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Profile and Trends in Hospitalizations for Respiratory Diseases in Ananindeua-PA: Epidemiological Analysis (2013-2022)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study aimed to analyze the epidemiological profile of hospital admissions for respiratory system diseases in the municipality of Ananindeua-PA, between 2013 and 2022, highlighting morbidity, mortality patterns, and associated factors.
Study Design: The research was descriptive, retrospective, and quantitative, based on the analysis of secondary data.
Place and Duration of Study: The study was conducted in Ananindeua, Pará, Brazil, covering the period from January 2013 to December 2022.
Methodology: Data were collected from the Hospital Information System (SIH/SUS) using the TabNet/DATASUS platform. Variables analyzed included year of care, sex, age group, color/race, nature of admission (urgent or elective), and number of deaths. Descriptive statistical analysis was performed using Microsoft Excel-2019, with results presented in tables and graphs.
Results: Between 2013 and 2022, Ananindeua recorded 35,281 hospital admissions for respiratory diseases, with pneumonia being the leading cause (22,804 cases). Most hospitalizations were urgent (99%). Women accounted for 53% of admissions, while men had the highest death rates (55.12%). The most affected age group was 1 to 4 years (17.46%), followed by young adults aged 20 to 39. Regarding color/race, 70.41% of the records lacked this information, but among the reported cases, brown individuals were the most prevalent (27.81%). The total number of deaths during the period was 1,290, with the highest occurrence among those aged 80 and over (26.74%).
Conclusion: The study revealed that respiratory diseases remain a significant public health challenge in Ananindeua, primarily affecting young children, young adults, and the elderly. Urgent hospitalizations were predominant, and higher mortality rates were observed among men and older populations. Strengthening Primary Health Care (PHC) is crucial to prevent avoidable hospitalizations, and further research is needed to explore racial and social disparities observed in the data.

Keywords: Hospital admissions; nursing; respiratory diseases; racial.

1. INTRODUCTION

Chronic non-communicable diseases (NCDs) are the main causes of death worldwide and have led to a high number of premature deaths, loss of quality of life and a high degree of activity limitations. The chronic diseases with the greatest global impact are diseases of the circulatory system, cancer, diabetes and diseases of the respiratory system, both of which have risk factors in common: smoking, sedentary lifestyle, unhealthy diet, excessive alcohol consumption and obesity (Brasil, 2011).

In Brazil, NCDs are among the leading causes of hospital admissions and are responsible for around 41 million deaths worldwide every year, which corresponds to 70% of all deaths (Becker, 2020). In 2019, 54.7% of deaths recorded in Brazil were caused by NCDs, but when it comes specifically to diseases of the respiratory system, the number of deaths recorded was 162,005 in the 0-80 age group (Brazil, 2021).

Diseases of the respiratory system represent a significant public health problem in Brazil, with high morbidity and mortality rates. Due to the progressive nature of some respiratory diseases, it is common for patients to have severe episodes of symptoms, requiring hospitalization for proper management (Silva et al, 2023a).

Diseases of the respiratory system can be classified as acute or chronic and are found in both the upper and lower airways. They are present in all age groups, especially in more vulnerable groups, and have a variety of etiologies and forms of presentation (Camarço et al, 2021). Among the main chronic respiratory diseases are asthma and Chronic Obstructive Pulmonary Disease, which include chronic bronchitis, obstructive bronchiolitis and pulmonary emphysema (Brazil, 2011).

Colds, tonsillitis and sinusitis are the most common acute upper respiratory infections affecting the population. Among acute lower respiratory infections, pneumonia is one of the main causes of hospitalization and mortality in low- and middle-income countries such as Brazil (Camarço et al, 2021).

Chronic lower respiratory diseases can affect quality of life and cause disability in individuals, causing great economic and social impact, physical, emotional and intellectual limitations that arise with the disease, generating suffering and consequences in the lives of the patient and their family (Brazil, 2010).

Respiratory diseases can be aggravated by the aging process, alcohol consumption, smoking, genetic traits, exposure to air pollution, climate change and a reduction in the effectiveness of the immune system. It can develop from infancy, depending on maternal exposure to risk factors, and prematurity of the child. However, as we age, physiological processes occur, such as a reduction in the potential for cell signalling to protect the respiratory mucosa, increasing the chances of infections. Pulmonary elasticity and lung volumes are also impaired because at this stage there is a loss of elastin and an increase in collagen crystallization, causing the airways to undergo remodelling (Lemos, 2023).

The role of nurses in this context is characterized by a sequence of activities involving direct care and nursing management developed by each department. Nurses become protagonists in the entire care process, not only providing direct care, but also organizing the unit to improve care for each patient's health needs (Maximiano et al, 2023).

The nursing care provided to patients is carried out through the Systematization of Nursing Care (SNC), making it possible to draw up an integrated care plan, providing guidance to mitigate the difficulties of treatment in search of a good recovery: monitoring vital signs, recording saturation frequently, monitoring respiratory function along with clinical signs and lung auscultation, oxygen therapy according to need, healthy habits and exercises appropriate to their lung condition (Ravaglia, 2022).

Nurses occupy a strategic and reference position in the team, since it is also their job to stop the chain of transmission of microorganisms, reducing the risk of healthcare-related infections (HAIs), including respiratory infections acquired in the hospital environment, infections associated with inhalation devices and invasive mechanical ventilation. Some precautions that the nursing team, as well as the entire multidisciplinary team, should take to control these infections are: educating health professionals, washing hands and using PPE, avoiding the accumulation of secretions, avoiding the use of equipment between patients, properly disinfecting respiratory equipment, humidifying the ventilator with sterile water, as well as keeping the patient's headboard between 30 and 45 degrees to reduce the risk of aspiration (Santos, et al., 2021).

In Brazil, respiratory tract diseases represent an important challenge for health services, and this has become more evident with the emergence of COVID-19. The pandemic period has led to increased demand for the health system, a large number of hospital admissions and visible depletion of health resources (Custodio et al, 2021). The outbreak of the pandemic revealed a collapse in the health sector due to a lack of adequate equipment, materials and infrastructure. During the COVID-19 pandemic, nurses and their teams have been at the forefront of carrying out and imposing efficient care in the face of relatively new pathologies, requiring the technical and scientific knowledge of the entire team. Thus, nurses need strategies to reduce the suffering caused by COVID-19 during the pandemic, providing assistance and comfort to patients throughout their care (Parca et al., 2022).

In view of this, the following guiding question was posed: What is the epidemiological profile of hospitalizations due to diseases of the respiratory system in the municipality of Ananindeua, Pará, between 2013 and 2022? To answer this question, the following objective was developed: To analyze the epidemiological profile of hospital admissions for respiratory

system diseases in the municipality of Ananindeua, Pará, between 2013 and 2022.

2. METHODOLOGY

This is a descriptive, retrospective and quantitative study. Retrospective research seeks to analyze existing data on a given subject, and the quantitative approach is generally used when you want to measure opinions, reactions, sensations, habits and attitudes etc. of a universe (target audience) through a sample that represents it in a statistically proven way (Manzato & Santos, 2012).

The data was collected from secondary data available in the Hospital Information Systems (SIH), through the TabNet platform of the Information and Informatics Department of the Unified Health System (DATASUS) for the municipality of Ananindeua, in the state of Pará, Brazil. Geographically, it has an area of approximately 2,512.2 km². In terms of population, it is considered the second most populous municipality in the state of Pará, with a population of approximately 478,778 inhabitants, according to the Brazilian Institute of Geography and Statistics (IBGE) estimate for 2022.

They were selected from the following tabs: Epidemiological and Morbidity, SUS Hospital Morbidity (SIH/SUS), General, by place of hospitalization (Pará); health region (CIR)-Metropolitan I-COD 15006; Hospitalizations-period 2019 to 2023; Municipality of Ananindeua-COD.150080 Chapter ICD-10: Diseases of the respiratory system; variables studied: character of care; color/race; age range from 01 to 80 years; female and male; number of deaths; year of care, place of hospitalization.

The inclusion criteria were information from individuals notified of respiratory diseases in this period. In addition, the data range from 2013 to 2022 was used to better elucidate the current situation in the municipality of Ananindeua, in the state of Pará. Data reported outside of Ananindeua was excluded, as well as data from previous years.

For processing and analysis, the data collected was organized in Microsoft Excel-2019, displayed in spreadsheets to obtain the results, and explained through tables and graphs for percentage descriptive analysis with a thorough and careful reading of the selected information, highlighting the data presented in the objectives of this work and discussed based on the available scientific evidence. The research was carried out using secondary data sources and information available on the DATASUS and TABNET platforms, which are public knowledge. It was not necessary to submit the study to the Research Ethics Committee.

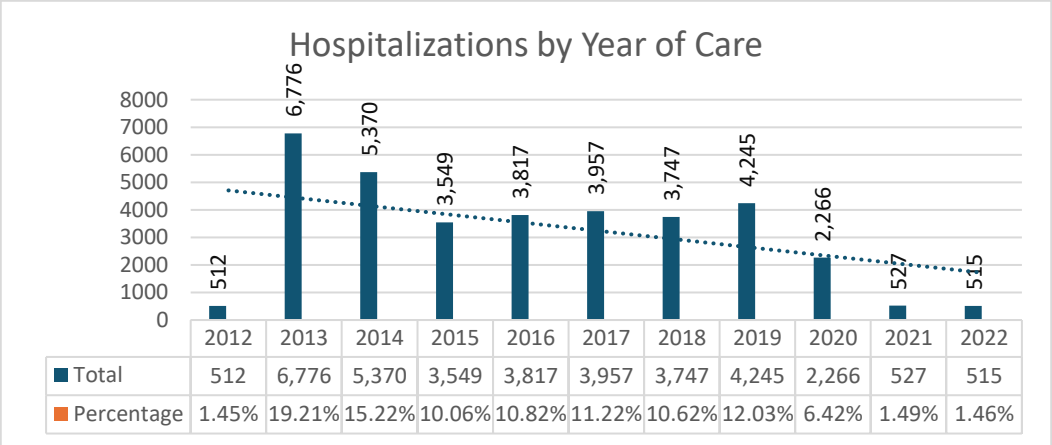
3. RESULTS AND DISCUSSION

According to data collected from the Hospital Information System - TABNET, in the filter by place of hospitalization, the Municipality of Ananindeua (150080), which is located in the state of Pará, has a total of 35, 281 hospitalizations for diseases of the respiratory system (ICD-10) between 2013 and 2022. On the morbidity list, pneumonia leads the way with the highest number of hospitalizations, with 22,804 recorded in the years described. Asthma is in second place with 4,163 hospitalizations. Other diseases of the respiratory system in the morbidity list have a total of 2,535 hospitalizations, emphysema bronchitis and other COPD with 1,031 hospitalizations, acute bronchitis and acute bronchiolitis with 713 hospitalizations, acute upper airway infections with 594 hospitalizations, bronchiectasis with 93 hospitalizations and others.

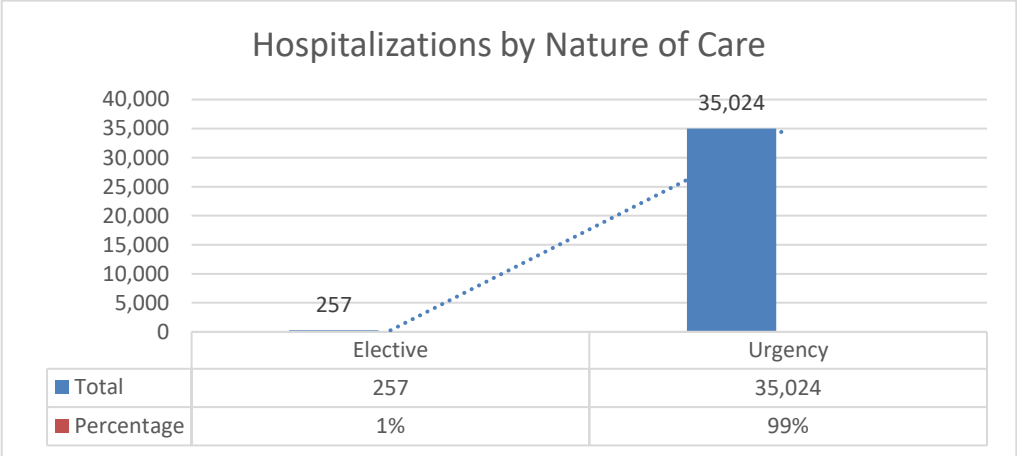
Graph 1 shows the year of care according to municipality, with the year with the highest number of records being 2013, with 6,776 (19.21%) hospitalizations, followed by 2014 with 5,370 (15.22%), with a decrease in hospitalizations between 2015 and 2018 with an average of 3,600 (42.22%). 600 (42.72%) records, with an increase in hospitalizations in 2019 with 4,245 (12.03%) and the period with the lowest record of cases was 2022 with 515 (1.46%), followed by 2021 with 527 (1.49%) recorded hospitalizations.

Graph 2 shows hospitalizations by type of care according to municipality between 2013 and 2022. The largest number recorded was emergency care with 35,024 (99%) and elective admissions with 257 (1%).

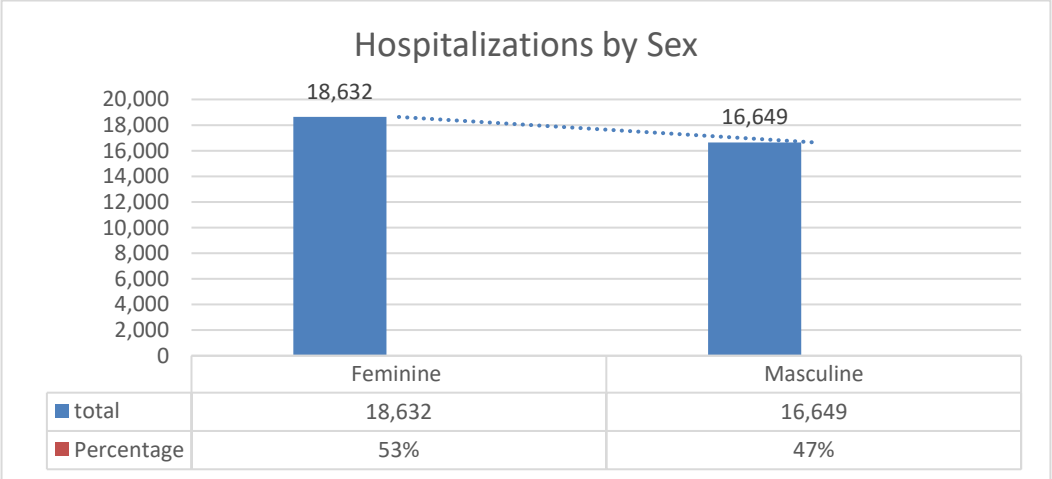
In terms of the number of hospitalizations by gender, Graph 3 shows that females had the highest rate of hospitalizations with 18,632 (53%) records and males with 16,649 (47%) in the years 2013 to 2022.



Graph 1. Distribution of hospitalizations for diseases of the respiratory system according to the year of care in Ananindeua between the years 2013 and 2022.
Source: SIH/DATASUS/TABNET (2025).



Graph 2. Distribution of hospitalizations for diseases of the respiratory system according to the nature of care in Ananindeua between the years 2013 and 2022
Source: SIH/DATASUS/TABNET (2025).

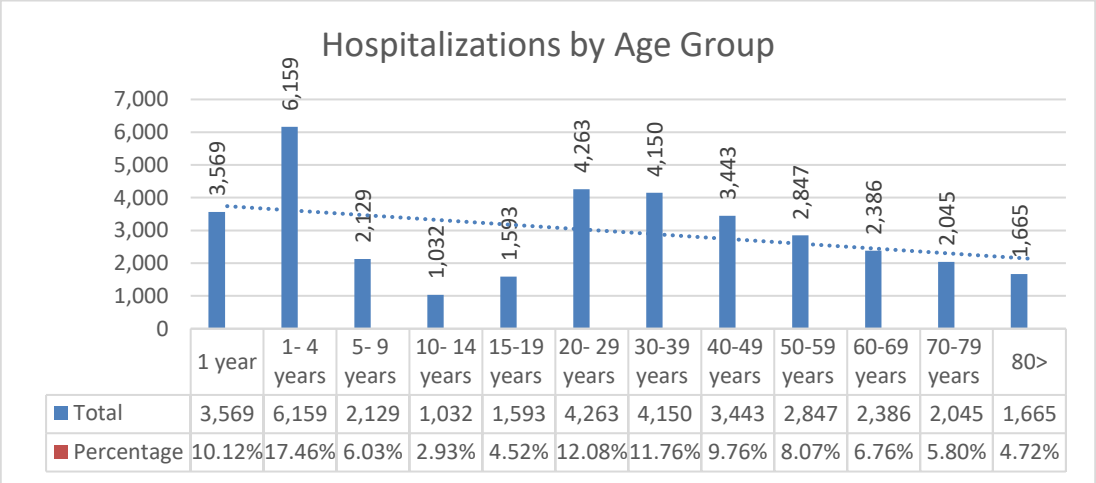


Graph 3. Distribution of hospitalizations for respiratory system diseases by sex according to municipality of Ananindeua between the years 2013 to 2022
Source: SIH/DATASUS/TABNET (2025)

With regard to the age group of hospitalizations for respiratory diseases in Ananindeua PA, graph 4 shows that the most prevalent was the 1 to 4 age group with 6,159 (17.46%) hospitalizations, followed by the 20 to 29 age group with 4,263 (12.08%) and the 30 to 39 age group with 4,150 (11.76%), and the lowest number of hospitalizations occurred in the 10 to 14 age group with 1,032 (2.93%) hospitalizations.

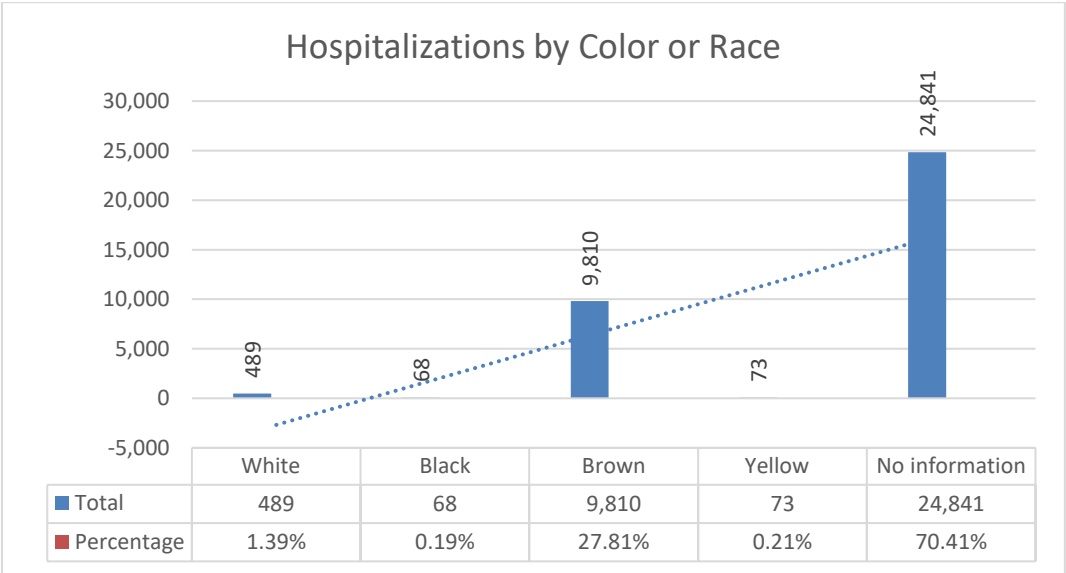
With regard to the number of admissions by color and race, it was observed that brown was the most prevalent color with 9,810 (27.81%) admissions and black had the lowest rate with 68 (0.19%) records, in addition 24,841 admissions were recorded that did not have this information, which is equivalent to 70.41% of those recorded (Graph 5).

As for deaths, the total number recorded, deaths by sex and deaths by age group were verified (Graph 6). The total number of deaths was 1,290 between 2013 and 2022.



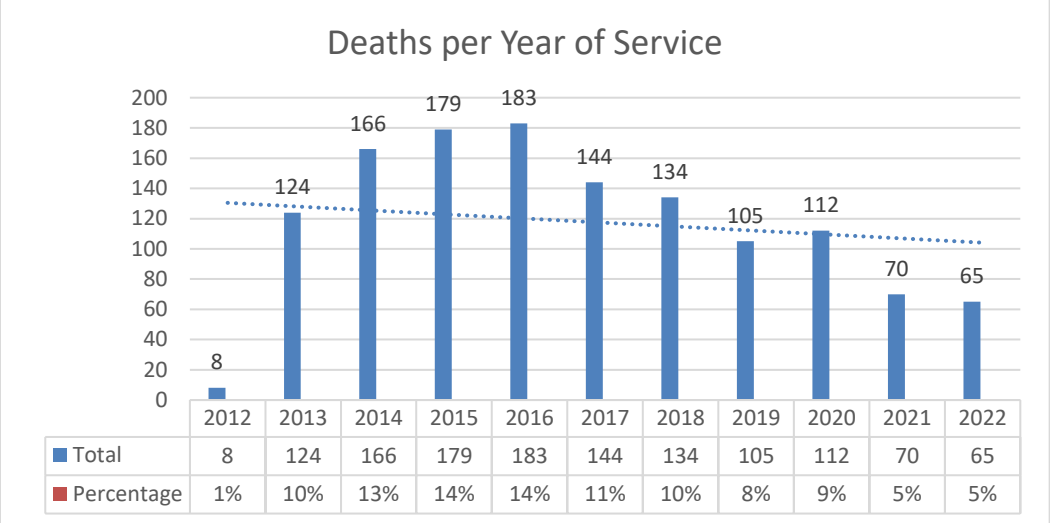
	1 year	1- 4 years	5- 9 years	10- 14 years	15-19 years	20- 29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80>
Total	3,569	6,159	2,129	1,032	1,593	4,263	4,150	3,443	2,847	2,386	2,045	1,665
Percentage	10.12%	17.46%	6.03%	2.93%	4.52%	12.08%	11.76%	9.76%	8.07%	6.76%	5.80%	4.72%

Graph 4. Distribution of hospitalizations for diseases of the respiratory system by age group according to the municipality of Ananindeua between the years 2013 and 2022.
Source: SIH/DATASUS/TABNET (2025).



	White	Black	Brown	Yellow	No information
Total	489	68	9,810	73	24,841
Percentage	1.39%	0.19%	27.81%	0.21%	70.41%

Graph 5. Distribution of hospitalizations for diseases of the respiratory system by color/race according to the municipality of Ananindeua between the years 2013 and 2022.
Source: SIH/DATASUS/TABNET (2025).



Graph 6. Distribution of deaths per year of care for respiratory system diseases according to the municipality of Ananindeua between the years 2013 and 2022.
Source: SIH/DATASUS/TABNET (2025).

Analyzing the reported cases of deaths by sex from respiratory tract diseases according to the municipality of Ananindeua between 2013 and 2022, Graph 6 shows that males were the most frequently listed with 711 (55.12%) recorded cases, and females with 579 (44.88%) deaths.

When it comes to deaths by age group from respiratory tract diseases according to the municipality of Ananindeua between 2013 and 2022, Graph 6 shows that the most prevalent age was 80 years and over with 345 (26.74%) deaths, followed by the 70 to 79 age group with 269 (20.85%) records, and the least prevalent age was 05 to 09 years with only 02 deaths (0.16%).

The study showed that the number of hospital admissions due to respiratory diseases is distributed unevenly over the years. Graph 1 shows the oscillation in the number of admissions between 2013 and 2019. The study carried out by Silva et al (2023b) shows that these figures may be related to the characteristics of the region, such as climate, air conditions and quality, demographic composition, access to health services, low vaccination coverage, lack of preventive proposals and early treatment, lifestyle habits of the population and poor socioeconomic conditions, factors which may influence the increase or decrease in respiratory hospitalizations.

Graph 1 shows a decline between 2020 and 2022 in hospitalizations for respiratory diseases according to the year of care in Ananindeua between 2013 and 2022. The article by Siqueira (2022) exposes the correlation between the reduction in hospitalizations with the arrival of covid-19, with the first confirmed case in Brazil in 2020, with the depletion of hospital beds, high transmissibility of severe acute respiratory syndrome, congestion in the health system, and as it is possible to analyze the results, the other respiratory diseases did not follow this increase. In this pandemic period there has been a reduction in demand for health services for other respiratory causes that do not have covid-19 in several countries, it is assumed that the fear of social contact and the hospital environment may have influenced the decrease in the number of hospitalizations.

According to Quirino et al., (2024), when it comes to respiratory diseases, we can see that Primary Health Care (PHC) services should control morbidity indicators, such as the list of Hospitalizations for Conditions Sensitive to Primary Care (ICSAP), which shows the health conditions in which PHC could intervene and avoid unnecessary hospitalizations.

Given that Acute Respiratory Infections (ARI) are the main causes of morbidity and mortality in terms of the nature of care, it can be seen that PHC is not effective. Due to the severity of respiratory cases in children, which evolve rapidly, referrals to emergency services are necessary, which explains the high demand of 35,024, corresponding to 99% of cases, as

illustrated in graph 02, so the Emergency Care Units (UPA) become the gateway for these cases.

Based on the results described in graph 03, there was a slight predominance of hospitalizations in females (53%) compared to males (47%), which contradicts the majority of published studies, because although men are more likely to smoke, less likely to seek and adhere to health treatments, and have a less healthy lifestyle, women are still more likely to be affected by respiratory problems.

Silva et al., (2023a) explains that smoking is a risk factor for the development of respiratory diseases with a higher prevalence in men, while women are the most affected by the effects of cigarette smoke. This can be explained by the biological and hormonal differences between the sexes, as women go through periods of changes in hormone levels, more precisely in adulthood, which can negatively affect their quality of life, leaving them susceptible to the development of these diseases. The author also mentions that, over the years, the prevalence of COPD in women has increased considerably due to the adherence to the habit of smoking in middle- and low-income classes.

As illustrated in Graph 4, early childhood (0 to 4 years) and adults (20 to 39 years) are the most affected ages when it comes to hospitalizations for respiratory diseases. This scenario involves the most vulnerable age group, and some of the factors that boost this increase are the compromised immune system, associated chronic diseases, unfavorable socioeconomic conditions, such as low income and high family density, aspects such as inadequate nutritional status, low birth weight and early interruption of breastfeeding, low vaccination coverage, thus, it is necessary to provide qualified assistance aimed at prevention and treatment of these diseases and illnesses (Camarço et al., 2021).

According to Graph 5, the distribution by race/color of people who did not declare had the highest number (24,841 cases), followed by browns (9,810 cases), whites (489 cases) and blacks (30 cases). (30 cases). These data indicate disparities that deserve further investigation in order to understand possible socioeconomic, environmental and genetic factors that may contribute to such differences (Silva, 2024).

Comparing the graphs of hospitalizations per year of care (Graph 1) and deaths (Graph 6), it is possible to state that mortality from respiratory diseases in the municipality is low in relation to the number of hospitalizations, since the total number of hospitalizations is 35,281 (100%) and the number of deaths recorded in the same years (2013 to 2022) is 1,290, corresponding to only 3.6% of cases.

Although women have more hospitalizations, men have more deaths. Poor adherence to treatment, smoking, a less healthy lifestyle and less demand for health services may influence these rates. Although early childhood children and adults have a higher rate of hospitalization, the elderly lead the number of deaths. Silva et al., (2023b) points out that aging is associated with physiological changes in the respiratory system, causing a decrease in the elasticity of the lungs, a deficit in the strength of the respiratory muscles, making them less responsive in the fight against infections, which can increase the risk of respiratory complications and the incidence of hospitalizations with increasing age.

The study by Alexandrino et al., (2022) reveals that there has been an increase in mortality from respiratory diseases in the last decade, especially among the over-75s, and that the elderly have been at greater risk of falling ill and dying from pneumonia and other respiratory causes. Some issues can predispose the elderly to lung diseases, such as sociodemographic, economic and behavioral variables, smoking and comorbidities, as well as age-related changes in the immune system.

According to Oliveira et al., (2021), NCDs, mainly cardiovascular diseases, cancers, chronic respiratory diseases and diabetes, account for the largest proportion of deaths worldwide (63% annually). Chronic respiratory diseases alone were the third leading cause of death (7%) worldwide in 2017, behind cardiovascular diseases and neoplasms, especially chronic obstructive pulmonary disease (COPD) and asthma. The scenario of chronic respiratory diseases in Brazil followed the global trend, with COPD being the fourth leading cause of death in 2019.

The study by Siqueira, (2022) brings data described by the World Health Organization (WHO) that lists respiratory tract infections as the cause responsible for more than 20 million

deaths in the world in early childhood (up to 5 years) during the year 2016. In Brazil, from 2012 to 2021, respiratory diseases were the cause of 22,939 deaths among children under the age of ten.

On the other hand, analyzing the data found in this study, it is possible to observe that the mortality rate is increasing in the elderly over 80 years old, and the most predominant sex is male. Alexandrino et al., (2022) confirmed in their article that between 2015 and 2019 the mortality rate in this period was among elderly males over 80 years of age, which shows that the proportion of deaths from respiratory diseases has been increasing among this population and one of the reasons was the SARS-COV-2 pandemic scenario, which was aggravated by the diseases that already existed in this age group.

4. CONCLUSION

The survey showed that most of the care provided was urgent, with women being more susceptible to respiratory hospitalizations than men, in relation to age groups, early childhood and adulthood are the most affected ages, and as for color or race, it was observed that the majority of the numbers recorded were from information not provided. Compared to deaths, men and the elderly have the highest number of records.

This study demonstrated the seriousness of respiratory diseases, which can be progressive and sudden, observing the particularities of the municipality and its challenges, taking into account the socio-economic, demographic and genetic conditions of the population, since health is not determined by the absence of disease, but by the set of factors that promote quality of life.

The importance of new studies and scientific articles containing up-to-date information on respiratory diseases and the problems that lead to hospitalizations, as well as the individual's coexistence with chronic symptoms, rehabilitation and integration into society, is highlighted. In addition, it is necessary to strengthen strategic measures and programs for this public, improving primary care so that they adhere to appropriate treatment in order to prevent problems.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The authors declare that generative AI technologies were used during the process of editing this manuscript. The technologies used were:

DeepL translator (online version): AI-based machine translation tool used to translate parts of the text from Portuguese into English. The large - scale language model used is property of DeepL GmbH.

The input instructions provided to the aforementioned AI technologies included fragments of Portuguese text related to respiratory diseases, with the aim of obtaining translations and linguistic suggestions in English for international publication.

COMPETING INTERESTS DISCLAIMER

Authors have declared that they have no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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