

Original Article

Analysis of the epidemiological profile of hospitalizations for varicose veins of the lower extremities from 2018 to 2022: a quantitative and comparative overview in Brazil*Análise do perfil epidemiológico das hospitalizações por veias varicosas das extremidades inferiores de 2018 a 2022: Uma visão quantitativa e comparativa no Brasil***Ariane Nascimento Macedo¹, Cícero Fidelis Lopes²**

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ABSTRACT: The clinical, surgical and socioeconomic relevance of varicose veins in the lower limbs is a point of resonance for the investigation of this condition, which has a wide impact on patients and society. The study aims to outline the epidemiological profile of hospitalizations for this venous pathology through a quantitative and comparative analysis between the five Brazilian regions. From the DATASUS consultation, from January 2018 to May 2022, ICD-10, race/color, sex, age, number, character, total amount of hospitalizations and average length of stay were analyzed. The total number of hospitalizations was higher for females with 151011 hospitalizations. In the age group of 50 to 59 years, for females with 44070 admissions. The white race/color, in females, has a higher number of hospitalizations with 25570 hospitalizations. The Southeast region concentrates 57.14% of the total number of hospitalizations and holds most of the total hospitalization values. The Northeast region had high averages of permanence, in terms of urgency, above 12; 12; 10; 8 and 6, in females, and values above 18; 14; 14; 10 and 10, in males, from 2018 to 2022 respectively.

Keywords: Vascular surgery; Varicose veins; Surgical clinic; Epidemiology.

RESUMO: A relevância clínica, cirúrgica e socioeconômica das veias varicosas de membros inferiores, configura-se como ponto de ressonância para a investigação desse acometimento com amplo impacto para o paciente e a sociedade. O estudo visa traçar o perfil epidemiológico das internações por essa patologia venosa através de uma análise quantitativa e comparativa entre as cinco regiões brasileiras. A partir da consulta ao DATASUS, de janeiro de 2018 a maio de 2022 foram analisados CID-10, raça/cor, sexo, idade, número, caráter, valor total das internações e média de permanência. O número total de internações foi maior para o sexo feminino com 151011 hospitalizações. Na faixa etária de 50 a 59 anos, para o sexo feminino com 44070 internamentos. A raça/cor branca, no sexo feminino, possui um maior quantitativo de internamentos com 25570 hospitalizações. A região Sudeste concentra 57,14 % do número total de internamentos e detém a maior parte dos valores totais de internação. A região Nordeste apresentou elevadas médias de permanência, no caráter urgência, acima de 12; 12; 10; 8 e 6, no sexo feminino, e os valores acima de 18; 14; 14; 10 e 10, no sexo masculino, de 2018 a 2022 respectivamente.

Palavras-chave: Cirurgia vascular; Veias varicosas; Clínica cirúrgica; Epidemiologia.

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INTRODUCTION

Veins are blood vessels that return blood from the body to the heart. In this regard, the veins in the leg must overcome gravity to do their job and are aided by the calf muscles that compress the veins, propelling the blood toward the heart¹.

A series of valves prevent backflow. In some people, dilation of the veins near the surface of the skin (superficial veins) and failure of the valves to close properly allow the blood to flow in both directions. This retrograde flow of blood is called venous reflux. Reflux can lead to the development of tortuous, dilated, and elongated veins, which characterizes the formation of varicose veins¹.

The involvement in the venous system of the lower limbs, which consists of an interconnected network of superficial veins, perforating veins and deep veins, besides the severity of symptoms tends to increase according to the number of affected systems².

In the context in which the patient develops varicose veins in the lower limbs, it is also necessary to understand chronic venous disease (CVD), which is a state of venous hypertension that profoundly compromises vein function. These changes range from telangiectasias to reticular veins, varicose veins, and even trophic changes in the skin and subcutaneous tissue of the lower limbs³.

Therefore, the clinical and surgical relevance of this venous involvement, more frequent with advancing age, is due to the physiological, aesthetic and social impact on the patient's life, which may evolve to a severe stage of ulceration with systemic repercussions.

Lower limb varicose veins are a serious repercussion of CVD that is highly present in Brazil, with deep resonance in the patient's quality of life. In this sense, the current analysis has as a central pillar to highlight the epidemiological nuances that make up this extensive portion affected by this varicose impairment that may culminate in prolonged hospitalization, work leave and surgical intervention.

It is worth pointing out that varicose veins can cause discomfort, skin alterations, absenteeism from work, and significant medical and emotional disabilities. Symptoms include swelling, restlessness, heaviness and fatigue in the limbs, pain/pain sensation, burning, tingling, direct tenderness, itching, and night cramps in the legs⁴.

Therefore, because it is responsible for significant morbidity, also affecting work productivity, generating retirements and restricting activities of daily life and leisure, it has become important to carry out scientific and multidisciplinary research⁵.

Importantly, the CEAP classification is the most complete diagnosis and classifies the clinical severity and work disability in patients with chronic venous disease. Besides the clinical and anatomical criteria, it

also analyzes the etiological and pathological criteria. The clinical classification is divided into: C0 (no signs of venous disease), C1 (telangiectasias and reticular veins), C2 (varicose veins), C3 (edema), C4 (subcutaneous changes; it is divided into C4a, which represents changes in pigmentation and eczema, and C4b, lipodermatosclerosis and white atrophy) C5 (healed stasis ulcer) and C6 (open stasis ulcer)⁶.

Being an extremely relevant condition, CVD affects different age groups, directly affecting the lower socioeconomic levels, because it can remove the individual from his or her normal activities, such as work, and can go so far as to cause the early retirement of this individual who is in a productive phase⁶.

Thereby, understanding the strong impact caused by this venous reflux condition both in the clinical-surgical and socioeconomic fields represents a watershed for a more targeted, comprehensive and effective prevention, with impacts on reducing hospital costs and maintaining the patient's quality of life.

OBJECTIVE

To delineate the epidemiological profile of patients hospitalized for lower limb varicose veins from 2018 to 2022 through variables related to age, race/color, number, length of stay, character, and total value of hospitalization of patients with lower limb varicose veins.

In addition to comparing the variables quantitatively and qualitatively among the five regions of the country between 2018 and 2022, in line with the critical analysis of the data that make up this national profile of involvement. In order to highlight the possible clinical, surgical and socioeconomic implications for the patient and society.

METHODOLOGY

This is a descriptive study carried out by consulting the DATASUS health information systems; data from January 2018 to May 2022 were consulted.

The epidemiological characteristics were analyzed from variables such as ICD-10 category, race/color (white, black, brown, yellow and indigenous), gender (male and female) and age (20 to 79 years), data were also extracted on the number, character, total value of hospitalizations and average length of stay among the five regions of the country.

RESULTS

In relation to the number of hospitalizations in the five regions of the country between 2018 and 2022, through the division by age group 20 to 29; 30 to 39; 40 to 49; 50 to 59; 60 to 69 and 70 to 79 years old, female gender, encompassing black, brown, yellow, indigenous and white color/race.

Table 1 - Hospitalizations by age group in females

Region	20 to 29 years old	30 to 39 years old	40 to 49 years old	50 to 59 years old	60 to 69 years old	70 to 79 years old	Total
1 Northern region	130	654	755	609	376	131	2655
2 Northeast region	726	3319	5217	4974	3123	1186	18545
3 Southeast region	2854	13220	23958	25732	17262	4311	87337
4 South region	1195	5028	9563	11206	7964	2269	37225
5 Midwest region	156	819	1431	1549	1020	274	5249
Total	5061	23040	40924	44070	29745	8171	151011

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

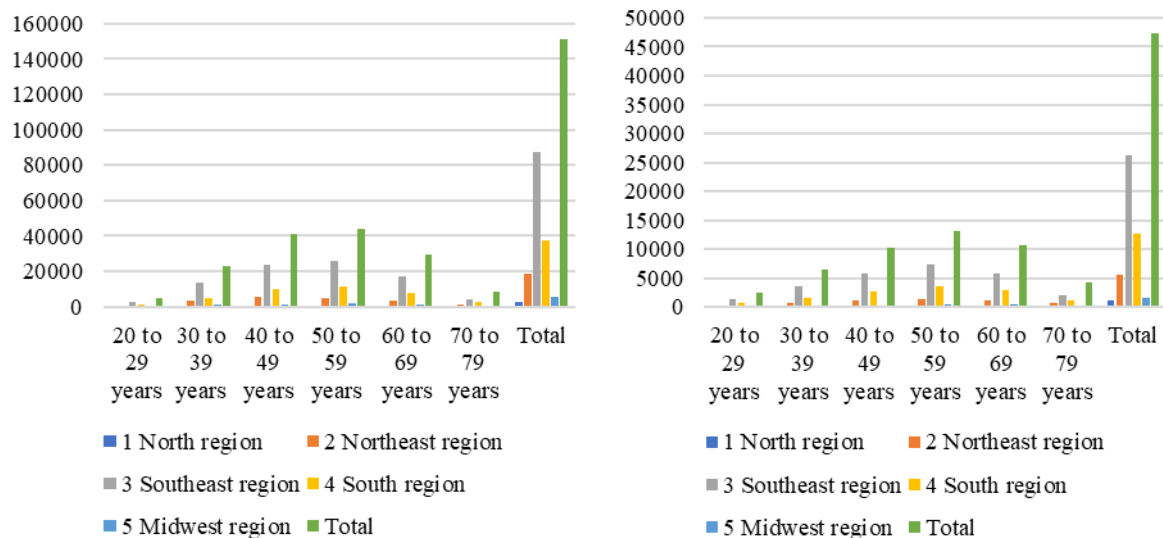
The age group 50 to 59 years has the highest number of hospitalizations with 44070 hospitalizations and the Southeast region has the highest number of hospitalizations in this age group with a total of 25732 hospitalizations.

It is possible to observe that for males, from 2018 to 2022, the largest number of hospitalizations is in the 50 to 59 age group, with 13247 hospitalizations and the Southeast region concentrates the largest number of hospitalizations.

Table 2 - Hospitalizations by age group in males

Region	20 to 29 years old	30 to 39 years old	40 to 49 years old	50 to 59 years old	60 to 69 years old	70 to 79 years old	Total
1 Northern region	55	136	212	275	263	178	1119
2 Northeast region	331	804	1203	1457	1147	641	5583
3 Southeast region	1332	3708	5782	7396	5891	2154	26263
4 South region	621	1556	2748	3694	2906	1119	12644
5 Midwest region	99	215	342	425	399	204	1684
Total	2438	6419	10287	13247	10606	4296	47293

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

Graph 1 - Graphical representation of hospitalizations by age group for females (left) and males (right)

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

Regarding the analysis of hospitalizations by race/color in males, it is observed that the white race/color has

a total of 25570 hospitalizations, followed by the brown race with 18280. The region with the most hospitalizations in these two races/colors is the Southeast region.

Table 2 - Male hospitalizations by age group

Region	White	Black	Brown	Yellow	Indigenous	Total
1 Northern region	59	35	989	32	4	1119
2 Northeast region	685	310	4338	248	2	5583
3 Southeast region	13351	1738	10719	453	2	26263
4 South region	11001	325	1197	119	2	12644
5 Middle-Western region	474	71	1037	95	7	1684
Total	25570	2479	18280	947	17	47293

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

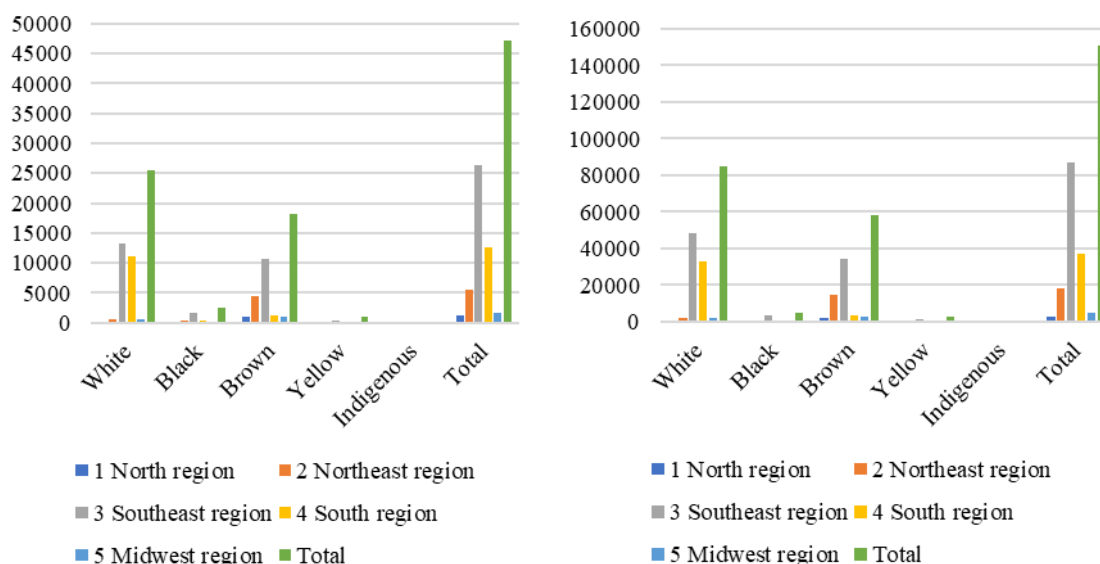
In females, the race/color with the highest number of hospitalizations is white with 85027 hospitalizations, followed by brown with 58282. The region with the most cases in these two most affected races/colors is

the Southeast region. The Southern region ranks second regarding the white race/color and the Northeastern region ranks second regarding the brown race/color.

Table 3 - Hospitalizations by race/color in females

Region	White	Black	Brown	Yellow	Indigenous	Total
1 Northern region	137	23	2419	71	5	2655
2 Northeast region	2339	636	14976	586	8	18545
3 Southeast region	48121	3609	34292	1309	6	87337
4 South region	32666	668	3577	306	8	37225
5 Middle-Western region	1764	136	3018	327	4	5249
Total	85027	5072	58282	2599	31	151011

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

Graph 2 - Graphic representation of hospitalizations by race/color for males (left) and females (right)

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

In the verification of hospitalizations by region and year of processing, for males, it is possible to deduce that between the years 2018 and 2019, the number of hospitalizations for varicose veins of the lower limbs were

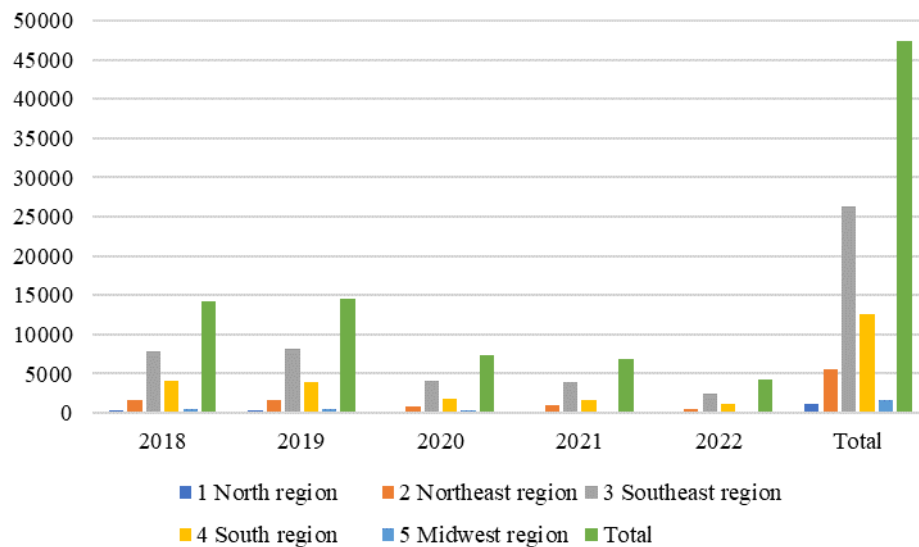
higher in the Southeast and South regions. In the Southeast, the number was above 5000 hospitalizations in 2018 and 2019, while in the South it was below this threshold, but close to that of the Southeast.

As for the years 2020, 2021, and 2022, the total number of hospitalizations decreased significantly, staying below the level of 10,000 hospitalizations. The sum of the total number of hospitalizations between 2018 and 2022 is higher in the Southeast region with a quantity above 25000 hospitalizations, as well as the South region exceeding

the threshold of 10000 and the Northeast region of 5000 hospitalizations.

The Southeast region holds 55.56% of the total hospitalizations when, while the South region has about 22.23% and the Northeast with 11.12% if also compared to the total amount. It is worth noting that the total number of hospitalizations exceeded the 45000 threshold.

Graph 3 - Male hospitalizations by region and year of processing



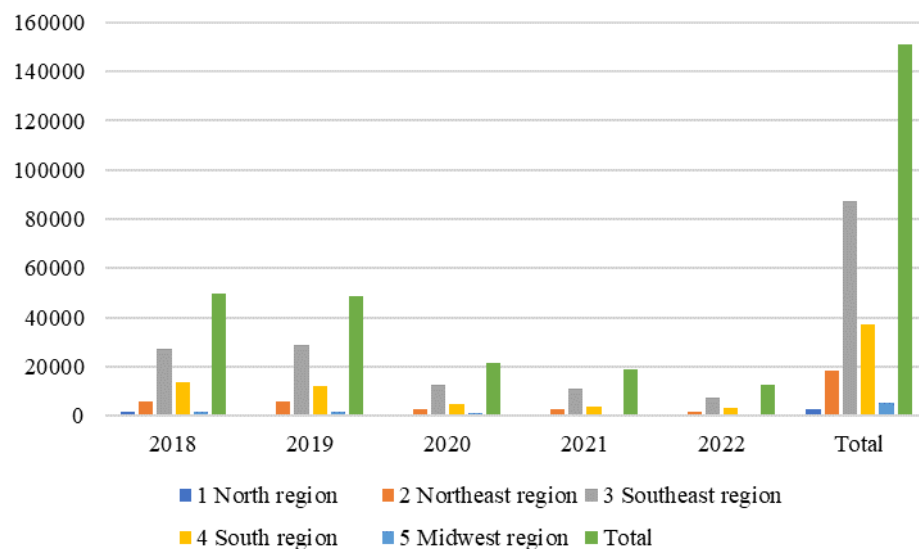
Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

Regarding the observed data for female gender, it is evidenced that between the years 2018 and 2019 the Southeast region obtained a quantity of hospitalizations that exceeded the threshold of 20000 hospitalizations. While the South region was below this threshold, but with proximity to the Southeast region.

The Northeast region expressed a quantitative of

hospitalizations close to the South region. The total number of hospitalizations, between 2018 and 2019, was above the threshold of 40000 hospitalizations and in subsequent years was equal or below the threshold of 20000 hospitalizations. In the total quantity, the female gender expressed a quantity above 140000 hospitalizations. The Southeast region has 57.14% of the total number of hospitalizations when compared percentually to the other regions in the chart.

Graph 4 - Hospitalizations by region and year of processing in females



Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

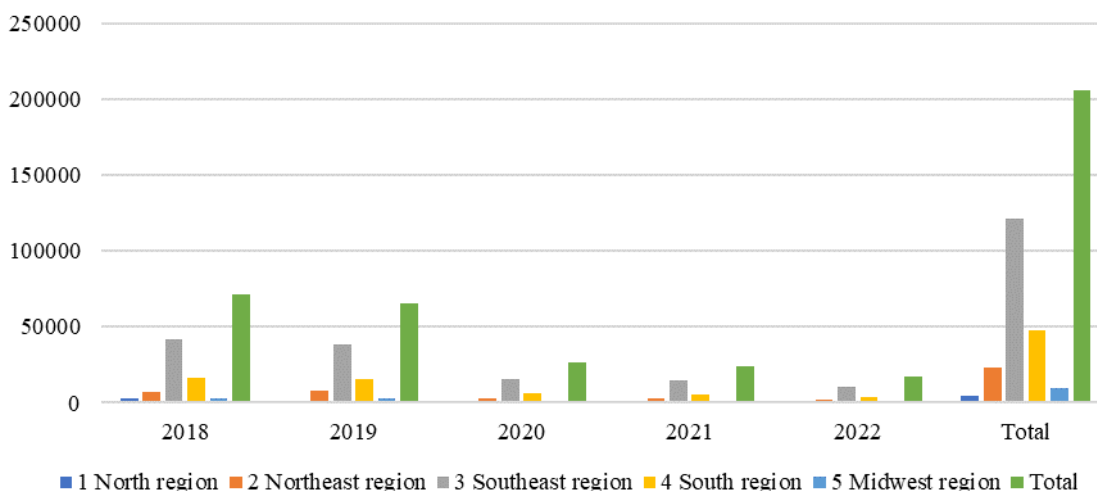
Regarding elective hospitalizations, by region and year of processing, for males and females. It is observed that the number of total elective admissions was higher between 2018 and 2019, when compared to the other subsequent years, exceeding the level of 50000 admissions. In the Southeast region, there were more elective hospitalizations in these two years. In the subsequent years, the quantity was below the threshold of 50000 hospitalizations.

From the perspective of analysis of the total number of hospitalizations from 2018 to 2022, in the

five Brazilian regions, it is observed a greater expression in the Southeast region, exceeding the level of 100000 hospitalizations, while in the South region it was around 50,000 hospitalizations.

The sum of the total number of elective hospitalizations in the five regions between 2018 and 2022 exceeded the threshold of 200000 hospitalizations. In this regard, the total number of elective hospitalizations in the Southeast region is equivalent to 50% of the total and the South region with about 25%.

Graph 5 - Elective admissions in male and female



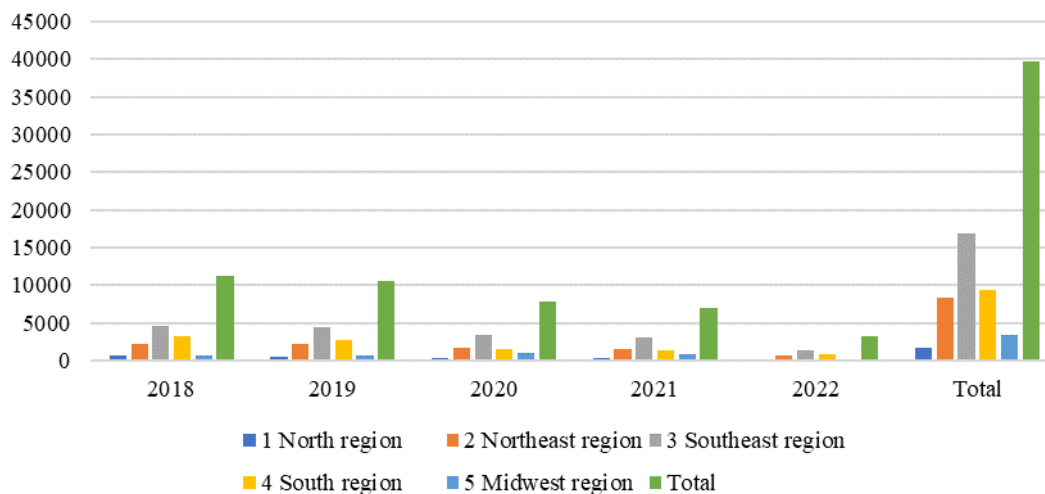
Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

In the urgency department, for both genders, the number of hospitalizations in the Southeast region is higher, but did not exceed 5000 hospitalizations. The total number of hospitalizations in the years 2018 and 2019 exceeded the threshold of 10000 hospitalizations, and in subsequent years the regional and total hospitalizations do not exceed

the same threshold in the graph.

In relation to the total number of hospitalizations, in the five years analyzed, the Southeast region represents about 37.5% of the total sum of hospitalizations, that is, almost half of the urgency admissions are concentrated in this region of the country.

Graph 6 - Male and female hospitalizations for urgency

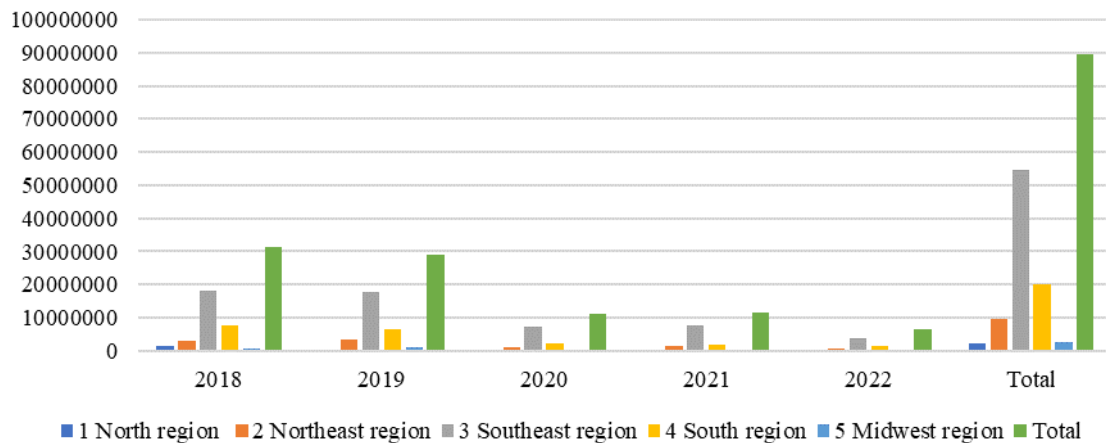


Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

The total value of hospitalizations, on an elective basis for females, in the years 2018 and 2019 were higher when compared to the subsequent years, exceeding the threshold of 30000000 and 20000000 reais, respectively.

The Southeast region concentrates most of the amounts allocated in the respective years mentioned. In relation to the total values, it can be seen that in the years 2018 to 2022, the threshold of 90000000 reais was reached.

Graph 7 - Total value of elective hospitalizations for females

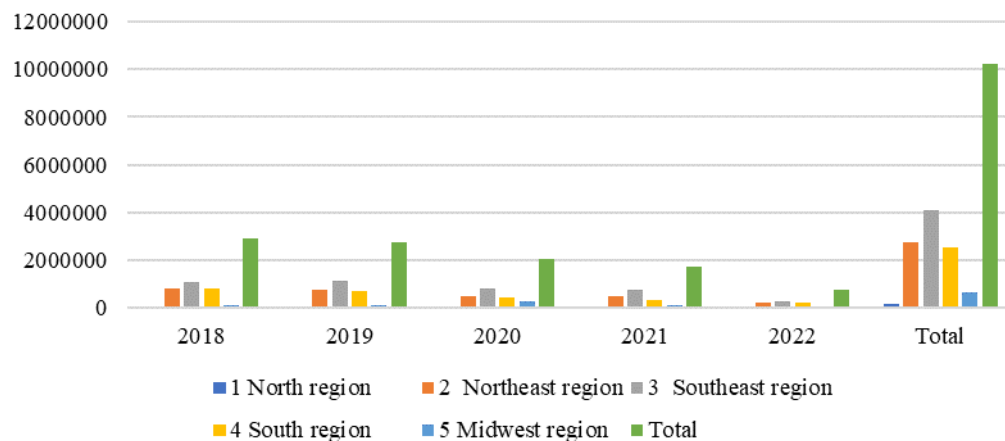


Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

In the urgency character, the total values of hospitalizations in the years 2018, 2019 and 2020 were higher, exceeding the threshold of 2000000 reais if compared to the subsequent years. The Southeast,

Northeast, and Midwest regions also have the highest values in their respective years. Regarding the total hospitalization values, it is observed that the threshold of 10000000 reais was exceeded and the Southeast region represents 40% of this total.

Graph 8 - Total value of urgency admissions for females

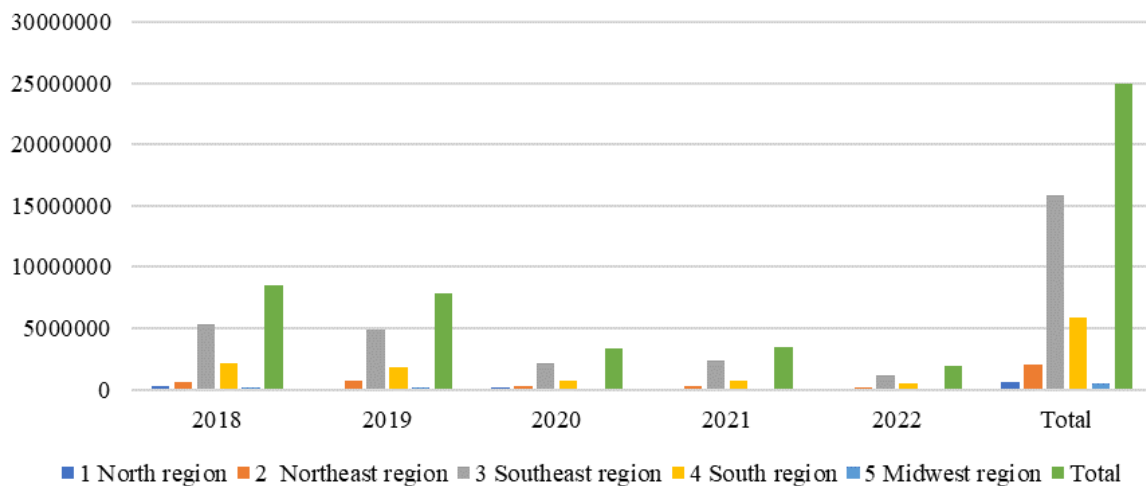


Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

The total value of elective hospitalizations in males in the years 2018 and 2019 were higher when compared to the subsequent years, exceeding the threshold of 5000000 reais. The Southeast region presents high values in these

respective years close to this quantitative level, and in 2018 slightly exceeded the highlighted threshold. The Southeast region concentrates 60% of the total value of the five regions in the years analyzed.

Graph 9 - Total value of elective hospitalizations for males

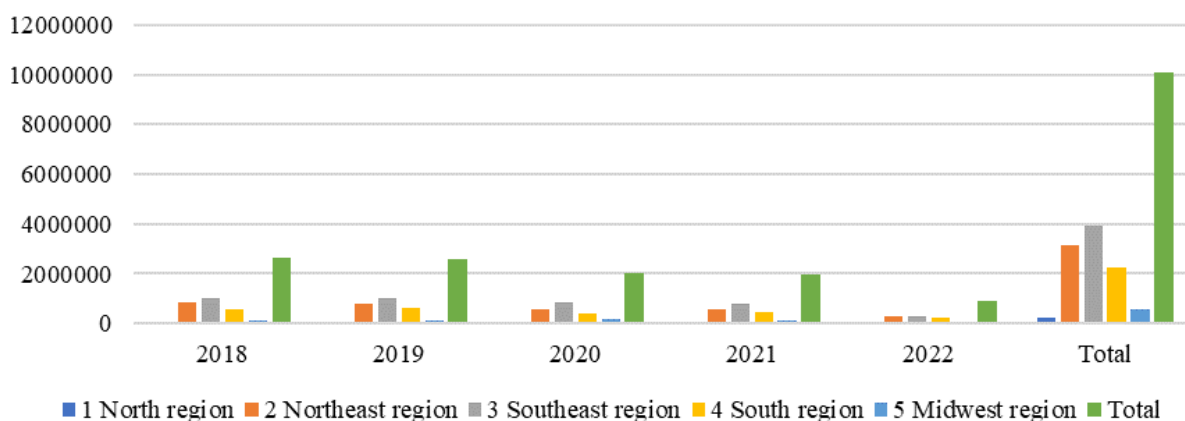


Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

For the urgency character, in the male gender, it is observed that the total value of hospitalizations in the years 2018, 2019, 2020 and 2021 were close to and exceeded the threshold of 2000000 reais, when compared to the

subsequent year. Moreover, the Southeast and Northeast regions have the highest values in these respective years. It is worth noting that the Southeast region has 40% of the total value, the Northeast region with about 30%, followed by the South region with 20%.

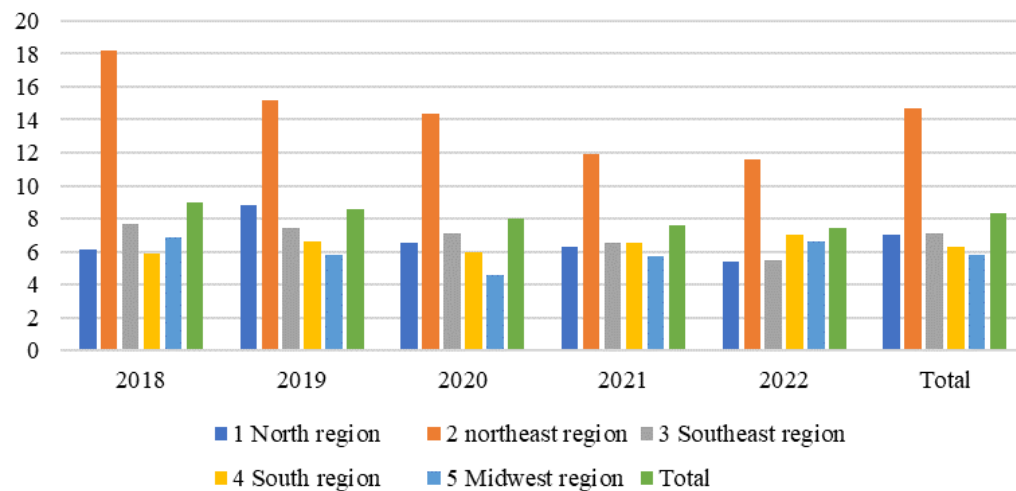
Graph 10 - Total value of urgency admissions for males



Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

Therefore, the Northeast region, in the urgency character, for males, presented the highest average length of stay, with the values being above 18; 14; 14; 10 and

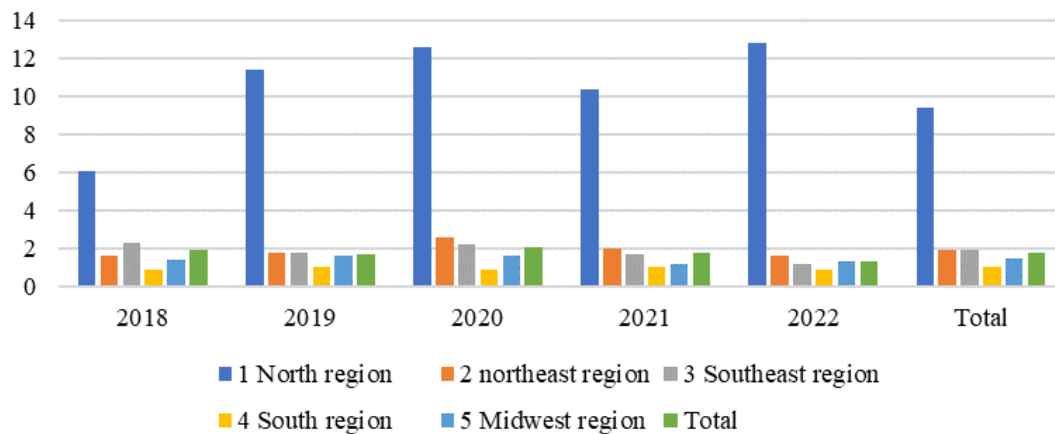
10, for the years 2018 to 2022, respectively. Regarding the average total length of stay, the Northeast region also presented a value above 14, while the national total average was above 8.

Graph 11 - Average length of stay of urgency for male

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

In the elective character, for males, the Northern region presented the highest average length of stay, with

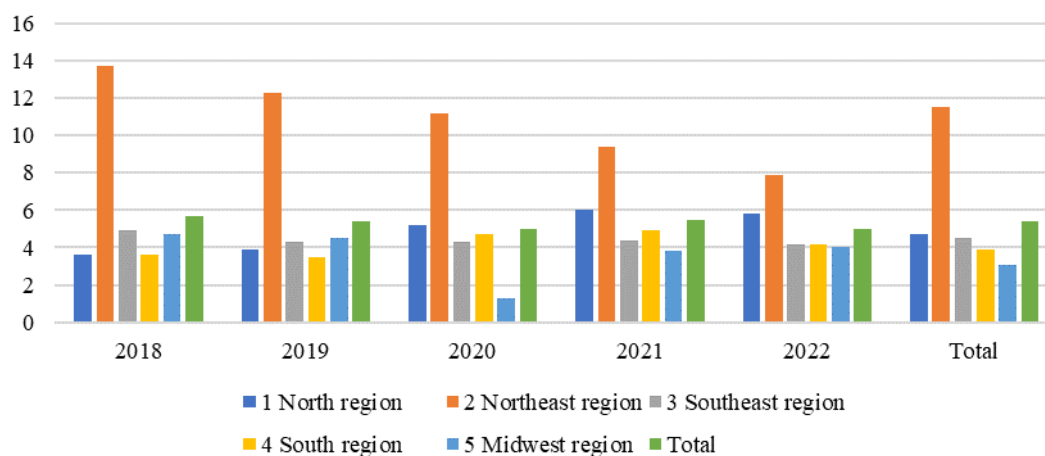
values above 6; 10; 12; 10 and 12 in the five years analyzed respectively, including in relation to the total average length of stay above 8.

Graph 12 - Average permanence in the elective character for males

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

When analyzing the average length of stay, urgency character for the female gender, it is observed that the Northeast region presented the highest average length of

stay, with values above 12; 12; 10; 8 and 6, in the years 2018 to 2022, respectively.

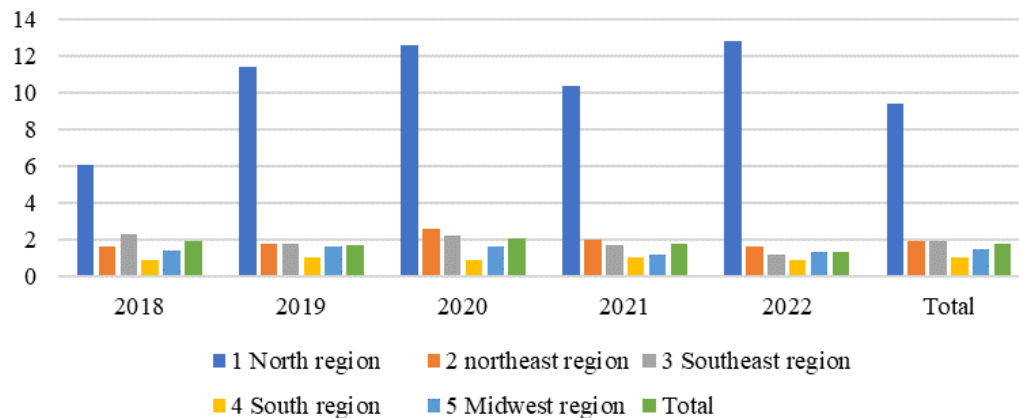
Graph 13 - Average length of stay in urgency for female

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

The total average for the Northeast region for the five years was also the highest above 10, while the total national average was above 4 days of stay.

In the analysis of the elective character for female, the Northeast region reached, in 2018, the highest average

with time above 1. In subsequent years, the North region obtained the highest averages with values above 2; 2; 3; 4 between the years 2019 to 2022, respectively. Besides also presenting the highest average total length of stay with a quantity close to 2 days of hospitalization.

Graph 14 - Average length of stay elective for female

Source: Ministry of Health - SUS Hospital Information System (SIH/SUS)

DISCUSSION

According to the data extracted and analyzed, it is possible to deduce that females have the highest number of hospitalizations. The age range of 50 to 59 years expresses high numbers of hospitalizations for females and males, however, with predominance for females.

In this perspective, it can be noted that within the risk factors for developing varicose veins that include genetic predisposition, age, female gender, pregnancy, prolonged position, weakened vascular walls, previous

shear vessel injury and increased intravenous pressure⁷. It can be observed that the age range and female gender highlighted in the analysis of the results are indications of danger for the development of this condition.

It can be observed that the sum of the total number of hospitalizations in the five regions of the country from 2018 to 2022, related to the female sex, was 151011, while that of the male sex was 47293, that is, the number of hospitalizations for the female sex is 319.3% higher when compared to the male sex. This data points to the need for more attention to the Brazilian female public,

which corresponds to the largest quantitative portion of hospitalizations due to varicose veins in the lower limbs.

In this regard, most studies have shown that chronic venous disease is more prevalent among women, although in a recent study, the difference between genders was small⁸. In the Framingham Study, the annual incidence of varicose veins was 2.6% among women and 1.9% among men, and in contrast to the Edinburgh Vein Study, the prevalence of varicose veins was higher in men^{8,9}. In the San Diego Population Study, chronic venous disease was more prevalent in populations of European origin than in blacks or Asians^{8,9}.

Consistent with the results, the development of lower limb varicose veins profoundly impacts the quality of life of the female public, income generation, and health resources for prevention, follow-up, and therapy whether in clinical, surgical, or socioeconomic form.

Chronic venous disease is associated with reduced quality of life, especially in relation to pain, physical function, and mobility. It is also associated with depression and social isolation⁸.

It appears that admissions by elective character for women are higher, when compared to the urgency character and also with men. In this scenario, there is an indication of the possibility of an association with cultural and aesthetic factors, from the moment the male public may seek an angiologist later, when the Chronic Venous Disease (CVD) worsens, while women may seek an intervention in the early stages.

As for the financial dimensioning, it was found that the total value of admissions for the female public by elective character was higher when compared to the urgency character, and also in comparison with males. In this aspect, the data obtained configures itself as a point of reflection on the importance of intervention when necessary and quickly. Thus, early treatment aimed at preventing venous hypertension, reflux and inflammation may relieve CVD symptoms and reduce the risk of ulcers, which reduce quality of life and are expensive to treat⁸.

This is a factor that needs to be better appreciated by health management in order to find a cost-benefit balance to meet this population demand from primary health care to a prolonged hospitalization situation.

The average length of stay, on an urgency basis, for males was higher in the Northeast region in comparison

with the other regions. This reinforces the hypothesis that the male population may seek care later, with a condition, which will require more resources for treatment and, therefore, prolonging the patient's stay in the hospital.

Another possible factor, within this analysis, in which the average length of stay is high for the North and Northeast region is also the need to prolong the hospitalization in view of the few socioeconomic resources of the patient to maintain care outside the hospital environment, and consequently returning with a worsened condition.

The socioeconomic impacts are also present, since they permeate the need for absence from work activities, receipt of sick pay, and loss of mobility to perform activities previously performed in the family, professional, and social spheres.

According to data from the National Institute of Social Security (INSS), lower limb varicose veins resulted in 42,899 grants of sick allowance between January and December 2016 in the country⁵. Therefore, when observing the data, the Southeast region stands out in terms of the quantitative profile and the total value of hospitalizations, both elective and urgency, within the established variables.

However, in relation to the average length of stay, the Northeast region concentrates the highest average for females and males in the emergency department in the years analyzed.

FINAL CONSIDERATIONS

In addition to understanding the impacts caused by hospitalizations for lower limb varicose veins in the country. It is worth stressing the importance of the analysis of the dynamics of the most affected public, which are women in the age bracket from 50 to 59 years, of white and mixed race, as well as to provide a more investigative and accurate look at the risk factors and social determinants that tangent this public and the implications from this conjuncture.

From this perspective, it is essential to develop new studies to draw a deeper profile of these segments, with greater updates in data and implications, in addition to exposing greater strategies for reducing the effects caused by this serious complication of CVD with relevant morbidity.

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REFERENCES

1. Heller JA, Evans NS. Varicose veins. *Vasc Med*. 2015;20(1):88-90. doi: <https://doi.org/10.1177/1358863X14566224>
2. Raju S, Neglén P. Chronic venous insufficiency and varicose veins. *New Engl J Med*. 2009;360(22):2319-27. doi: <https://doi.org/10.1056/NEJMcp0802444>.
3. Lins EM, Barros JW, Appolônio F, Lima EC, Barbosa Junior M, Anacleto E. Perfil epidemiológico de pacientes submetidos a tratamento cirúrgico de varizes de membros inferiores. *J Vasc Bras*. 2012;11(4):301-304. doi: <https://doi.org/10.1590/S1677-54492012000400008>
4. Hamdan A. Management of varicose veins and venous insufficiency. *JAMA*. 2012;308(24):2612-2621. doi: <https://doi.org/10.1001/jama.2012.111352>
5. Lima DC. Varicose veins and occupational health: symptoms, treatment and prevention. *Rev Bras Med Trab*. 2019;17(4):589-93. doi: <https://doi.org/10.5327/Z1679443520190460>
6. Santos RFFN, Porfirio GJM, Pitta GBB. A diferença na qualidade de vida de pacientes com doença venosa crônica leve e grave. *J Vasc Bras*. 2009;8(2):143-147. doi: <https://doi.org/10.1590/S1677-54492009000200008>
7. Wang M, Ashwani KS. Varicose veins. *J Radiol Nursing*. 2019;38(3):150-154. doi: <https://doi.org/10.1016/j.jradnu.2019.04.004>
8. Bergan JJ, Schmid-Schönbein GW, Smith PD, Nicolaides AN, Boisseau MR, Eklof B. Chronic venous disease. *New Engl J Med*. 2006;355(5):488-98. doi: <https://doi.org/10.1056/NEJMra055289>
9. Lim CS, Davies AH. Pathogenesis of primary varicose veins. *J Brit Surg*. 2009;96(11):1231-1242. doi: <https://doi.org/10.1002/bjs.6798>

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