

# Epidemiology of migraine and other cephalic pain syndromes in Brazil

## Summary

Headache is a highly prevalent pathology that affects individuals of varying ages, and that brings great functional and social damage to the individual, affecting productivity, concentration and interaction with the environment, it is more frequent in the age group of 20-50 years, has great impact on the daily activities of individuals, with functional and social impairment. The objective of this study was to analyze the epidemiological profile of migraine and other cephalic pain syndromes in Brazil from 2015 to 2019, through a study exploratory, descriptive, epidemiological, time series study, from January 2015 to December 2019, with secondary data from DATASUS - Ministry of Health, Brazil. There were n=49358 hospitalizations for headache and other pain syndromes in the period, which were more prevalent: Southeast Region (n = 16390), year 2019 (n = 11996), age group 30-39 years (n = 9333), female (n = 32465), white race (n = 20790), average length of stay in the Northeast Region (n = 4.7 days), deaths (n = 379), mortality rate in Brazil (n = 0.77), with higher rate in the North (n = 1.21), total amount spent in the period was R \$ 21045292,00, in the South Region the total amount spent was higher than in the others, totaling R \$ 6961648,00. Therefore, headache is quite prevalent in Brazil, a growing trend in terms of the public number of hospitalizations/year, in terms of health, it demands high cost, affects more women and whites. In the case of an extensive epidemiological study, these data can support public health policies that aim to diagnose the different types of headache early and treat each type, thus improving their quality of life and work performance.

**Keywords:** headache, migraine; epidemiology; collective health

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## Introduction

Headache is a chronic disease that is very common in the population, with greater prevalence in women, it is classified as primary or secondary and described as a neurological problem.<sup>1</sup> According to the World Health Organization (WHO), it is estimated that 50% of the population suffers an episode of headache once a year, and they point out that different types of headache represent the third biggest cause of years lost due to disability, due to pain and other symptoms, damaging quality of life, in addition to high financial losses for the SUS.<sup>2</sup> Is defined as any type of pain that affects the cranial cavity from the eye socket to the back of the head. Pain below the eyes is called facial pain.<sup>3</sup> It is one of the main health problems worldwide and the second most common type is migraine, with a global prevalence among adults greater than 10%. In Brazil, the prevalence of migraine is estimated at 15.2%.<sup>4</sup>

Headache is a chronic pain that is a major public health problem, compromising quality of life, damaging its social, personal and work components. It is one of the most common neurological symptoms and represents a complaint frequently found in clinical practice, so that it represents, in Brazil, around 9% of consultations at the primary health care level.<sup>5</sup> We can group headaches into two different etiological groups: primary headaches, which include migraine, cluster headache, tension headache; and the group of secondary headaches that occur due to the presence of a pathology.<sup>6</sup> Due to the high demand for cases in primary care and hospital emergencies, early diagnosis and correct management of different types of headaches are imperative. Only in this way will we be able to obtain an effective and long-term therapeutic approach, directly impacting people's quality of life and social well-being. Therefore, the study of this clinical entity is of great importance as it continues to be a disease that is neither well

diagnosed nor treated correctly, despite the advances made in recent years.

## Methodology

Exploratory, descriptive, epidemiological, time series study, from January 2015 to December 2019, with secondary data from DATASUS - Ministry of Health, Brazil. The following were investigated: Migraine and other headache syndromes, ICD-10: G43-G44. The variables under study will be: sex, age group, race, year, region, number of hospitalizations, days of hospitalization, amount spent, mortality rate, deaths and other variables that were available in DATASUS.

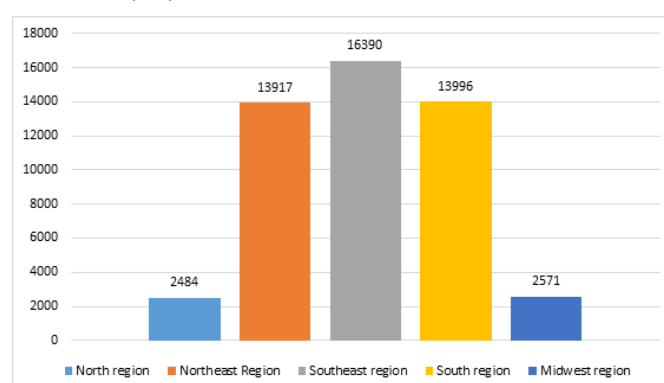
Data collection was carried out through access to the DATASUS System, through the TABNET-DATASUS of the Ministry of Health, which is an official and public database, made available by this Ministry online, the data were obtained by accessing the link: <http://www2.datasus.gov.br/DATASUS/index.php?area=02>, with access to the Epidemiological and Morbidity tabs → SUS Hospital Morbidity → by place of residence → Brazil, to extract data relating to variables: region, sex, race, age group, hospitalization, year of processing, amount spent, deaths, mortality rate, average length of stay. The data will be exported from DATASUS and tabulated in Excel, and later imported into the Bioestat 5.3 Program.

The data were imported from DATASUS and tabulated in an Excel spreadsheet, later exported to the Bioestat 5.3 Program, with analysis of absolute data, frequencies and descriptive statistics. Regarding ethical aspects, this research project will not be submitted to the Ethics Committee corresponding to the region, respecting the ethical and legal aspects proposed by Resolution No. 466, of December 12, 2012,

in which an opinion is waived in cases of research with secondary data in public database. Therefore, our work does not require approval from the Research Ethics Committee, as, it uses public and secondary data.

## Results

Hospitalizations for Migraines and other cephalic pain syndromes (Graph 1), in Brazil from 2015 to 2019, totaled  $n=49358$  hospitalizations, when distributed by Region, a higher overall number was observed in the Southeast, followed by the South and Northeast. The North and Central-West had a quantity well below that of the other Regions. The Southeast presented 33%, the South 29%, the Northeast 28%, the Central-West 5% and the North 5% of hospitalizations, which were represented by a mean= $9,871.6 (\pm 6,777.6)$  and coefficient of variation (CV)=68.7%.

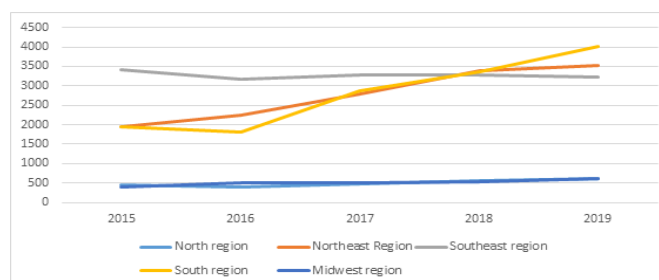


**Graph 1** Distribution of hospitalizations for Migraines and other cephalic pain syndromes, by Region, from 2015 to 2019.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

When studying hospitalizations by Region (Graph 2), it was observed that the South Region presented  $n=1935$  hospitalizations for this pathology in 2015, with a reduction in 2016 with  $n=1813$ , showing from then on a growing trend that culminated in  $n=4006$  hospitalizations, overlapping to the other Regions mean= $2799.2 (\pm 935.94)$  and CV=33.4%. The Northeast Region had  $n=1951$  hospitalizations in 2015, demonstrating an increasing trend throughout the period with  $n=3532$  hospitalizations, ranking second in the distribution by region/year mean= $2783,4 (\pm 691,14)$  and CV=24.83%.

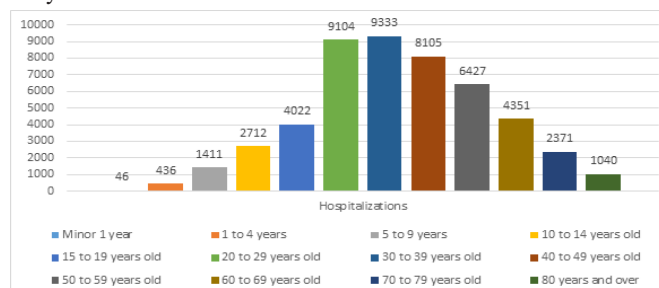
The Southeast Region had  $n=3429$  hospitalizations in 2015, showed a drop in 2016 with  $n=3161$ , in 2017 there was a slight increase to  $n=3287$  hospitalizations and maintained some stability with a downward trend and in 2019 it closed with  $n=3227$  hospitalizations mean= $3278 (\pm 99.04)$ , CV=3.02%. The North and Central-West Regions showed a lot of similarity in distribution, with a slight growth trend, demonstrating stability and remaining at levels well below the others throughout the period, the North Region had  $n=439$  hospitalizations in 2015 and 616 in 2019 mean= $496.8 (\pm 89.81)$  and CV= 18.08%. The Central-West had  $n=405$  hospitalizations in 2015 and  $n=615$  in 2019 with mean= $514.2 (\pm 75.35)$  and CV=14.65% (Graph 2).



**Graph 2** Distribution of hospitalizations for Migraines and other cephalic pain syndromes, by Region/year, from 2015 to 2019.

Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

Regarding the age group (Graph 3), from 20-29 years old there was a considerable increase in hospitalizations for migraines and other cephalic pain syndromes, these hospitalizations remained high until the age group 50-59 years old, with 66% of the sample. For each age group, there was the following percentage distribution: 30-39 years old=19%, 20-29 years old=18%, 40-49=16%, 50-59=13%, 60-69 years old=9%, 70-79 years=5%, 80 years or +=2%, 5-9 years=3%, 1-4 years=1%.



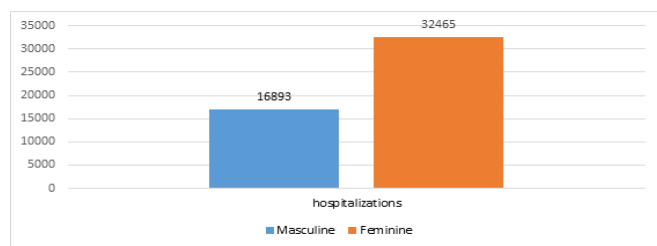
**Graph 3** Distribution of hospitalizations for Migraines and other cephalic pain syndromes, by age group, from 2015 to 2019.

Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

As for sex (Graph 4), women accounted for the vast majority of hospitalizations for migraines and other pain syndromes, with women representing 66% and 34% of hospitalizations. As for race (Graph 5), white was the one with the highest number of hospitalizations with 42%, followed by brown with 35%, no information with 18%, black with 3%, yellow with 2% and indigenous with 0%. As for the average number of days spent there, this average ranged from 3 to 4.7 days

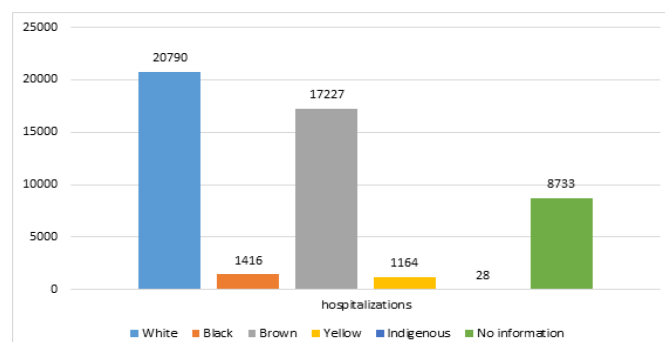
The Northeast region presented the highest average with 4.7 days, followed by the North region with 4.5 days, then the Southeast with 3.8 days, the Central-West with 3.1 and the South with 3 days.

As for average amount spent (Graph 6), there was a large increase in costs in the South and Northeast regions, starting in 2016, exceeding expenses in the Southeast region. The North and Central-West showed lower spending, which remained stable until 2018, with slight growth in the North from then on. The Southeast showed spending stability until 2017, with a drop from 2017 to 2018 and a slight increase from 2018 to 2019, however remaining in 3rd place in spending in Brazil since mid-2016.



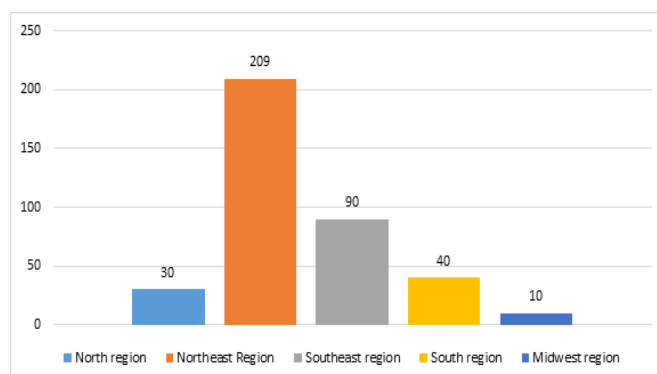
**Graph 4** Distribution of hospitalizations for Migraines and other cephalic pain syndromes, by Sex, from 2015 to 2019..

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.



**Graph 5** Distribution of hospitalizations for Migraines and other cephalic pain syndromes, by Race, from 2015 to 2019.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

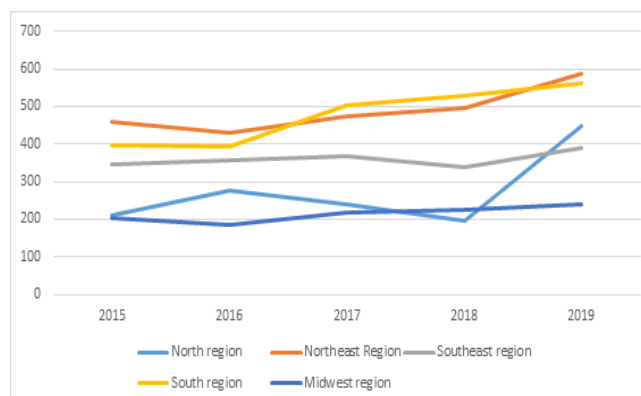


**Graph 7** Distribution of deaths due to hospitalizations for Migraines and other cephalic pain syndromes, from 2015 to 2019.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

## Discussion

In the years analyzed, there were 49,358 hospitalizations due to headache and other pain syndromes, which were more prevalent in the Southeast Region (n=16,390), in 2019 (n=11,996), in the age group of 30-39 years (n= 9,333), female (n=32,465), white race (n=20,790), with a longer average stay in the Northeast Region (n=4.7 days), deaths (n=379), mortality rate in Brazil (n =0.77), with a higher rate in the North (n=1.21), total amount spent in the period was R\$21,045,292.00, in the South Region the total amount spent was



**Graph 6** Distribution of hospitalizations for Migraines and other cephalic pain syndromes, by average value, from 2015 to 2019.

Source: Prepared by the author with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2022.

Regarding deaths (Graph 7) from migraines and other cephalic pain syndromes, there were n=379 deaths, the highest number of deaths occurred in the Northeast with 55%, followed by the Southeast with 24%, South with 10%, North with 8% and Central West with 3%. Regarding the mortality rate, a significant number was evident in the Northeast region (1.5%) compared to the other regions. Followed by the North (1.21%), Southeast (0.55%), Central-West (0.39%) and South (0.29%).

higher than in the others, totaling R\$6.961.648,00. The variability in migraine prevalence worldwide is intriguing. Initially, we consider attributing a geographic factor as a possible cause for this variability. However, evaluating the findings in the literature, it is concluded that there is no consistency in the sense that a certain geographic area presents higher prevalence of migraines than other places.

The demographic composition of different studies may be a determining factor in the variability of migraine prevalence, as women and young people are at greater risk for this morbidity, according to the literature. The meta-analysis study by Stewart et al.<sup>7</sup> showed that sex and age are the main factors responsible for the variation in migraine prevalence findings. Using linear regression analysis, the authors pointed out that sex is responsible for 15% of this variability, and, added to age, accounts for 30% of such differences. When analyzing the results, the evidence is in agreement with the literature discussion on the topic, as it confirms that women suffer more from migraines than men. Studies relate this higher prevalence in females to several factors, for example, hormonal fluctuations that occur during the menstrual cycle. Women may experience migraine episodes before, during and after menstruation. This situation can also trigger stress, which stands out as an important factor associated with migraines.<sup>8</sup> This cause represents an important potential for triggering a migraine, as everyday events and pressures increase stress levels, which can act as a trigger for pain crises. Another associated factor is the clinical condition of anxiety, which also contributes to the inability to control physiological changes related to the nervous system, which often become exacerbated and represent a certain threat or danger, worsening the condition of individuals who suffer from migraines.<sup>9</sup>

In this study, the hospital admission rate for women is significantly higher than for men. And, in addition to the factors that may be associated with migraine, considering those already mentioned, it is possible to observe other causes with which these data may be related, for example, the excessive use of medication, which contributes to the patient's worsening.<sup>10</sup> This issue has increasingly been identified as the source of many headache cases. As it is a rather frequent discomfort, there is an idea in common sense that migraines can be resolved with a simple analgesic and, therefore, the population is gradually led to self-medicate in a mistaken way and, without realizing it, can cause further damage to their clinical condition, leading to a situation that leads to hospitalization.<sup>11</sup>

Some authors report that 13.4% of migraine patients seek emergency units, at least once, due to headache. These circumstances raise another question, regarding the level of information that the population has about the excessive use of medications and, also, about the effects that this act may end up bringing to their daily lives. From then on, it is important to reflect on the need to develop public policies aimed at discussing migraine as a chronic, non-communicable disease.<sup>12</sup> The inappropriate use of medications, as one of the causes for many hospitalizations, is linked to another indicator, which is the time the patient remains hospitalized (average days of stay per hospital stay), due to some disabling condition, a topic suggestive of new studies to deepen the explanations of this object, since the literature does not yet include this data, in order to support us.

In a study by Queiroz et al.<sup>13</sup> a greater propensity to migraine was found in the Southeast and South regions, while in the North, Northeast and Center-West regions, greater susceptibility to chronic headaches, when analyzing a population of n=3848 people from all over Brazil, possibly due to European descendant from the South and Southeast regions, which is genetically more prone to such events, and may also be related to a lifestyle with greater competitiveness and stress. In the Central-West, North and Northeast, where there is a greater proportion of African descendant, cases of chronic headache may refer to precarious health care conditions, which would lead to an increase in self-medication with painkillers. In our study, as it is an epidemiological study supported by secondary data, we did not achieve the classification of migraines, since our data are limited to the DATASUS findings, therefore we cannot emphasize such aspects found in that study.

Regarding the amount spent, the great financial demands imposed on the SUS to cover hospitalizations for migraines and other pain syndromes were observed, as emphasized by the International Association for the Study of Pain (2011). The financial costs of headache result in addition to the direct cost of treatment, in costs resulting from incapacitation associated with absence from work and decreased productivity. In Europe, migraine had 1 billion dollars invested in its treatment. These costs reached 25 billion euros/year, costs that are second only to dementia, being among the highest than those invested in other neurological diseases. This leads us to consider that, in addition to the direct costs to the SUS represented by the total amount spent explained in this work, there are additionally secondary costs resulting from losses in productivity and disability. Therefore, financial losses and losses in the quality of life of each patient must be added to the amount spent. The SUS is responsible for the majority of hospitalizations, therefore we agree with Silva et al.,<sup>14</sup> whose study confirms this high loss to the country.

Headache has a prevalence of 15.2% in the Brazilian population, with women being the most affected, mainly due to the use of contraceptives and hormonal factors, and as a consequence, it affects daily activities and social relationships.<sup>15</sup> These findings corroborate our data, which refer to women as the majority of the population with migraines. The number of deaths found in this study is considered high, as migraine is understood as a benign syndrome that should not necessarily result in greater damage, however, difficulties in diagnosis and treatment can cause long-term damage, as they can even interfere with the health of the affected vessels, thus our data corroborate the findings of Correia; Linhares; Martins,<sup>9</sup> who consider deaths resulting from difficulty in diagnosis, including difficulty in identifying warning signs and diagnostic errors for the management of secondary headaches, demonstrating diagnostic failures measured by them in between 23% and 51% of patients with subarachnoid hemorrhage and up to 50% migraine. This is a fact that concerns us, given that these are cases that need to be treated in a timely manner to prevent death. In our study, due to its methodological design, it is not possible to infer cause/effect relationships, but it sends a warning signal to seek such reasons for the deaths found.

It is essential that a physical and neurological examination is carried out to assess the need for further investigation, such as neuroimaging and CSF (cerebrospinal fluid) examinations. Since the morbidity of a secondary headache is substantially higher, this differentiation can be decisive for a better prognosis and adequate management of the condition.<sup>16</sup> This improvement in diagnosis could result in limiting the damage, including reducing the number of deaths, especially in the Northeast, where the highest number of deaths and in the North, which has the highest recorded fatality rate. There is a need for more studies developed in Brazil, including cross-sectional and longitudinal studies, to relate the number of deaths by region and the relationship between head pain complaints and other chronic diseases, such as diabetes, hypertension, metabolic disorders and other neurovascular disorders, to understand the extent of such pathology and its outcomes.

## Final considerations

There were a large number of hospitalizations due to migraines and other cephalic pain syndromes, during the period under study, there were a greater number of hospitalizations in the Southeast, however there were more deaths due to migraines in the Northeast, as well as longer lengths of stay and greater lethality in the North, women The white race and the 30-39 age group were most affected. Considering that it is a disabling disease and has greater expression in the productive phase, it causes great losses, not only financial, but impacts on quality of life, which was not measured in this work, but deserves to be mentioned, due to its relevance. Therefore, migraine and other cephalic pain syndromes are an important public health problem, which deserves adequate scientific interest and a correct medical approach, requiring, therefore, improvements in public health policies aimed at this pathology, which should rely on continuous epidemiological investigation.

## Acknowledgments

None.

## Conflicts of interest

The authors declare that there are no conflicts of interest.



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