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Spatial and temporal analysis of outpatient and inpatient care for headaches in Sergipe/Brazil between 2012 and 2024

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Introduction
In Brazil, specialized hospital and neurological care has evolved in parallel with the consolidation of the Unified Health System (SUS) and the country's economic cycles. Furthermore, the expansion of health information systems has progressively improved case registration, while the economic recession of the mid-2010s, subsequent fiscal constraints on health financing, and the COVID-19 pandemic have strained outpatient and specialized capacity. Since headache is a largely manageable condition at the outpatient level, its hospitalization pattern constitutes a sensitive marker of how economic and health sector development translates into access to care. Regionalized evidence is scarce, especially in Sergipe, where neurologists have historically been concentrated in Aracaju, deepening territorial inequalities.

Objective
To analyze the spatial and temporal trends of outpatient and inpatient care for headaches in Sergipe between 2012 and 2024.

Methods
An ecological time-series study was conducted using secondary data from the Hospital Information System (SIH/DATASUS) and Outpatient Information System (SIA/DATASUS) and population denominators from the 2022 Brazilian Demographic Census. Hospitalization and outpatient visit rates per 100,000 inhabitants were assessed using Prais-Winsten regression and the Mann-Kendall test. Territorial inequity was quantified using the Gini index of the distribution of hospitalizations and neurologists among the 75 municipalities of the state. A significance level of 5% ($p<0.05$) was adopted.

Results
Between 2012 and 2024, 427 hospitalizations for headache were recorded. The hospitalization rate increased significantly from 0.25 to 3.58 (+14.1%; p=0.002; Mann-Kendall p=0.005), with the post-pandemic period exceeding the pre-pandemic baseline level by 86.5%. Hospitalizations predominated among women (67.3%; female:male ratio of 2.06:1) and adults of working age aged 20 to 59 years (63.5%), with a peak in the 30 to 39 age group. The average length of stay was 7.5 days, the hospital mortality rate was 1.4% (6 deaths/427 hospitalizations) , and the total costs amounted to R$ 131,617.89 (average of R$ 309.69 per hospitalization). In parallel, specialized outpatient consultations did not show significant differences when analyzed over time (1.52 times; APC +2.6%; p = 0.14), and the number of neurologists increased from 55 to 77. Access proved markedly unequal: the Gini index reached 0.80 for hospitalizations (five municipalities concentrated 61.1% of cases) and 0.97 for neurologists, of whom 81.8% were located in the capital. Furthermore, 64 of the 75 municipalities did not have a neurologist.

Conclusion
Hospitalizations for headaches in Sergipe increased sharply during the study period, mainly among women of working age, while specialized outpatient capacity and the number of neurologists remained constant. This mismatch highlights inequity in access to neurological care. Strengthening primary care diagnosis and decentralizing specialized services can help meet growing population needs.

Keywords:
Migraine
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