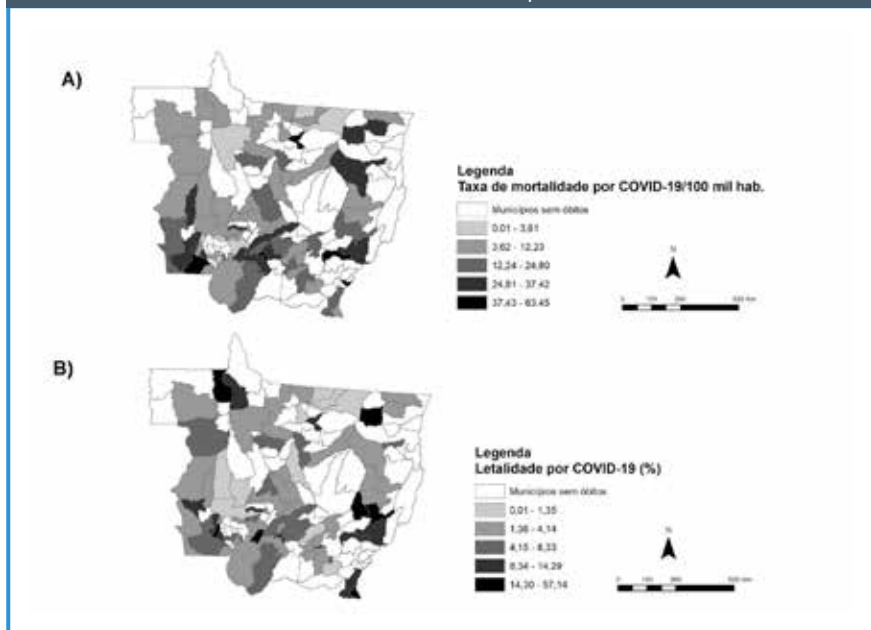
The results showed 621 deaths residing in the state of Mato Grosso, from April 3rd to June 30th. This number represents about 3,8% of confirmed cases, deaths occurred in seventy-five municipalities in the state, equivalent to 53,2% of the state's municipalities, although it is in the process of interiorization of the state.

The Mortality Rate of COVID-19 for Mato Grosso in the analyzed period was 17.8 / 100 thousand inhabitants, while for the capital Cuiabá it was 30,7/100 thousand inhabitants. The five largest MRs were found for the following municipalities: Ponte Branca (63,5/100 thousand inhab.), General Carneiro (54,2/100 thousand inhab.) both from the Southeast of Mato Grosso's geographical intermediate region (GIR), Nova Santa Helena (53,8/100 thousand inhab.) Belonging to North of Mato Grosso's GIR, Porto Esperidião (49,9/100 thousand inhab.), corresponding to Southwest of Mato Grosso's GIR and Várzea Grande (44,6/100 thousand inhab. .) which, like Cuiabá, belongs to South Center of Mato Grosso's GIR (Figure 1A). It is noteworthy that the first four municipalities have a population of less than 15 thousand inhabitants.

The highest lethality presented occurred in the municipalities of Nova Xavantina (57,1%), where of the 7 confirmed cases in the municipality four died, followed by São José do Xingu (33,3%), both in the Northeast of Mato Grosso GIR. The same lethality was found for Porto Estrela and Jauru (33,3%), both in the Southwest of Mato Grosso, while Cotriguaçu showed a lethality of 28.6%, located in the North of Mato Grosso's GIR.

Of the total deaths in the period, 61% were male (Table 1). The general average age of deaths was 63,9 years (SD = 16,3 years), with 62,7 years for men (SD = 16,6 years) and 65,6 years for women (SD = 15,7 years), a difference

Figure 1– Spatial distribution of the mortality rate (A) and lethality (B) by COVID-19 in the state of Mato Grosso, from April to June 2020.



Source: Information bulletins released by the Mato Grosso State Department of Health (SES-MT). Available in: <http://www.saude.mt.gov.br/informe/584>

Table 1 - Characterization of deaths by Covid-19, according to demographic variables and pre-existing diseases. Mato Grosso, April to June 2020

Variáveis:	N	%
<b>Sexo</b>		
Masculino	379	61,0
Feminino	242	39,0
<b>Faixa Etária</b>		
≤ 5	3	0,5
06 a 10	0	0,0
11 a 20	3	0,5
21 a 30	9	1,6
31 a 40	30	5,2
41 a 50	68	11,9
51 a 60	98	17,0
61 a 70	142	24,7
71 a 80	127	22,1
> 80	95	16,5
<b>Número de doenças pré-existentes</b>		
Nenhuma	73	11,8
Uma	194	31,2
Duas	187	30,1
Três ou mais	72	11,6
Em investigação	95	15,3
<b>Doença pré-existente</b>		
Hipertensão	310	39,3
Diabetes	220	27,9
Outras doenças do aparelho circulatório	95	12,1
Doenças renais	49	6,2
Doenças do aparelho respiratório	49	6,2
Obesidade	33	4,2
Neoplasias	15	1,9
Outras doenças pré-existentes	17	2,2

Source: Information bulletins released by the Mato Grosso State Department of Health (SES-MT). Available in: <http://www.saude.mt.gov.br/informe/584>

Table 2 - Pre-existing diseases (PED) according to sex and average age. Mato Grosso, April to June 2020

Variável	Com DPE	Sem DPE	Valor de p	
<b>Sexo:</b>	Masculino	268	46	0,53
	Feminino	185	27	
<b>Idade em anos (média-DP*)</b>	65,3 (14,9)	57,7 (20,7)	0,003	

\* Standard deviation. Source: Information bulletins released by the Mato Grosso State Department of Health (SES-MT).

of 2,9 years more for women ( $p = 0,03$ ) (data not shown).

Regarding the age group, deaths were more frequent in individuals over 40 years of age, who together accounted for 92,2% of total deaths. The age groups with the highest proportions were 61 to 70 years old (24,6%) and 71 to 80 years old (22,2%), but there were 15 deaths among those aged up to 30 years (Table 1).

As for the PED, 72,9% of the deaths presented some PED. The most frequent PED were hypertension (39,3%), diabetes (27,9%) and other diseases of the circulatory system (12,1%), which together accounted for 79,3% of the diseases in this group (Table 1).

There was no difference between genders regarding the presence of PED, however those who presented some PED were, on average, 7,6 years older than those who did not present any of them (65,3 vs. 57,7 years,  $p = 0,003$ ) (Table 2).

## DISCUSSION

Until May 25th, among the states belonging to the central-west region, Mato Grosso do Sul (MS) (17 deaths) and Mato Grosso (40 deaths) had not reached 50 deaths 6, however, on May 31st, while MS had 20 deaths, MT already totaled 61 deaths.

The Ministry of Health highlights that while the metropolitan region of Mato Grosso comprises 24% of confirmed cases of Covid-19, the interior represents 76% of the total infected.<sup>5</sup>

Men had a higher proportion of deaths due to COVID-19, about 56,4% more than women, even though they had an average age higher than men. Other studies have also pointed out a higher occurrence of the event in this group, which also follow Brazilian trends for the same period.<sup>7,8</sup>

According to Giagulli and collaborators (2020)<sup>9</sup>, low serum testosterone levels may predispose men, especially the elderly, to a poor prognosis or dea-

th from COVID-19, which can also be attributed to the reflection of the social imaginary that sees men as being invulnerable, contributing to taking care of themselves less and expose yourself more to risky situations<sup>10</sup>, such as not wearing a mask, fulfilling social isolation, among other preventive measures. The fact that men are culturally and socially attached to macho and hegemonic conceptions (as invulnerable and strong beings), added to the conception that preventive care is typically feminine preciousness, and to an alleged feminine fragility, makes women, from an early age, seek more health services when compared to men.<sup>11</sup>

The majority of deaths occurred in individuals over 60 years old, corroborating the data at the Brazilian level, which suggests that 69,4% of deaths by COVID-19 occur in individuals over 60 years old.<sup>12</sup> Studies have identified a greater number of elderly people and people with comorbidities would have a higher risk of death and lower survival.<sup>13</sup> In China, he identified that the risk of death is positively correlated with age, that is, in the 50 cases evaluated, older patients had fewer days from the first symptom to death.<sup>14</sup> With the arrival of old age and the decline in immunological function, the elderly have an increased susceptibility to infections<sup>15</sup>, which may justify deaths by COVID-19 in this group.

Despite the higher proportion of deaths in the elderly, MT is among the states that have reported deaths in children and adolescents. Noteworthy is the death of an 8-month-old indigenous person from the Maraiwatsede ethnic group, belonging to the Xavante Indigenous Sanitary District.<sup>16</sup>

Of the deaths that occurred until June 30th, 72,9% had at least one DEP. The most frequent were arterial hypertension, diabetes and other diseases of the circulatory system (79,3%). According to the Ministry of Health, individuals who have these pre-existing health conditions are more likely to de-

**Despite the higher proportion of deaths in the elderly, MT is among the states that have reported deaths in children and adolescents. Noteworthy is the death of an 8-month-old indigenous person from the Maraiwatsede ethnic group, belonging to the Xavante Indigenous Sanitary District.**

velop serious illnesses more frequently than others.<sup>5</sup>

Arterial hypertension, diabetes and cardiovascular diseases were also the pre-existing conditions most associated with severe cases of COVID-19.<sup>(14,18)</sup> COVID-19 can disproportionately affect people with cardiovascular disease, increasing the risk with old age and, consequently, more likely to lead to death.<sup>19,20</sup>

At the national level, for that same period, the Epidemiological Bulletin No. 17 of the MS, corresponds to the epidemiological week<sup>21</sup>, even in different orders, also highlights the presence of these same PEDs: heart disease was present in 7.318 deaths, followed by diabetes (5.627 deaths), kidney disease (1.218), neurological disease (1.159) and pneumopathy (1.061).<sup>12</sup> Most individuals were 60 or older, except for obesity. In epidemiological week No. 24, for the main comorbidities associated with deaths, heart disease (5,236 deaths) ranked first, followed by diabetes (4,035), kidney disease (1,190) and pneumopathy (784).<sup>21</sup>

A large study published by the Chinese Center for Disease Control and Prevention, with data on 44.672 confirmed cases from COVID-19, reported mortality of 2,3%. The most frequent comorbidities in patients who died were hypertension, diabetes mellitus, cardiovascular disease and age over 70 years.<sup>22</sup>

Among the limitations of this study, it is possible to indicate the absence of other information in the Bulletins, which could provide a better understanding of the profile of deaths, such as race / skin color, education and health care, that is, factors that are directly related to the occurrence of pre-existing diseases. Caution is also suggested in the interpretation of MR results and lethality, due to the great variability in the population of the municipalities and the low frequency of the studied event.



## CONCLUSION

The findings point to the importance of knowing the most vulnerable groups and regions, which have the highest proportion of deaths due to COVID-19 in the state. Guiding action practices in primary care aimed at guiding the population towards early diagnosis and proper care, preventing

the involvement of vulnerable groups pointed out in this study, such as male individuals, the elderly, and people with some DPE. Government agencies should take ownership of research data to guide the application of public social protection policies, especially to vulnerable groups.

Actions to strengthen the SUS, primary health care and the incor-

poration of an awareness of co-responsibility by government officials, health professionals and society in coping with COVID-19, are strategies that can reduce contagion, especially among groups of risk. Thus, reducing the need for specialties as an intensive care unit and ensuring the availability of the health service, again, for everyone. ■

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