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Epidemiological Profile of Hospital Morbidity Due to Pneumonia in Aracati-CE, 2020-2024

Roberlyne Lima dos Santos[1], Francisco Wanderlei Lima Silva[2], José Damião da Silva Filho[3], Anielle Torres de Melo[4], Maria Janaelvia Guimarães Paiva[5], Arthur da Silva Rebouças[6], Ana Caroline Rocha de Melo Leite[7], Rodolfo de Melo Nunes[8]

Abstract. Pneumonia remains a public health challenge, particularly in regions with socioeconomic disparities, such as Aracati-CE, where limited healthcare access exacerbates morbidity. This study aimed to analyze the epidemiological profile of hospital morbidity due to pneumonia in the municipality, within the SUS, from 2020 to 2024, identifying patterns and risk groups. A quantitative, descriptive, and retrospective design was employed, with data extracted from the SUS Hospital Information System (SIH/SUS) via DATASUS. A total of 1,875 hospitalizations were recorded, peaking in 2022 (546) and lowest in 2021 (181), likely due to COVID-19 preventive measures. Children aged 0-9 years (38.45%) and elderly over 80 (26.51%) accounted for most hospitalizations, with the latter comprising 59.44% of 254 deaths. Pardo individuals predominated (87.2%), reflecting local demographics. The analysis revealed that socioeconomic vulnerabilities and healthcare access barriers intensify incidence and mortality, particularly among children and the elderly. The study achieved its objectives, underscoring the need for prevention policies and improved healthcare access. Longitudinal studies are recommended to further explore associated factors and strategies to reduce regional disparities.

Keywords: Pneumonia. Hospital Morbidity. Epidemiology. Public Health.

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Perfil Epidemiológico da Morbidade Hospitalar por Pneumonia em Aracati-CE, 2020-2024

Resumo. A pneumonia permanece um desafio de saúde pública, especialmente em regiões com desigualdades socioeconômicas, como Aracati-CE, onde fatores como acesso limitado à saúde agravam sua morbidade. Este estudo teve como objetivo analisar o perfil epidemiológico da morbidade hospitalar por pneumonia no município, no âmbito do SUS, entre 2020 e 2024, identificando padrões e grupos de risco. Utilizou-se um delineamento quantitativo, descritivo e retrospectivo, com dados extraídos do

[1] Centro Universitário Multiversa do Jaguaribe (UNIJAGUARIBE). Aracati, Ceará, Brazil. E-mail: roberlyne.santos@fvj.br
[2] Centro Universitário Multiversa do Jaguaribe (UNIJAGUARIBE). Aracati, Ceará, Brazil. E-mail: wanderlei.lima@fvj.br
[3] Centro Universitário Multiversa do Jaguaribe (UNIJAGUARIBE). Aracati, Ceará, Brazil. E-mail: jdsf_junior@hotmail.com
[4] Centro Universitário Multiversa do Jaguaribe (UNIJAGUARIBE). Aracati, Ceará, Brazil. E-mail: anielle.torres@fvj.br
[5] Centro Universitário Multiversa do Jaguaribe (UNIJAGUARIBE). Aracati, Ceará, Brazil.
E-mail: janaelviapaiva@gmail.com
[6] Centro Universitário Multiversa do Jaguaribe (UNIJAGUARIBE). Aracati, Ceará, Brazil.
E-mail: athur.reboucas@unijaguaribe.edu.br
[7] Universidade da Integração Internacional da Lusofonia Afro-Brasileira (UNILAB). Redenção, Ceará, Brazil.
E-mail: acarolmelo@unilab.edu.br
[8] Universidade Federal do Ceará, Centro Universitário Fametro, Centro Universitário Multiversa do Jaguaribe (UFC – UNIFAMETRO - UNIJAGUARIBE), Fortaleza, Ceará, Brazil. E-mail: rodolfo_k6@yahoo.com.br

Sistema de Informações Hospitalares (SIH/SUS) via DATASUS. Foram analisadas 1.875 internações, com pico em 2022 (546) e menor número em 2021 (181), possivelmente influenciado por medidas contra a COVID-19. Crianças de 0 a 9 anos (38,45%) e idosos acima de 80 anos (26,51%) concentraram a maioria das internações, com estes últimos representando 59,44% dos 254 óbitos. Indivíduos pardos predominaram (87,2%), refletindo a demografia local. A análise revelou que vulnerabilidades socioeconômicas e barreiras de acesso à saúde intensificam a incidência e a mortalidade, especialmente entre crianças e idosos. Conclui-se que o estudo alcançou seus objetivos, destacando a necessidade de políticas de prevenção e melhoria no acesso à saúde. Recomendam-se estudos longitudinais para aprofundar os fatores associados e estratégias para reduzir disparidades regionais.

Palavras-chave: Pneumonia. Morbidade Hospitalar. Epidemiologia. Saúde Pública

Perfil Epidemiológico de la Morbilidad Hospitalaria por Neumonía en Aracati-CE, 2020-2024

Resumen. La neumonía sigue siendo un desafío de salud pública, especialmente en regiones con disparidades socioeconómicas, como Aracati-CE, donde el acceso limitado a la salud agrava la morbilidad. Este estudio tuvo como objetivo analizar el perfil epidemiológico de la morbilidad hospitalaria por neumonía en el municipio, en el ámbito del SUS, entre 2020 y 2024, identificando patrones y grupos de riesgo. Se empleó un diseño cuantitativo, descriptivo y retrospectivo, con datos extraídos del Sistema de Información Hospitalaria (SIH/SUS) a través de DATASUS. Se registraron 1.875 hospitalizaciones, con un pico en 2022 (546) y el menor número en 2021 (181), probablemente influenciado por medidas contra el COVID-19. Los niños de 0 a 9 años (38,45%) y los ancianos mayores de 80 años (26,51%) representaron la mayoría de las hospitalizaciones, siendo estos últimos responsables del 59,44% de los 254 fallecimientos. Los individuos pardos predominaron (87,2%), reflejando la demografía local. El análisis mostró que las vulnerabilidades socioeconómicas y las barreras de acceso a la salud intensifican la incidencia y la mortalidad, especialmente en niños y ancianos. El estudio cumplió sus objetivos, destacando la necesidad de políticas de prevención y mejor acceso a la salud. Se recomiendan estudios longitudinales para profundizar en los factores asociados y reducir disparidades regionales.

Palabras clave: Neumonía. Morbilidad Hospitalaria. Epidemiología. Salud Pública.

INTRODUCTION

Pneumonia, one of the leading lower respiratory infections, constitutes a global public health challenge, ranked as the fifth leading cause of mortality worldwide in 2021, with a disproportionate impact in developing countries (WHO, 2024). In Brazil, it stands as the third leading cause of death, with community-acquired pneumonia (CAP) generating high hospitalization rates and financial burden on the Unified Health System (SUS) (Corrêa et al., 2018; SBPT, 2022). Characterized by infection in the pulmonary alveoli, often caused by *Streptococcus pneumoniae*, pneumonia presents symptoms such as cough, fever, dyspnea, and pulmonary crackles, varying by bacterial, viral, or fungal etiology (Waterer, 2021; Corrêa et al., 2017).

The high prevalence of pneumonia in Brazil is evidenced by studies indicating that, between 2008 and 2021, approximately 52.7% of hospitalizations for respiratory diseases in adults were attributed to pneumonia, with around 44,000 deaths recorded in the first half of 2022 alone (Lemos et al., 2023; SBPT, 2022). Despite advances in clinical management, challenges persist, including delayed diagnosis, atypical symptoms in the elderly, and socioeconomic factors such as poverty and lack of sanitation, which amplify incidence among vulnerable populations, including children under five and the elderly (Gaspar et al., 2020; Chebib et al., 2021; Lima et al., 2024). Regions with social inequalities, such as Northeast Brazil, exhibit significantly higher hospitalization rates, highlighting gaps in healthcare access and prevention (Andrade et al., 2025; Michelin et al., 2019).

Localized analysis of pneumonia is crucial for developing public health strategies to mitigate its impact on specific communities. This study is justified by the need to understand epidemiological patterns in Aracati-CE, a municipality marked by socioeconomic vulnerabilities, where limited healthcare access and poor living conditions may exacerbate pneumonia morbidity and mortality. The expected results can support public policies aimed at reducing hospitalizations and deaths, as well as promoting efficient resource allocation within the SUS (SBPT, 2018).

The overall objective of this study is to analyze the hospital morbidity profile for pneumonia in Aracati-CE within the SUS from 2020 to 2024. Specifically, it aims to: (1) characterize pneumonia hospitalizations by variables such as age group, sex, race/color, and occurrence of deaths; (2) identify temporal trends in incidence and mortality; and (3) map local risk groups. The guiding question is: what are the epidemiological patterns and factors associated with hospital morbidity due to pneumonia in Aracati-CE from 2020 to 2024?.

Putting stripes on people's faces is a common practice in many contexts to ensure respect for individual rights and ethical integrity in the dissemination of information. Therefore, images taken of people must have stripes on their faces considering the protection of identity with respect for dignity and individual freedom.

METHODOLOGY

This study adopts a quantitative, descriptive, and retrospective design, utilizing secondary data extracted from the Hospital Information System of the Unified Health System (SIH/SUS), available through the SUS Department of Informatics (DATASUS).

Data Source

The data were obtained from the DATASUS platform (http://www.datasus.gov.br), specifically from the SIH/SUS section, which compiles information on hospital admissions in public and SUS-affiliated facilities across Brazil.

Period and Temporal Scope

The analysis covers the period from January 2020 to December 2024, focusing on hospital admissions recorded in the municipality of Aracati-CE.

Analyzed Variables

The variables extracted from SIH/SUS included: Primary diagnosis (coded according to the International Classification of Diseases – ICD-10, specifically codes related to pneumonia); Age group; Sex; Race/color; Number of hospitalizations; Average length of hospital stay; Hospital deaths; Total cost of hospitalizations.

Inclusion and Exclusion Criteria

All hospital admission records in Aracati-CE with a primary diagnosis of pneumonia, as per ICD-10 codes (J12 to J18), were included. Records with inconsistent, duplicated, or unclear diagnostic information were excluded to ensure data quality and reliability.

Data Collection and Analysis Procedures

Data collection was conducted between February and March 2025 using the DATASUS TABNET tool. Specific filters were applied to delimit the municipality of Aracati-CE, the period from 2020 to 2024, and the diagnosis of pneumonia (ICD-10 Morbidity List). Sociodemographic variables (sex, age group, race/color) and deaths were extracted through customized tabulations.

The data were organized in Microsoft Excel® 2016 spreadsheets, enabling systematization and descriptive analysis. Results were expressed in absolute values, percentages, averages, and rates, with comparative tables and graphs constructed to identify patterns and trends in hospitalizations and deaths

due to pneumonia over the study period. Microsoft Word® 2010 was used for the textual description of results.

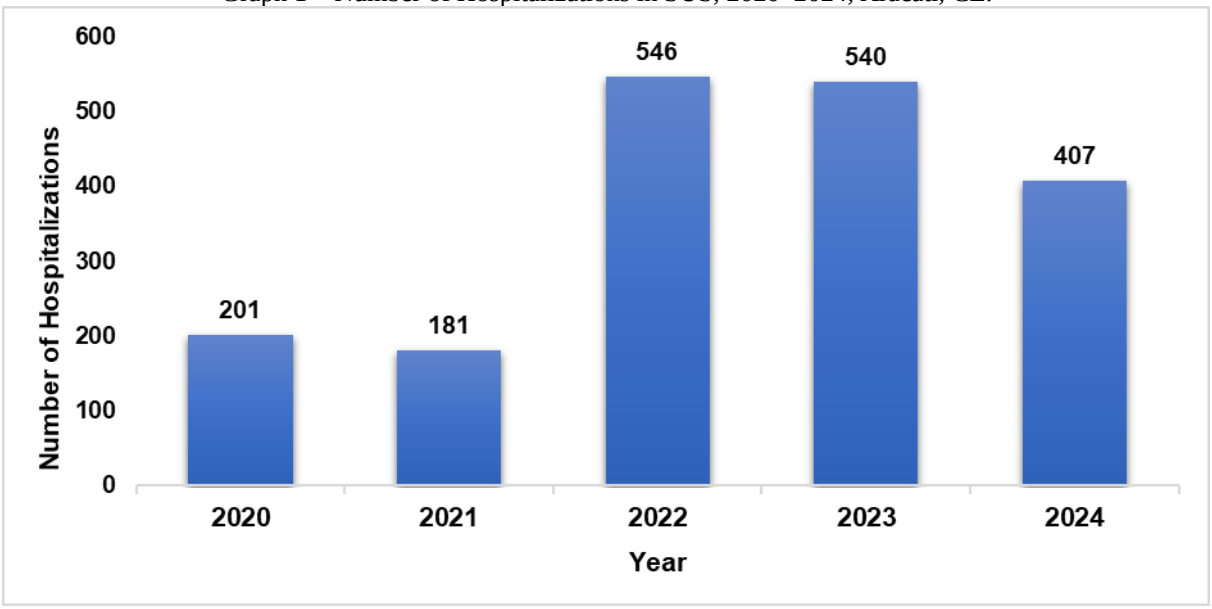
Ethical Aspects

As the study is based on publicly available secondary data without individual identification, it is exempt from submission to a Research Ethics Committee, in accordance with Resolution No. 510/2016 of the National Health Council.

RESULT AND DISCUSSION

The analysis of hospital admissions for pneumonia in Aracati, Ceará, within the SUS (Unified Health System) framework from 2020 to 2024 (Graph 01) recorded a total of 1,875 hospitalizations, with the lowest number in 2021 (181) and the highest in 2022 (546). These findings are consistent with the results of Mendes et al. (2025), who also observed a reduction in hospitalizations in 2020 and 2021, followed by an increase in 2022 and 2023. The implementation of protective measures, such as mask-wearing and social isolation during the peak prevalence of COVID-19 (2020 and 2021), likely contributed to the decreased incidence of pneumonia-related cases (Peres et al., 2025).

Graph 1 – Number of Hospitalizations in SUS, 2020–2024, Aracati, CE.



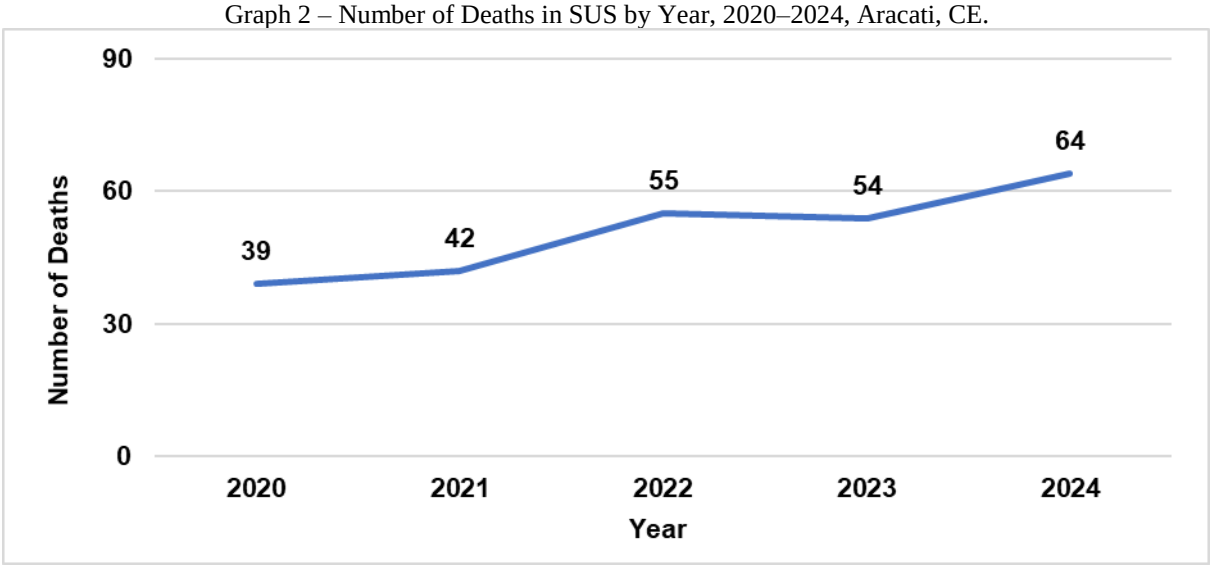
Source: Prepared by the author (2025).

Regarding the distribution by sex, no significant difference was observed in the number of hospitalizations between male (938) and female (n= 937) individuals. Rios et al. (2024) reported similar

findings, noting minimal differences in hospitalization rates between sexes. Although the variation in hospitalization numbers is slight, the results may reflect, in the case of males, a tendency to neglect seeking healthcare services, leading to delayed diagnoses and, consequently, more severe clinical conditions requiring complex and costly interventions (Costa et al., 2022). Research by Carneiro, Adjuto, and Alves (2019) revealed that male individuals typically seek healthcare only in urgent situations, limiting early diagnosis. Additionally, factors such as a preference for self-medication, the perception that healthcare settings are primarily for females, and incompatible service hours with work routines further contribute to this group's avoidance of healthcare services.

From 2020 to 2024 (Graph 02), a total of 254 deaths were recorded, resulting in an annual average of 50.8 deaths. In this context, the years 2022, 2023, and 2024 showed death counts above this average, while 2020 and 2021 recorded figures below it. This pattern may have been influenced by the COVID-19 pandemic, as similarities in symptoms and the prioritization of COVID-19-related care likely contributed to the underreporting of pneumonia cases (Dutra et al., 2024). Almeida et al. (2024) noted that, in the Northeast region, 2022 was marked by a surge in pneumonia-related deaths, consistent with findings in Aracati, CE. This increase may be associated with a lack of basic resources, such as sanitation, adequate nutrition, and infrastructure, which exacerbates population vulnerability and directly impacts health indicators, contributing to a higher incidence of respiratory diseases like pneumonia.

Graph 2 – Number of Deaths in SUS by Year, 2020–2024, Aracati, CE.

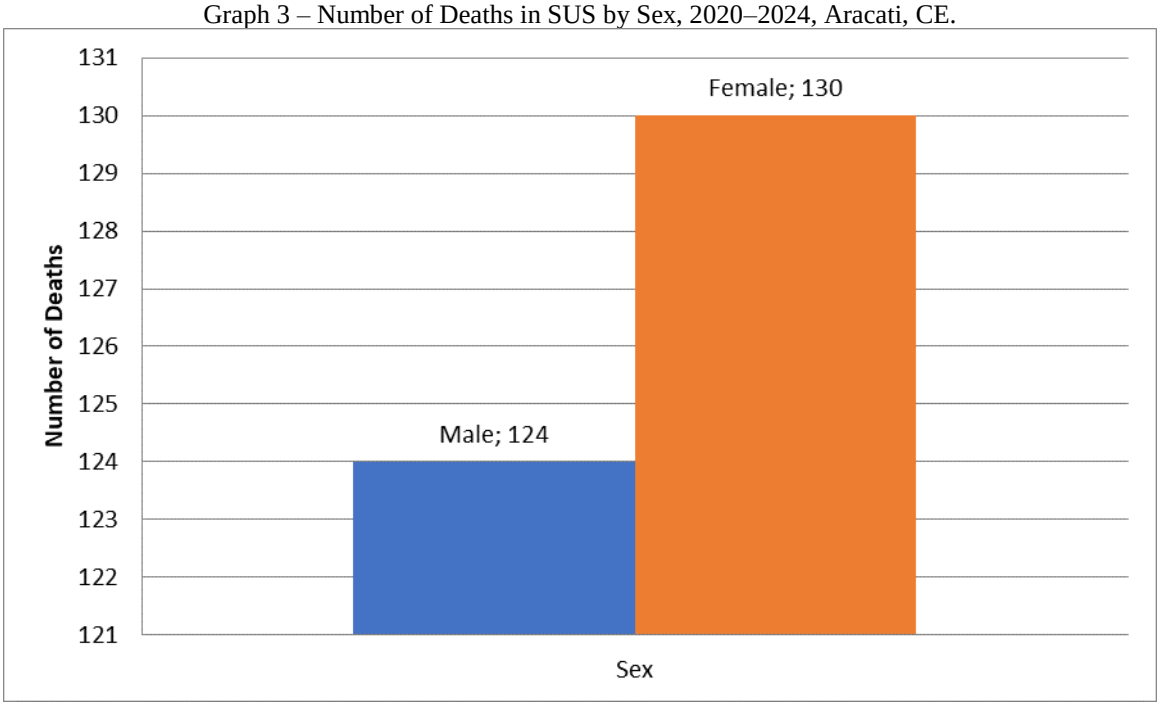


Source: Prepared by the author (2025).

Regarding the distribution of deaths by sex (Graph 03), mortality was slightly higher among females, accounting for 51.18% (n=130) of cases, compared to 48.82% (n=124) among males. Although subtle, this difference underscores the importance of considering sex as a relevant factor in epidemiological analyses. Several factors contribute to pneumonia mortality, including advanced age,

comorbidities, heart failure, chronic obstructive pulmonary disease (COPD), smoking, alcoholism, and environmental factors (Araújo et al., 2018). Additionally, studies suggest that the immune systems of men and women may respond differently to infections, which could also influence clinical outcomes (PharmaNord, 2020).

Graph 3 – Number of Deaths in SUS by Sex, 2020–2024, Aracati, CE.



Source: Prepared by the author (2025).

The age group with the highest number of recorded hospitalizations was 0 to 9 years (38.45%). Similar findings were reported by Silva et al. (2016), who analyzed hospital morbidity due to respiratory diseases in children aged 0 to 9 years in Maceió, Alagoas, from 2010 to 2014, identifying pneumonia as the most frequent cause of hospitalization in this age group. The study by Kliamca and Alcantara (2023) observed that children aged 0 to 4 years had the highest number of hospitalizations in Guarulhos, possibly influenced by reduced immunization rates, the immaturity of the immune system, and the narrower airway anatomy, which hinders effective clearance of foreign agents and increases susceptibility to respiratory infections. These data confirm that pneumonia continues to have a significant impact on child health, remaining a leading cause of hospitalization and mortality (Costa et al., 2022).

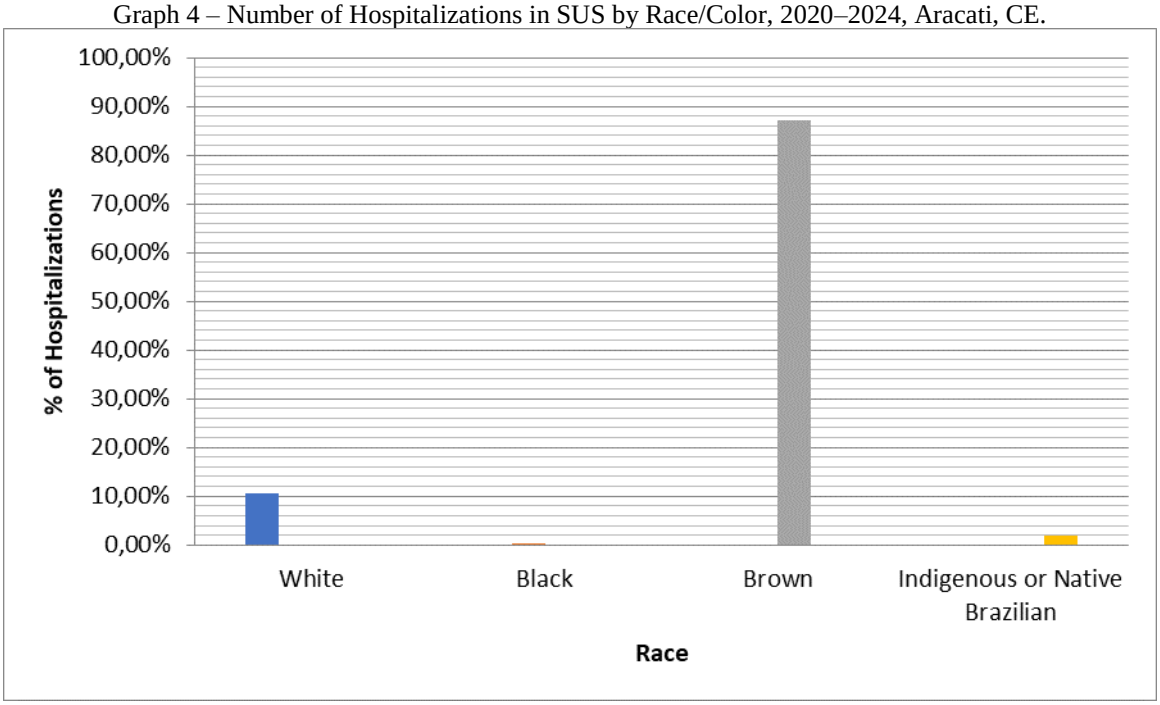
Table 1 – Number of Hospitalizations in SUS by Age Group, 2020–2024, Aracati, CE.

Age Group	Number of hospitalizations	%	Number of Deaths	%
0 a 9 anos	721	38,45%	0	0%
10 a 19 anos	31	1,65%	0	0%
20 a 29 anos	25	1,33%	3	1,18%
30 a 39 anos	36	1,92%	2	0,79%
40 a 49 anos	54	2,88%	7	2,76%
50 a 59 anos	104	5,55%	15	5,91%
60 a 69 anos	128	6,83%	19	7,48%
70 a 79 anos	279	14,88%	57	22,44%
80 anos ou mais	497	26,51%	151	59,44%
TOTAL	**1.875**	**100%**	**254**	**100%**

Source: Prepared by the author (2025).

Individuals aged 80 years and older also accounted for a significant proportion of pneumonia hospitalizations, representing 26.51% of cases. According to Costa et al. (2024), the elderly in this age group comprised the majority of hospitalizations among the analyzed age groups in 2024, highlighting the need for prolonged and specific care for this population, as aging compromises the immune system's effectiveness, and the presence of comorbidities further exacerbates this condition, constituting a significant risk factor for complications. Furthermore, this age group exhibited the highest mortality rates compared to others, reaching nearly 60% (Table 1), underscoring greater vulnerability in this group.

Graph 4 – Number of Hospitalizations in SUS by Race/Color, 2020–2024, Aracati, CE.



Source: Prepared by the author (2025).

Regarding race/color (Graph 04), pardo individuals accounted for 87.2% of total hospitalizations. This finding aligns with Brazil's demographic profile, as the 2022 Census indicates that the pardo population constitutes the largest ethnic-racial group in the country, representing approximately 45.3% of Brazilians (Brasil, 2023). Therefore, given that the majority of the population self-identifies as pardo, it is expected that this group would also have greater representation in hospitalizations. Similarly, Peres et al. (2025) observed that, from 2020 to 2024, pardo individuals were the most affected by pneumonia in Brazil. According to Mariano, Fernandes, and Fernandes (2023), Black and pardo populations face greater difficulties in accessing healthcare services due to factors such as unfavorable socioeconomic conditions, institutional barriers, and structural racism, which compromise access to adequate prevention, diagnosis, and treatment, thereby contributing to worse health outcomes. Consequently, this scenario leads to higher rates of illness and, subsequently, increased demand for hospitalizations among this population.

CONCLUSION

This study analyzed the hospital morbidity profile for pneumonia in Aracati-CE within the SUS framework from 2020 to 2024, focusing on variables such as age group, sex, race/color, and deaths. A total of 1,875 hospitalizations were recorded, with a peak in 2022 and the lowest number in 2021, likely influenced by COVID-19 preventive measures. The age groups of 0-9 years and over 80 years accounted for the majority of hospitalizations, with the elderly representing approximately 59.44% of deaths. The distribution by sex was balanced, with a slight predominance of deaths among women, while pardo individuals predominated in hospitalizations, reflecting the local demographic profile.

The findings highlight pneumonia as a public health challenge in Aracati-CE, exacerbated by socioeconomic inequalities and barriers to healthcare access, disproportionately affecting children, the elderly, and ethnic-racial groups. The high mortality among the elderly underscores the need for targeted care for this population, while the predominance of hospitalizations among pardos suggests structural barriers. Despite the limitation of secondary data, which may include underreporting, investments in prevention, childhood immunization, and specialized care for the elderly are recommended, along with longitudinal studies to further explore associated factors and promote equity in healthcare access.

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