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# *REVIEW OF THE DESCRIPTIVE ANALYSIS IN THE COVID-19 DATABASE AFTER TWO YEARS OF PANDEMIC DISEASE IN INDIGENOUS PATIENTS FROM THE STATE OF ACRE*

# *REVISÃO DA ANÁLISE DESCRITIVA NO BASE DE DADOS COVID-19 APÓS DOIS ANOS DE DOENÇA PANDÊMICA EM PACIENTES INDÍGENAS DO ESTADO DO ACRE*

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**Resumo**

Os primeiros casos de coronavírus comunicados no Acre foram confirmados em 15 de Março de 2020, em Rio Branco, e o primeiro caso de contaminação de uma pessoa indígena foi confirmado quase dois meses mais tarde, em 4 de Maio de 2020. Este artigo visa dar seguimento ao trabalho *Análise descritiva na base de dados COVID-19 após um ano da doença pandêmica em pacientes indígenas do Estado do Acre*, apresentando uma análise descritiva dos casos de COVID-19 em povos indígenas após dois anos da pandemia no Estado. Neste artigo, serão apresentados novos gráficos estatísticos do total de amostras e respectivas subamostras quando divididas por mortes e casos recuperados para comparar a situação atual com a anterior.

**Palavras-chave:** Acre. Brasil. COVID-19. Indígena. Pandemia Coronavirus.

**Abstract**

The first cases of coronavirus reported in Acre were confirmed on March 15, 2020, in Rio Branco, and the first contamination case of an indigenous person was confirmed almost two months later, on May 4, 2020. This article aims to follow up on the work *Descriptive analysis in the COVID-19 database after one year of the pandemic disease in indigenous patients from the State of Acre*, presenting a descriptive analysis of COVID-19 cases in indigenous people after two years of the pandemic in the state. In this paper, new statistical graphs of the total samples and their respective subsamples will be presented when divided by deaths and recovered cases to compare the current situation with the previous one.

**Keywords:** Acre. Brazil. Coronavirus pandemic. COVID-19. Indigenous.

## 1 INTRODUCTION

In March 2020, the World Health Organization (WHO) classified the spread of COVID-19 as a pandemic. According to the *Priberam* dictionary, this noun indicates an epidemic extension to an entire continent, to the whole globe. Only three months after the first disease cases were reported in China, the new coronavirus had spread to more than 100 countries. Since then, more than 6 million people worldwide have lost their lives to the disease[1].

In Brazil, deaths registered until now are around 655,000, which means that the country alone has about 10.5% of the global infection victims, despite representing only 2.7% of the planet's population. According to the *Coronavirus Brasil*[2] platform, the country occupies 15th place in deaths proportionally to people.

According to Fernandes & Lopes (2021), Acre notified its first confirmed case of COVID-19 infection on March 15, 2020. From April 9, 2020, and beyond, the Health Surveillance Secretariat considered that in the cities where cases were registered, they were already being assumed to be in the community or sustained transmission phase, as it was impossible to establish an epidemiological link between those cases. Acre's indigenous population is 15,921, in which 2,595 are urban, and 13,326 are in rural areas, where the ethnicities of the following *Alto and Baixo Acre*, and *Juruá and Tarauacá/Envira* regions will be analyzed (SESACRE, 2021; IBGE, 2010):

- *Apurina (Ipurina; Popukare)*

[1] Coronavirus (COVID-19) Deaths - https://ourworldindata.org/covid-deaths
[2] Coronavirus Brasil - https://covid.saude.gov.br/

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- *Arara do Rio Amonia (Apolima-Arara; Arara Apolima)*
- *Arara Shawadawa (Arara do Acre; Shawanaua)*
- *Huni Kuin (Kaxinawa; Cashinaua; Caxinaua)*
- *Kulina (Culina; Madiha)*
- *Manchineri (Machineri; Manxineru; Yine)*
- *Yaminawa (Iaminaua; Jaminawa)*

Besides these, the following ethnicities were also analyzed:

- *Arara (Arara do Para; Ukaragma)*
- *Ashaninka (Kampa; Ashenika)*
- *Jarawara (Jarauara)*
- *Katukina Pano*
- *Kaxarari (Caxarari)*
- *Nawa (Naua)*
- *Nukini (Nuquini)*
- *Shanenawa (Katukina Shanenawa)*
- *Tapajos*

## 2 METHODOLOGY

The dataset used came from Influenza Syndrome (S.G.) and Severe Acute Respiratory Syndrome (SARS-HOSPITALIZED) surveillance through the *Acre State Transparency Portal* website[3]: the Acre without COVID-19 Pact, which is a health and socioeconomic crisis management tool caused by the COVID-19 pandemic in the State of Acre (SESACRE, 2020a; SESACRE, 2020b).

The dataset used to analyze the impact of the disease on indigenous people in the first year was obtained on March 27, 2021, consisting of 1178 (one thousand, one hundred and seventy-eight) pieces of information, corresponding to the period from April 19, 2020, to October 15, 2020. Furthermore, to analyze the evolution of the disease in indigenous tribes in the second year of the pandemic, the dataset was obtained on January 18, 2022, composed of 1059 (one thousand, fifty-nine) information regarding the notification of cases of COVID-19 in the State of Acre referring to the period from April 19, 2020, to January 17, 2021.

The current dataset, as well as the data from the first year, went through pre-processing steps that allowed us to choose which data would be worked on, ensuring

[3] Government of the State of Acre - http://covid19.ac.gov.br

the completeness, honesty, and integrity of the information, which allowed the reduction of the amount of data to group them by common characteristics.

After the pre-processing step, the information extracted from the dataset resulted in 328 (three hundred and twenty-eight) notifications. And for each variable analysis to follow, histograms, bar charts, and boxplots were made to assess dispersion, asymmetry, and how the data is distributed:

- **Age:** Discrete quantitative variable, refers to the patient's age;
- **Gender:** Nominal qualitative variable, indicates whether the patient's gender is Female or Male;
- **Comorbidities:** Nominal qualitative variable, these are the comorbidities presented by the patient, being Without for indigenous patients who did not have any health condition and With for indigenous patients who had at least one of these health conditions: Carrier of chromosomal diseases or fragile immune status, Chronic heart diseases, Chronic kidney diseases in advanced stage (3, 4 or 5 grades), Decompensated chronic respiratory diseases, Diabetes, Immunosuppression, Obesity, High-risk pregnant woman or Postpartum (up to 45 days after delivery);
- **Status:** Nominal qualitative variable, which is the classification of disease cases, where Recovered are the cases of indigenous patients referring to recovered and the death cases.

## 3 RESULTS AND DISCUSSION

This section is about a descriptive analysis that presents the disease's performance in general. According to Fernandes & Lopes (2021), Figure 1(a) illustrates the histogram of the age variable where we observe that the ages with the highest frequency are in the range [0, 10] and that the ages with the lowest frequency are in the range [90+], with 0 being the minimum age and 107 the maximum age. Figure 1(b), corresponding to the second year of the pandemic, shows that the age group with the highest frequency of coronavirus contamination is between 20 and 50 years. Unlike the first year, the disease was more concentrated in adults and middle-aged people. Figure 1(a) shows that the lowest frequency range is also between [90+], with 0 as the minimum age and 109 as the maximum age of indigenous patients who tested positive for COVID-19.

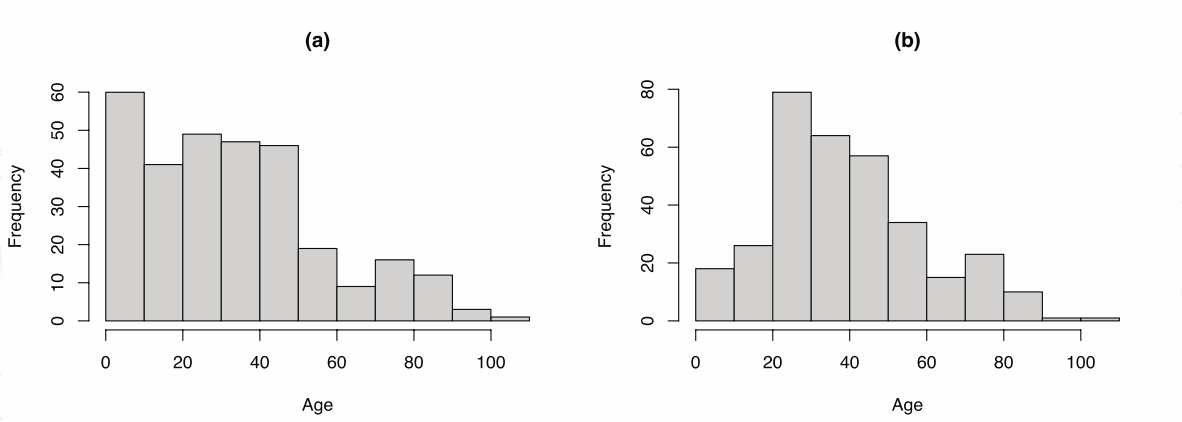


**Figure 1. Histogram of Age**

In Figure 2(a), it can be seen that the boxplots of the gender variable, in the first year of the pandemic, present asymmetry to the right, indicating that the highest concentration of those infected by COVID-19 is aged below 30 and 40 years for the male and female sexes, respectively, in which the female boxplot presented some possible outliers, indicating that women over 80 years of age were contaminated, and the male boxplot showed more significant variability in the age of infected men. In Figure 2(b), in the second year of the pandemic boxplots, it can be observed that the behavior of the graph for both men and women is similar to the first year, except that the median ages of infected women and men are between 20 and 30 years of age, respectively. There are even fewer possible outliers in the female boxplot, indicating that fewer women over 80 years of age were contaminated in the second year of the pandemic.

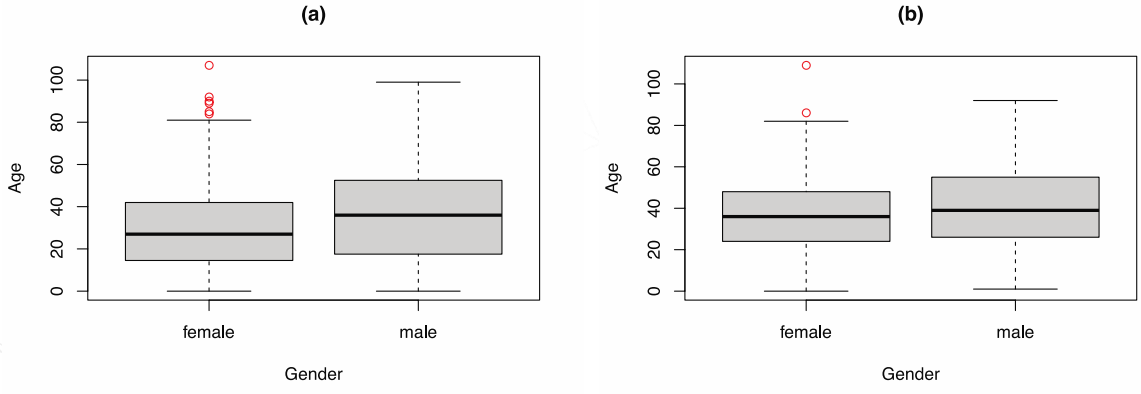


**Figure 2. Boxplots of Gender**

The barplots in Figure 3 serve to observe the frequency distribution of female and male indigenous patients with and without comorbidities (Figure 3(a)) and who of them died and recovered (Figure 3(c)), and they are for the first year of the analysis. In the second year of research, Figures 3(b) and (d), we note that there is a predominance of

females over males in both characteristics in most of them. The only exception is the barplot of the death characteristics, which predominates in males (FERNANDES; LOPES, 2021).

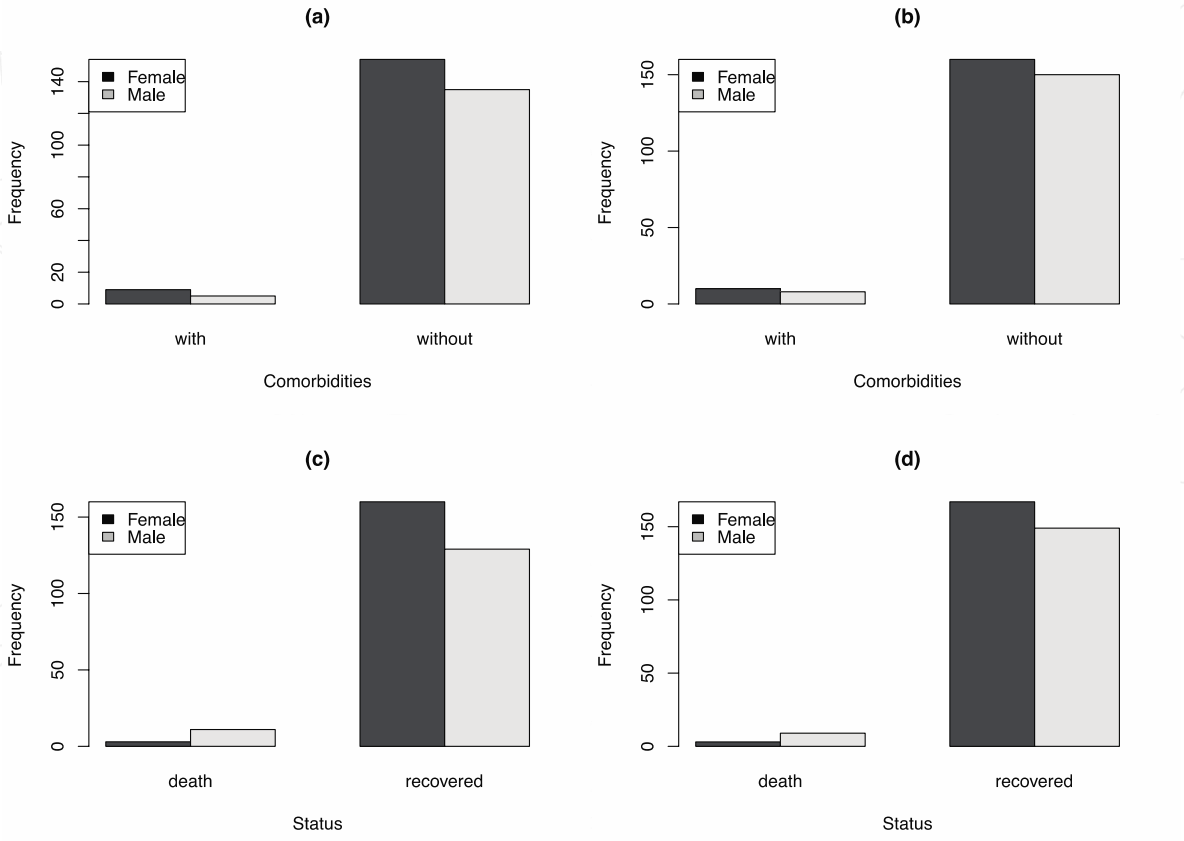


**Figure 3. Barplots of Gender by Comorbidities and by Status**

The boxplots in Figure 4(a) and 4(b) show the indigenous people infected with and without comorbidities, respectively, in the first and second years of the pandemic. In these, we can observe that, in years, the age of the indigenous people were similar in the first and third quartiles of the boxplot, corresponding to the ranges of 30 to 40 years and 50 to 60 years, unlike the first year in which the ages of the indigenous are distributed in the other quantiles. As for indigenous people without comorbidities, the graphs are very similar in both years, with possible outliers indicating that indigenous people of all ages were contaminated.

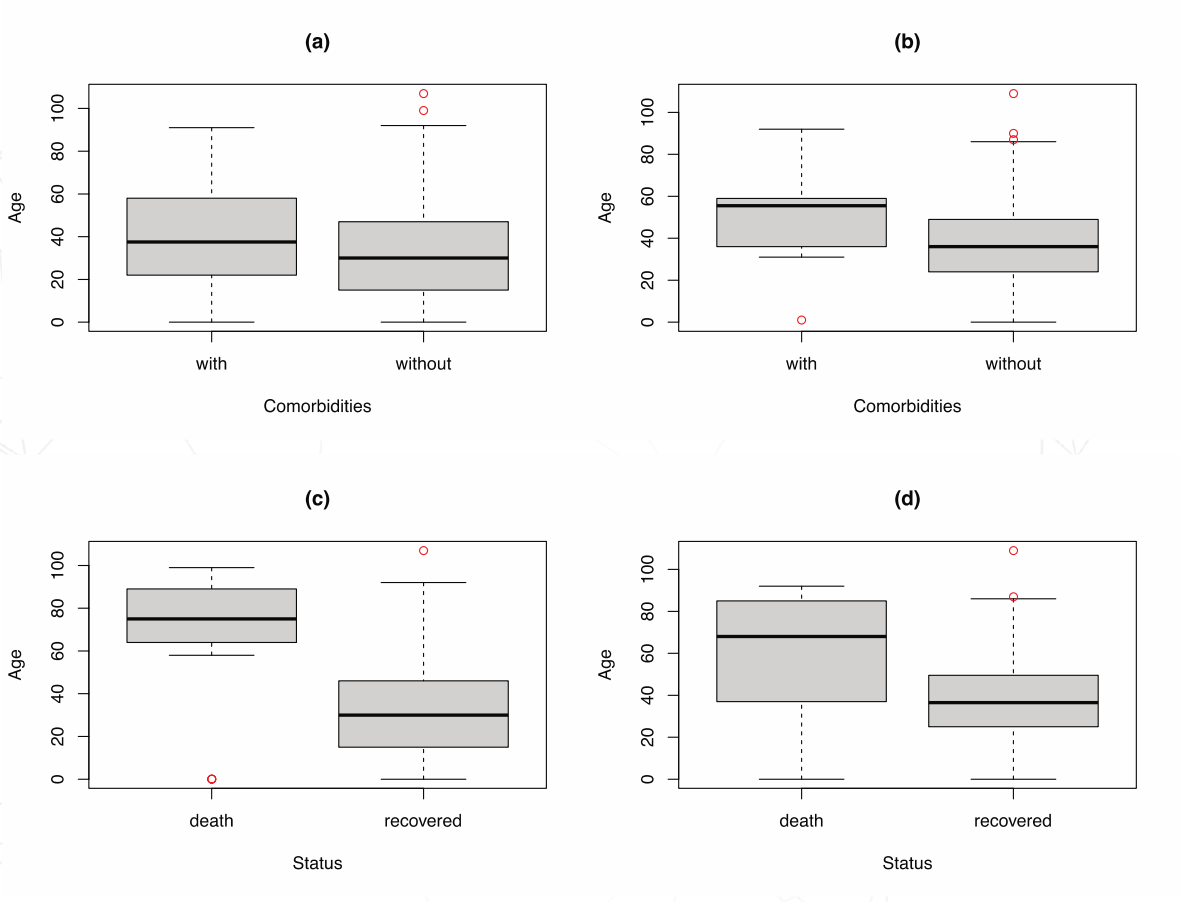


**Figure 4. Boxplots of Comorbidities and Status**

The boxplots in Figure 4(c) and 4(d) indicate the recovery and death of indigenous people infected with the coronavirus in the pandemic's first and second years, respectively. It can be seen that indigenous people aged between 50 and 100 and a child died of the disease. At the same time, there was more significant variability in the age of indigenous people who spoke of the disease in the second year. The coronavirus also killed younger indigenous people. Looking at the boxplots of the recovered people, we can see that both in the first and second year of the pandemic, indigenous people of all ages have overcome the disease, with the median age of the recovered in the 30-year range for both years.

### 3.1 ABOUT COVID-19 DEATH CASES

This subsection is about a descriptive analysis that presents the disease's performance in death cases. As Fernandes & Lopes (2021), Figure 5(a) illustrates the histogram of age variable where we observe that the ages with the highest frequency are in the range [80, 100+] and that the ages with the lowest frequency are in the range [20, 60], with 0 being the minimum age and 99 the maximum age. In Figure 5(b), for the

second year of analysis, the highest frequency range is between [80, 100+] and the lowest frequency range is between [20, 40], with 0 being the minimum age and 92 the maximum age of indigenous patients who died for COVID-19.

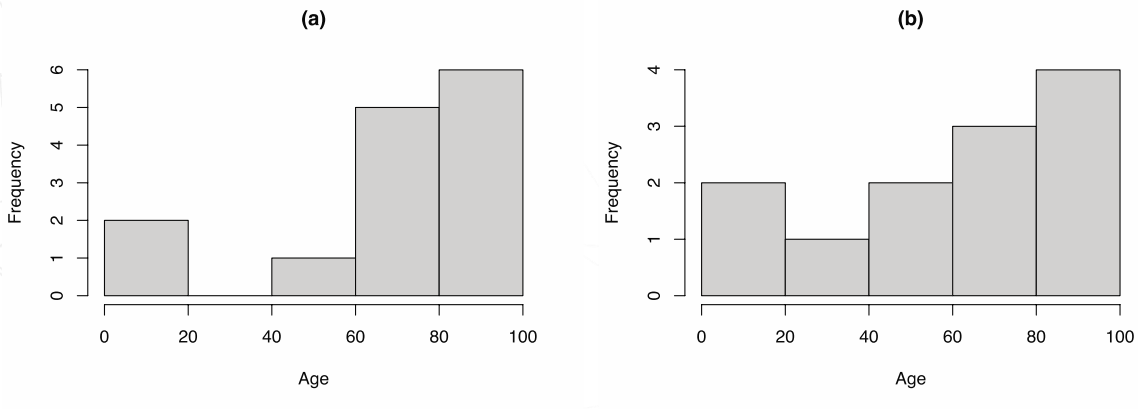


**Figure 5. Histogram of Age of death cases**

As Fernandes & Lopes (2021), in Figure 6(a), gender variable boxplots show that 50% of the data are distributed between the ages of 70 and 90 years old in the first year of the pandemic for the female sex, approximately having no outliers; while for the male sex the boxplots are roughly similar, having 1 outlier in both years.

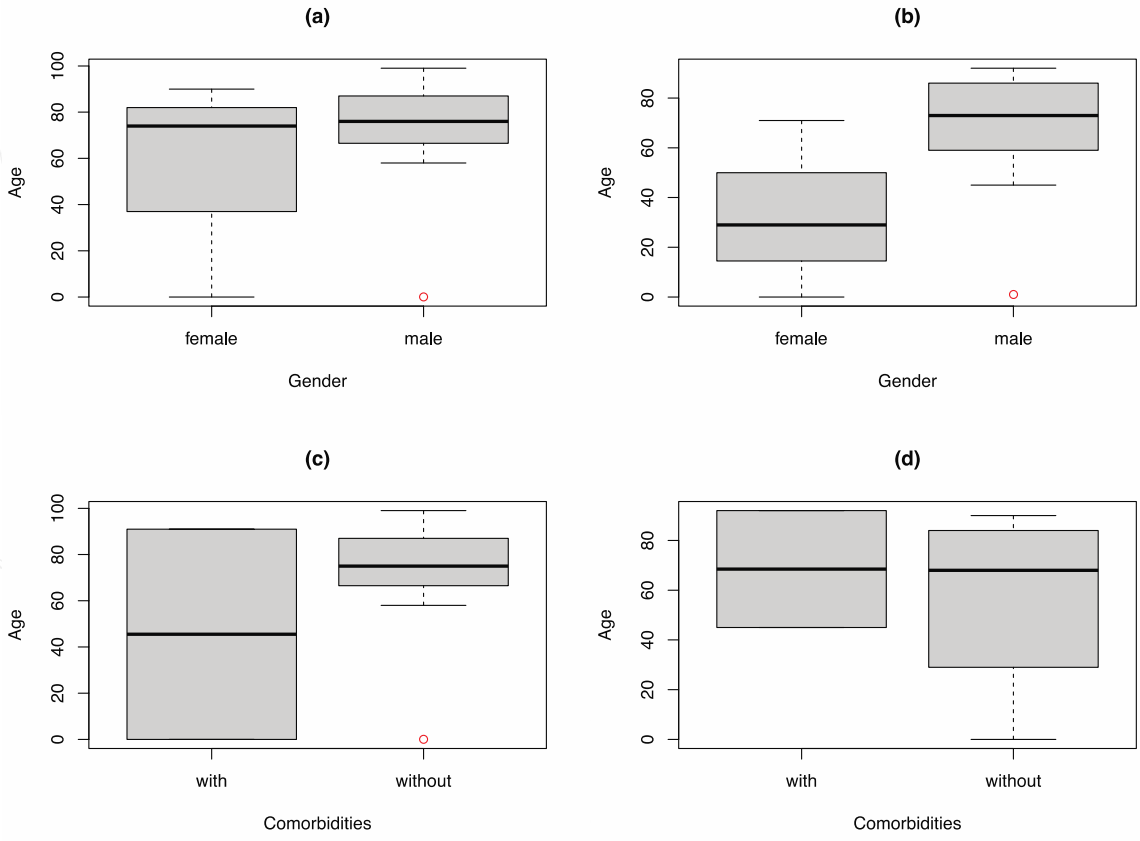


**Figure 6. Boxplots of Gender and Comorbidities of death cases**

According to Fernandes & Lopes (2021), in Figure 6(c), it can be observed that in the comorbidity variable boxplots, all the data are distributed between the ages of 0 and 90 years old for indigenous patients who presented comorbidities, approximately having high variability and no outliers; while indigenous patients who did not present comorbidities are between the ages of 70 and 90, roughly, 1 possible outlier was counted. In Figure 6(d), referring to the second year of analysis, the indigenous patients with comorbidities were above 50 years old, approximately, and without outliers. At the same time, there are patients of all ages without comorbidities.

Finally, the barplots of Figure 7(a) serve to observe the frequency distribution of female and male indigenous patients who died with and without comorbidities, where it is possible to notice that the male sex was predominant in the characteristics without comorbidities and equal to the elements in the female sex, as Fernandes & Lopes (2021). While in the second year of analysis, males were predominant in both traits, with and without comorbidities.

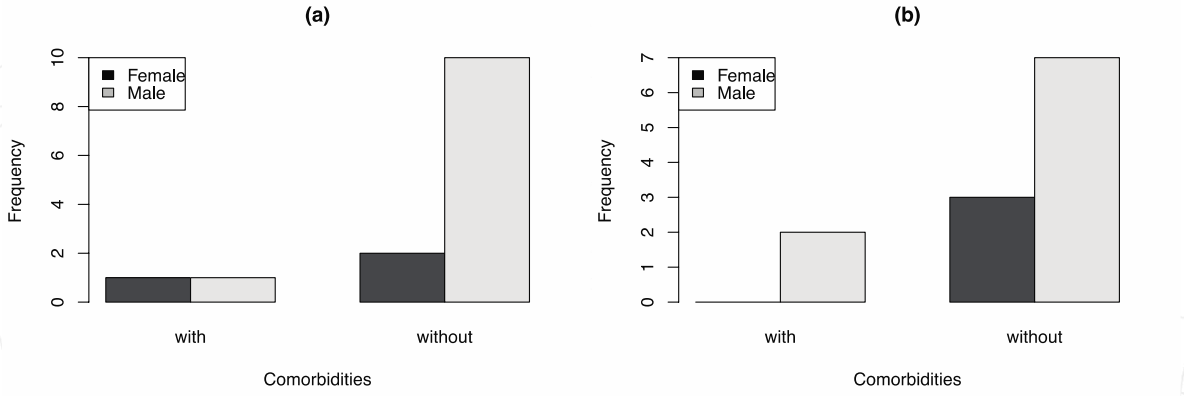


**Figure 7. Barplots of Gender by Comorbidities of death cases**

### 3.2 ABOUT COVID-19 RECOVERED CASES

This subsection is about a descriptive analysis that presents the disease's performance in the recovered cases. According to the original article Fernandes & Lopes (2021), Figure 8(a) illustrates the histogram of the variable age where it is observed that the ages with the highest frequency are in the range [0, 10]. The ages with the lowest frequency are in the range [90+], with 0 being the minimum age and 107 the maximum age. In Figure 8(b), referring to the second year of analysis, the range of highest frequency is between [20, 30] and the range of lowest frequency, as in the previous year, is also in [90+], being 0 the minimum age and 109 the maximum age of the indigenous patients who died from COVID-19.

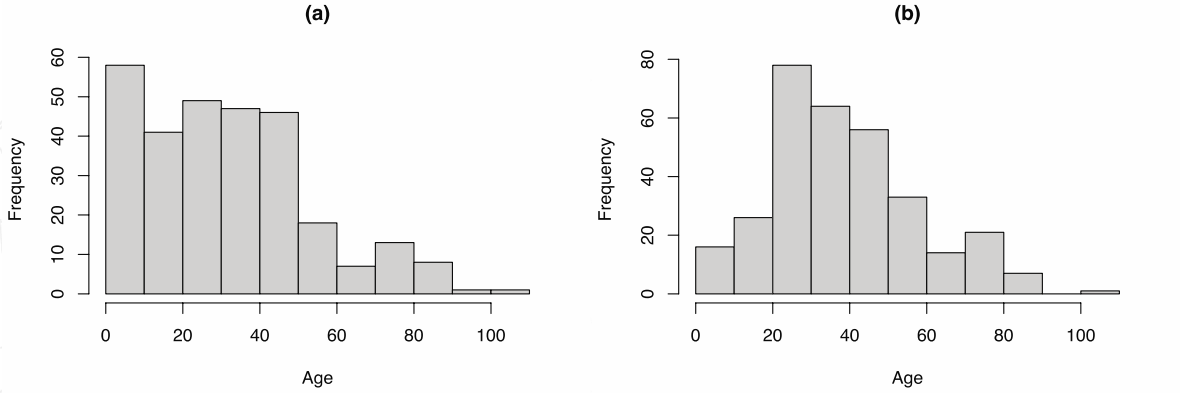


**Figure 8. Histogram of Age of recovered cases**

Looking at the boxplots of recovered cases according to gender, Figure 9(a) and Figure 9(b), it can be seen that the graphs are similar for both women and men in both years. For women, 75% of the patients who recovered were under 40 years old in the first year and 50 years old in the second year, and for men under 50 years old in both pandemic years. Possible outliers for the indigenous women can still be observed, indicating that the older women recovered from the disease.

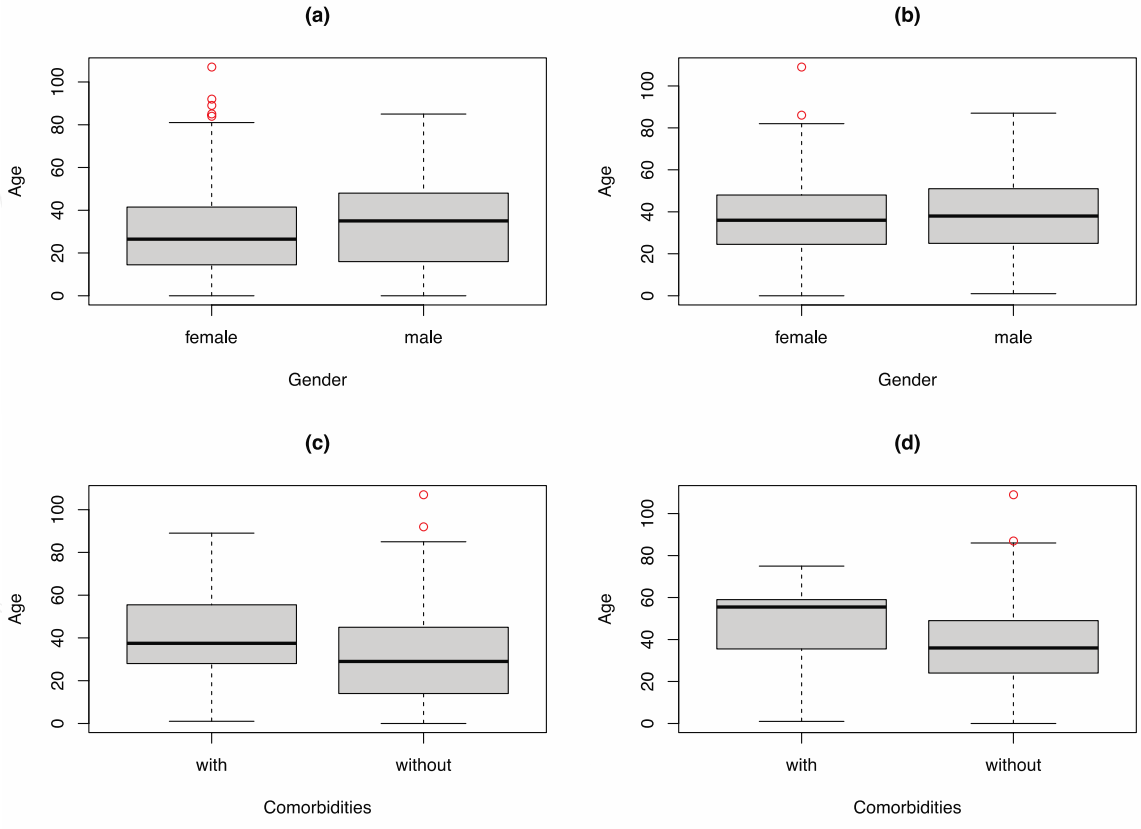


**Figure 9. Boxplots of Gender and Comorbidities of recovered cases**

Continuing with Figure 9(c) and 9(d), it can be seen that the boxplot of the patients with comorbidities shows right asymmetry in the first year and left asymmetry in the second year, indicating different median ages, below 40 years in year 1 and above 50 years in year 2. The boxplots of the patients without comorbidities are similar in the two years. Both showed possible outliers. In the first year, there was a little more variability in the ages of the patients with comorbidities. Both showed medians close to 30 years of age.

Finally, the barplots in Figure 10(a) and (b) serve to observe the frequency distribution of female and male indigenous patients who recovered with and without comorbidities, where it can be seen that the female gender was predominant in both characteristics, whether referring to the first analysis of the original article or in this second analysis of the present paper (FERNANDES; LOPES, 2021).

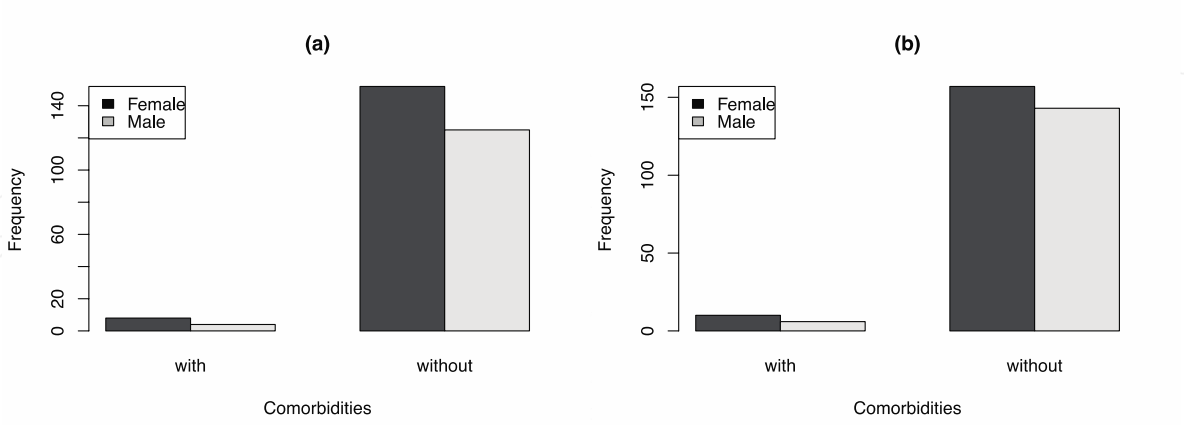


**Figure 10. Barplots of Gender by Comorbidities of recovered cases**

## 4 CONCLUSIONS

The visualization of the data utilizing these graphs: histogram, barplots, and boxplots, made it possible for us to assume some conclusions. First, starting with the histogram in Figure 1, we noticed that, in general, young and adult people aged between 0-59 years old tested more favorable to the disease than senior (60+ years) people in both sexes, both in the first analysis and in this second review analysis.

In Figure 3, we observed that in both first-year analyses and this review analysis, female Indigenous patients test more for comorbidities, both with and without health conditions, than males. The exception for male Indigenous patients is that they die more than female patients.

About death cases, both in the first analysis and in this review, Figure 5 shows a histogram that tells us that more elderly indigenous patients died than young and adult

people and that in the second analysis, more of them died without than with comorbidities. Also, still in the first analysis as in this review, Figure 8 shows a histogram that tells us that young and adult Indigenous patients recovered more from the disease than the older adults on the recovered cases.

And still on the two analyses, regarding the comorbidities of the Indian patients who died in Figure 7, it can be stated that they do not contribute negatively to the patient's health status because among the analyzed ages, according to the boxplots in Figure 6 and 9, their influence is minimal.

Referring to the first analysis about deaths, it is noted that 73.33% (11 cases) occurred in indigenous patients older than 60 years, 73.33% (11 cases) in male indigenous patients. Another public with a large percentage of deaths were indigenous patients without comorbidities representing 80.00% (12 cases) of a total population of 15 indigenous patients. In addition, regarding the recovered cases, it is found that 58.48% (169 cases) occurred in adult indigenous patients, 55.36% (160 cases) were female indigenous patients, and 95.85% (277 cases) without comorbidities out of a total population of 289 indigenous patients by March 27, 2021 (FERNANDES; LOPES, 2021).

As for the second analysis about deaths, it is observed that 58.33% (7 cases) occurred in indigenous patients older than 60 years, 75% (9 cases) in male indigenous patients. Another public with a large percentage of deaths were indigenous patients without comorbidities representing 83.33% (10 cases) of a total population of 12 indigenous patients. Furthermore, on recovered cases, it is found that 77.84% (246 cases) occurred in adult indigenous patients, 52.84% (167 cases) were female indigenous patients, and 94.93% (300 cases) without comorbidities out of a total population of 316 indigenous patients by January 18, 2022.

Nowadays, while the Covid-19 virus caused Brazilians to lose about three years in life expectancy overall, in Acre, this reduction was smaller. In that sense, the state was the second in the Northern region to feel the least, with its population losing just over 1 year of life expectancy. In the North, Acre was second only to the Tocantins, where the reduction in life expectancy was 1.18 years. In Acre, it was 1.79 (CASTRO *et al.*, 2021).

Finally, the cases and deaths numbers have been decreasing until March 13, 2022. According to the Transparency Portal of the State of Acre, 511,368 thousand people were immunized in the vaccination campaign against coronavirus. Even with all the difficulties imposed by the emergence of new variants, vaccination has proven to be efficient in the fight against the pandemic.

**5 ACKNOWLEDGEMENTS**

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