

Analysis of morbidity and mortality due to endometriosis in Brazil: an ecological study from 2014 to 2024

Análise da morbidade e mortalidade por endometriose no Brasil: um estudo ecológico de 2014 a 2024

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DOI: 10.5281/zenodo.15583765

Received: Mai 22, 2025

Approved: Mai 28, 2025

Fátima Joyce Bezerra Salviano

Medical Student

Institution: University Center Unidom Pedro II

Address: (Salvador – Bahia, Brazil)

Orcid ID: <https://orcid.org/0009-0009-7715-7544>

E-mail: joycesalviano2003@gmail.com

Francisco Wallace Bezerra Salviano

Medical Student

Institution: Federal University of Cariri - UFCA

Address: (Barbalha – Ceará, Brazil)

Orcid ID: <https://orcid.org/0000-0002-4223-3393>

E-mail: wallace.bezerra@aluno.ufca.edu.br

João Emanuel Braga Amaro Vieira

Medical Student

Institution: Federal University of Cariri - UFCA

Address: (Barbalha – Ceará, Brazil)

Orcid ID: <https://orcid.org/0009-0003-8452-736X>

E-mail: joao.emanuel@aluno.ufca.edu.br

Thallyson Yuri Lira Jovino

Medical Student

Institution: Federal Rural University of the Semi-Arid Region - UFERSA

Address: (Mossoró – Rio Grande do Norte, Brazil)

Orcid ID: <https://orcid.org/0009-0005-4650-3855>

E-mail: thallysonyuribr@gmail.com

Leonardo Feitosa Esmeraldo

Medical Student

Institution: UNIFACISA University Center

Address: (Campina Grande – Paraíba, Brazil)

Orcid ID: <https://orcid.org/0009-0007-0106-9113>

E-mail: leo.esmeraldo@outlook.com

Isabel Cristina Lacerda Montenegro

Medical Student

Institution: University Center Unidom Pedro II

Address: (Salvador – Bahia, Brazil)

Orcid ID: <https://orcid.org/0009-0004-3058-5924>

E-mail: belmontenegro1403@gmail.com

Metton Ribeiro Lopes e Silva

Medical Doctor

Institution: Estácio Medical School, Juazeiro do Norte – Brazil

Address: (Juazeiro do Norte – Ceará, Brazil)

Orcid ID: <https://orcid.org/0000-0002-3686-7592>

E-mail: metton.r@gmail.com

ABSTRACT

Introduction: Endometriosis is a chronic disease affecting women of reproductive age, with significant clinical and economic impacts on the healthcare system. **Objective:** To analyze the profile of hospital morbidity and mortality due to endometriosis in Brazil from 2014 to 2024. **Methodology:** An ecological observational study using secondary data from the Hospital Information System (SIH/SUS) and Mortality Information System (SIM). Incidence, mortality rates, hospital stay duration, and healthcare costs were analyzed. **Results:** The national average hospitalization rate was 10.0 per 100,000 women, with higher incidence in the South and Southeast regions. Elective care predominated over emergency care ($p < 0.0001$). The average hospital stay was 16.45 days, with annual costs exceeding R\$ 10 million and a significant increase in 2024. Correlation between hospitalizations and costs was weak and not significant. **Conclusion:** Endometriosis imposes a considerable burden on the healthcare system, highlighting the need for public policies to expand early diagnosis, professional training, and integrated care, especially in regions with limited diagnostic capacity. Limitations include the use of secondary data and lack of information on indirect costs and quality of life.

Keywords: Endometriosis, Public health, Hospital morbidity, Epidemiology, Economic burden.

RESUMO

Introdução: A endometriose é uma doença crônica que impacta a saúde de mulheres em idade reprodutiva, com relevância clínica e econômica para o sistema de saúde. **Objetivo:** Analisar o perfil da morbidade e mortalidade hospitalar por endometriose no Brasil, no período de 2014 a 2024. **Metodologia:** Estudo observacional ecológico utilizando dados secundários do Sistema de Informações Hospitalares (SIH/SUS) e do Sistema de Informações sobre Mortalidade (SIM). Foram calculadas taxas de incidência, mortalidade, tempo de internação e custos hospitalares. **Resultados:** A taxa média nacional de internações foi de 10,0 por 100 mil mulheres, com maior incidência nas regiões Sul e Sudeste. O atendimento eletivo predominou sobre o atendimento de urgência ($p < 0,0001$). O tempo médio de permanência hospitalar foi de 16,45 dias, com custos anuais médios superiores a R\$ 10 milhões, tendo aumento expressivo em 2024. A correlação entre número de internações e custos hospitalares foi fraca e não significativa. **Conclusão:** A endometriose representa uma carga significativa para o sistema de saúde, evidenciando a necessidade de políticas públicas para ampliar o diagnóstico precoce, qualificação profissional e cuidados integrados, especialmente em regiões com menor capacidade diagnóstica. Limitações incluem dados secundários e ausência de informações sobre custos indiretos e qualidade de vida.

Palavras-chave: Endometriose, Saúde pública, Morbidade hospitalar, Epidemiologia, Carga econômica.

RESUMEN

Introducción: La endometriosis es una enfermedad crónica que afecta a mujeres en edad reproductiva, con impactos clínicos y económicos significativos para el sistema de salud. **Objetivo:** Analizar el perfil de morbilidad y mortalidad

hospitalaria por endometriosis en Brasil entre 2014 y 2024. **Metodología:** Estudio observacional ecológico basado en datos secundarios del Sistema de Información Hospitalaria (SIH/SUS) y del Sistema de Información sobre Mortalidad (SIM). Se analizaron tasas de incidencia, mortalidad, duración de la estancia hospitalaria y costos hospitalarios. **Resultados:** La tasa promedio nacional de hospitalización fue de 10,0 por 100.000 mujeres, con mayor incidencia en las regiones Sur y Sudeste. Predominó la atención electiva sobre la atención de urgencia ($p < 0,0001$). La estancia hospitalaria promedio fue de 16,45 días, con costos anuales superiores a R\$ 10 millones y un aumento significativo en 2024. La correlación entre hospitalizaciones y costos fue débil y no significativa. **Conclusión:** La endometriosis representa una carga considerable para el sistema de salud, evidenciando la necesidad de políticas públicas que amplíen el diagnóstico precoz, la capacitación profesional y la atención integrada, especialmente en regiones con capacidad diagnóstica limitada. Las limitaciones incluyen el uso de datos secundarios y la ausencia de información sobre costos indirectos y calidad de vida.

Palabras clave: Endometriosis, Salud pública, Morbilidad hospitalaria, Epidemiología, Carga económica.

1. INTRODUCTION

Endometriosis is a chronic, benign, and inflammatory condition characterized by the presence of endometrial tissue outside the uterine cavity, affecting approximately 10% to 15% of women of reproductive age (Mehedintu et al., 2014). Despite its benign nature, endometriosis can cause debilitating symptoms such as chronic pelvic pain, dysmenorrhea, dyspareunia, and fatigue, which severely impact the quality of life and daily functioning of affected women. There is a significant association between endometriosis and infertility, with around 50% of infertile women presenting with this condition, highlighting the profound reproductive consequences of the disease. Importantly, endometriosis is a condition that does not discriminate, affecting women of all ethnicities and socioeconomic backgrounds, from diverse geographic regions, which underscores the global health burden it represents (Calzada et al., 2024; Maggiori et al., 2024). The complex and heterogeneous nature of endometriosis has challenged clinicians and researchers alike, emphasizing the urgent need for improved diagnostic tools and personalized management strategies to better address its multifaceted clinical presentations.

The development of endometriosis is determined by the complex interaction and combined effects of genetic and environmental risk factors. Families of genes related to the immune system, inflammatory pathways, cell adhesion, and extracellular matrix remodeling have been reported to be differentially expressed when comparing women with and without endometriosis (Eyster *et al.*, 2007; Wren, Wu, Guo., 2007). In women with endometriosis, the peritoneal fluid contains high concentrations of cytokines, growth factors, and angiogenic factors, derived from the lesions themselves, secretory products of macrophages and other immune cells, and follicular fluid following ovulation. Once formed, endometriotic lesions secrete various pro-inflammatory molecules. Cytokines—such as interleukins 1 and 8, tumor necrosis factor- α , and interferon- γ —act on chemotactic factors, which in turn recruit macrophages and T

lymphocytes to the peritoneal cavity. These immune cells mediate the inflammatory reaction associated with endometriosis (Oosterlynck *et al.*, 1991; Chegini, 2002).

Women with endometriosis may be asymptomatic or present with complaints of dysmenorrhea, dyspareunia, chronic pelvic pain, and/or infertility. Although a definitive diagnosis of endometriosis requires surgical intervention—preferably by videolaparoscopy—various findings from physical examinations, imaging studies, and laboratory tests can predict the presence of endometriosis with a high degree of reliability (Aoki *et al.*, 2010). The classification of endometriosis includes three distinct forms of the disease: peritoneal, ovarian, and deep. The peritoneal form is characterized by superficial implants located on the peritoneum; the ovarian form involves superficial implants on the ovary or cysts known as endometriomas; while deep endometriosis corresponds to lesions that penetrate the retroperitoneal space or the wall of pelvic organs, with a depth equal to or greater than 5 mm (FEBRASGO, 2021).

Considering the variability of clinical manifestations, etiopathogenic mechanisms, and diagnostic criteria of endometriosis, it becomes essential to conduct studies that deepen the understanding of the disease and support more effective strategies for diagnosis and management. In this context, the present study aims to analyze the sociodemographic profile of morbidity and hospital mortality due to endometriosis in Brazil from 2014 to 2024, in order to contribute to the improvement of public health policies and the care provided to affected women.

2. METHODOLOGY

This is a retrospective observational ecological study with a quantitative, descriptive, and exploratory approach, which analyzed population-level data on hospital morbidity and mortality due to endometriosis in Brazil from January 2014 to December 2024. The study aimed to describe the epidemiological profile of hospital admissions and to estimate the incidence (IR) and mortality (MR) rates related to the disease at both the national level and across Brazilian capitals. Data were extracted from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS) and the Mortality Information System (SIM), both made available by the Department of Informatics of the SUS (DATASUS), an agency under the Ministry of Health. Intercensal population projections used for rate calculations were obtained from the Brazilian Institute of Geography and Statistics (IBGE).

The variables analyzed were: (1) the absolute number of hospital admissions with a diagnosis of endometriosis; (2) the hospital incidence rate per 100,000 women; (3) the mortality rate due to endometriosis; (4) the type of care (elective or emergency); (5) the average length of hospital stay; and (6) the total costs of hospital services related to endometriosis. The analysis included admissions recorded in

all federal units, with emphasis on the capitals with the highest number of cases. Data were organized in spreadsheets using Microsoft Office Excel® (Microsoft Corporation, WA, USA) and analyzed using BioEstat® software, version 5.3, developed by the Mamirauá Institute (AM, Brazil).

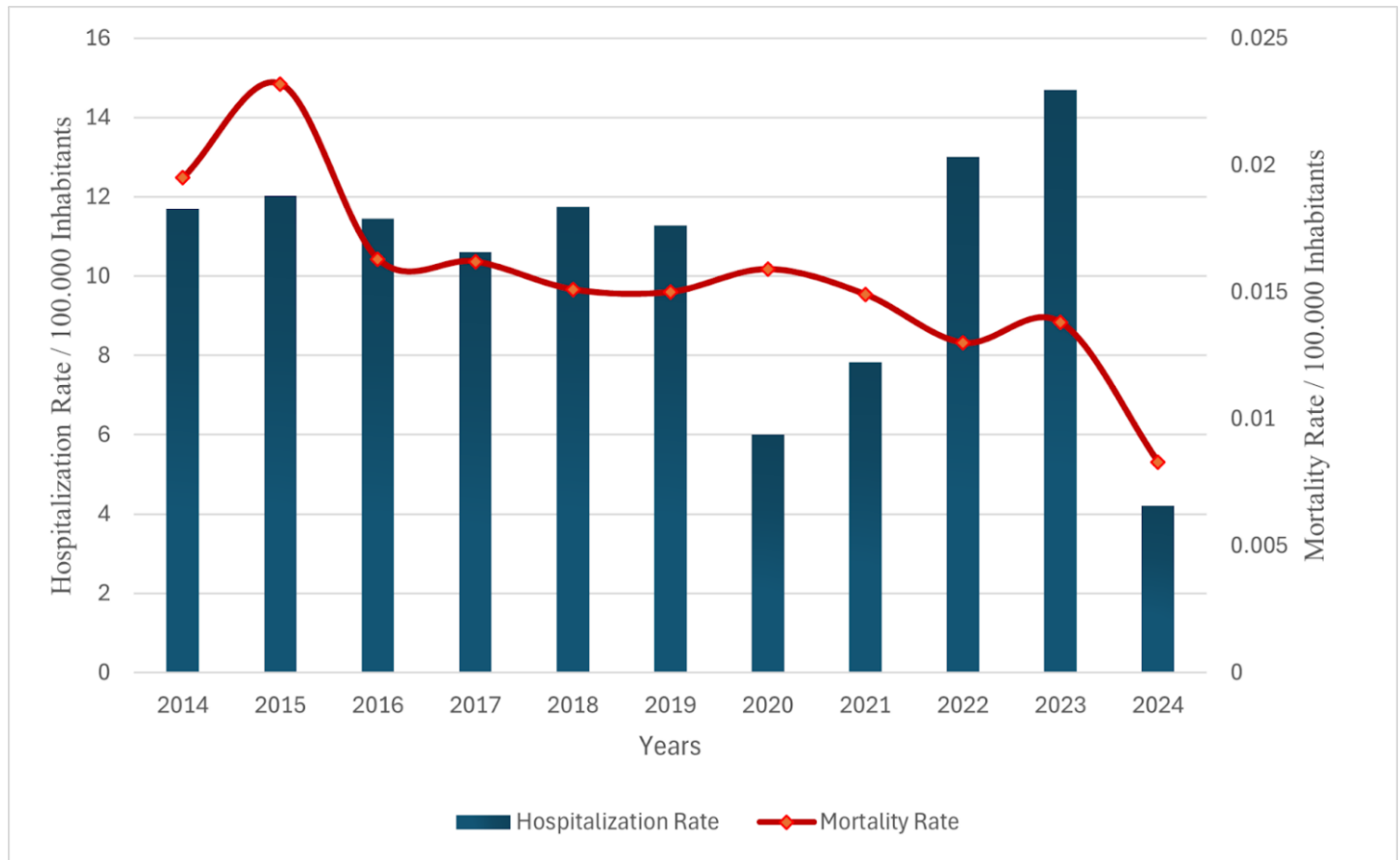
Statistical analyses were performed using descriptive statistics, including absolute frequencies, means, and standard deviations. The normality of continuous variables was assessed using the Shapiro-Wilk test. Differences among means were analyzed using the Kruskal-Wallis test, given the non-parametric nature of the data. The correlation between variables of interest, such as the number of hospital admissions and hospital costs, was evaluated using Pearson's correlation coefficient. All analyses considered a statistical significance level of $\alpha = 0.05$.

The study complied with the ethical principles established by Resolution No. 510/2016 of the Brazilian National Health Council (CNS), which guides research in the human and social sciences. As this was a study using secondary, publicly available data without individual identification, submission to a Research Ethics Committee was not required, in accordance with current legislation.

3. RESULTS

Between 2014 and 2024, a descriptive analysis was conducted on national data regarding hospital admissions for endometriosis in Brazil. The data revealed a national average hospital incidence rate (IR) of 10.0 admissions per 100,000 inhabitants, with a standard deviation (SD) of ± 3.06 . The observed median was 11.0, with an interquartile range (1st quartile: 8.5; 3rd quartile: 11.5). Regarding the mortality rate (MR), the national average was 0.015 (SD ± 0.003), with a median of 0.015 (Q1 = 0.014; Q3 = 0.016), reflecting relative stability in the number of deaths in relation to total hospital admissions throughout the analyzed decade (Figure 1).

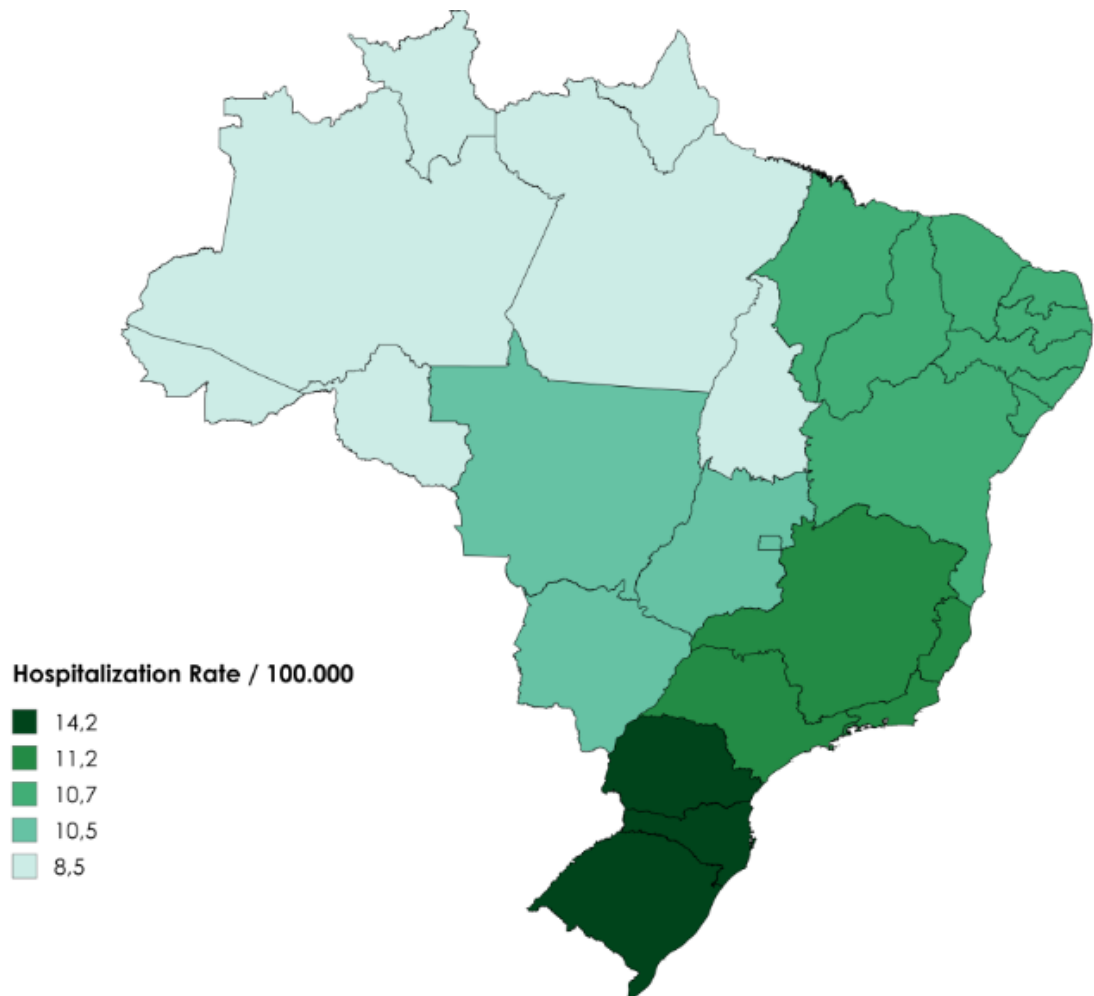
Figure 1. Hospitalization and Mortality Rates for Endometriosis in Brazil (2014–2024)



Source: Prepared by the authors (2025)

When stratified by geographic region, important differences were observed. Statistical analysis indicated a significant variation in the incidence rate among Brazilian regions ($p = 0.0085$). The South region presented the highest hospitalization rates, with a mean of 14.2 ($SD \pm 4.05$) and a median of 14.0 ($13.0 / 16.5$), standing out as the region with the greatest hospitalization burden. In contrast, the North region showed the lowest mean (8.5 ± 2.87), with a median of 8.0 . The Southeast, Northeast, and Central-West regions presented intermediate means of 11.2 , 10.7 , and 10.5 , respectively (Figure 2). Regarding the mortality rate, although there was no statistically significant difference ($p = 0.0590$), regional variability was noteworthy. The North region demonstrated greater data dispersion, with a mean of 0.01 ($SD \pm 0.01$), suggesting greater instability in mortality associated with hospitalizations. The Central-West region showed the lowest mean (0.00 ± 0.01), indicating stability and potential regional factors. In the remaining regions, mortality rate values were quite similar, remaining around 0.01 .

Figure 2. Hospitalization Rate for Endometriosis in the Administrative Regions of Brazil (2014–2024).

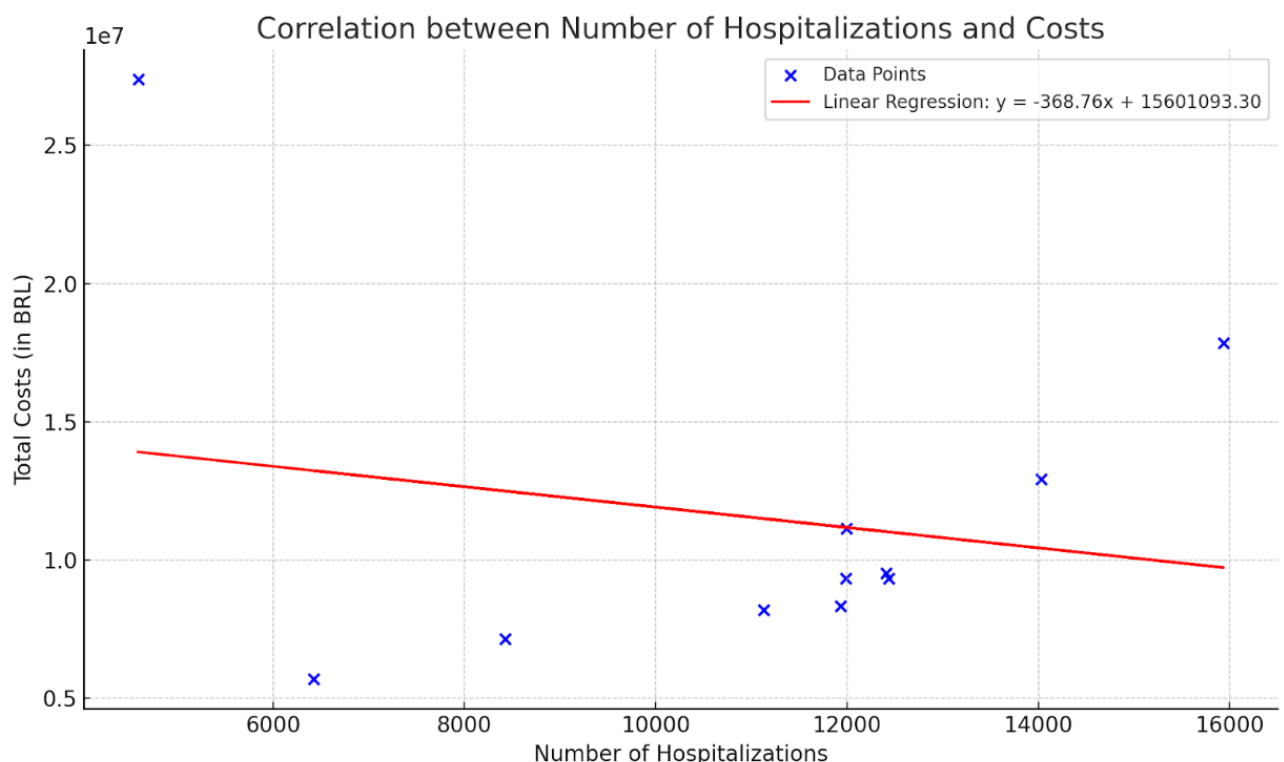


Source: Prepared by the authors (2025)

The analysis of data by type of hospital admission revealed substantial differences. Elective admissions presented an average of 9,519 cases over the years ($SD \pm 3,114.5$), with a median of 9,335 (1st quartile = 7,992; 3rd quartile = 11,157.5). In contrast, emergency admissions recorded a lower volume, with an average of 3,003.9 cases ($SD \pm 495.19$) and a median of 3,012 (2,677.5 / 3,396). The difference between these two types of admissions was statistically significant ($p < 0.0001$), indicating that hospitalizations for endometriosis are predominantly planned (elective), which may reflect both the organization of the healthcare network and the epidemiological profile of the target population. Additionally, the average length of hospital stay remained relatively stable over the years, with a mean of 16.45 days ($SD \pm 3.67$) and a median of 16 days (1st quartile = 15.5; 3rd quartile = 17.0). These values suggest the need for specialized care and complex interventions, reflecting the clinical burden of endometriosis, particularly in advanced cases or those with complications.

With respect to total hospital service costs, an annual average of BRL 10,625,867.30 (SD \pm BRL 6,929,985.3) was observed, with a median of BRL 9,335,358.09 (Q1 = BRL 7,671,900.14; Q3 = BRL 11,219,793.52). The highest cost was recorded in 2024, totaling over BRL 27 million, representing a sharp increase compared to previous years. This increase may be related to accumulated demand following the COVID-19 pandemic, the rising complexity of medical cases, or adjustments in healthcare service pricing. The Pearson correlation analysis between the number of hospital admissions due to endometriosis and the total associated costs revealed a correlation coefficient (r) of -0.197 with a p -value of 0.561 . These results indicate a weak and negative correlation between the variables—that is, as the number of admissions increases, total costs tend to decrease slightly, although this relationship is not statistically significant ($p > 0.05$). The linear regression equation, $y = -368.76x + 15,601,093.30$, reinforces this negative trend but does not support conclusive inferences. In practical terms, the data suggest that there is no consistent linear relationship between the volume of admissions and hospital expenditures. Other factors, such as case complexity, type of procedure, or cost per admission, may have a more substantial impact on total costs than the absolute number of hospitalizations (Figure 3).

Figure 3. Correlation between Number of Hospitalization for Endometriosis in Brazil and Costs (2014 - 2024)



Source: Prepared by the authors (2025)

Table 1 summarizes the main findings of the study, presenting the epidemiological and operational indicators related to hospital admissions for endometriosis in Brazil from 2014 to 2024. It includes mean values, standard deviations, medians, and interquartile ranges for incidence and mortality rates, as well as stratification by geographic region and type of care (elective or emergency). The table also presents the average length of hospital stay and total annual hospital-related costs, providing a comprehensive overview of the healthcare and economic burden associated with endometriosis in the country.

Tabel 1. Epidemiological, healthcare, and economic indicators related to hospital admissions for endometriosis in Brazil (2014–2024)

NATIONAL DATA (BRAZIL)						
	MEAN (SD)		MEDIAN (1ST Q / 3RD Q)		P-VALUE	
HOSPITALIZATION RATE (HR)	10,0 (± 3,06)		11,0 (8,5 / 11,5)			
MORTALITY RATE (MR)	0,015 (± 0,003)		0,015 (0,014/ 0,016)			
BY ADMINISTRATIVE REGIONS						
	HR		MR		0,0085	0,0590
	MEAN (SD)	MEDIAN (1ST Q / 3RD Q)	MEAN (SD)	MEDIAN (1ST Q / 3RD Q)		
NORTH	8,5 (± 2,87)	8,0 (7,0 / 9,5)	0,01 (± 0,01)	0,01 (0,00 / 0,02)		
NORTHEAST	10,7 (± 2,32)	11,0 (10,0 / 12,5)	0,01 (± 0,00)	0,01 (0,01 / 0,01)		
SOUTHEAST	11,2 (± 3,03)	11,0 (10,0 / 13,0)	0,01 (± 0,00)	0,01 (0,01 / 0,02)		
SOUTH	14,2 (± 4,05)	14,0 (13,0 / 16,5)	0,01 (± 0,00)	0,01 (0,00 / 0,02)		
CENTRAL-WEST	10,5 (± 3,29)	10,0 (8,5 / 12,0)	0,00 (± 0,01)	0,00 (0,00 / 0,01)		
TYPE OF CARE					< 0,0001	
	MEAN (SD)		MEDIAN (1ST Q / 3RD Q)			
ELECTIVE	9.519 (± 3.114,5)		9.335 (7.992 / 11.157,5)			
EMERGENCY	3.003,9 (± 495,19)		3.012 (2.677,5 / 3.396)			
AVERAGE LENGTH OF HOSPITAL STAY (DAYS)						
	MEAN (SD)		MEDIAN (1ST Q / 3RD Q)			
	16,45 (± 3,67)		16 (15,5 / 17,0)			
TOTAL HOSPITAL SERVICE COSTS (BRL)						
	MEAN (SD)		MEDIAN (1ST Q / 3RD Q)			
	10.625.867,3 (± 6.929.985,3)		9.335.358,09 (7.671.900,14 / 11.219.793,52)			

Source: Prepared by the authors (2025)

4. DISCUSSIONS

The present study demonstrated that the national average hospitalization rate (HR) for endometriosis was 10.0 ± 3.06 , with a median of 11.0, while the average mortality rate (MR) was 0.015 ± 0.003 . These data confirm the relevance of endometriosis as a significant challenge for the Brazilian healthcare system. As emphasized in the European guidelines, “this guideline offers best-practice advice on the care of women with endometriosis” recognizing the healthcare burden is fundamental to inform effective clinical and public health policies (Eshre, 2022).

Regional analysis revealed significant disparities: the South region showed the highest hospitalization rate (14.2 ± 4.05), followed by the Southeast (11.2 ± 3.03), while the North region registered the lowest rate (8.5 ± 2.87). These variations align with the national survey by Reis *et al.*, which identified the Southeast as responsible for the highest number of hospitalizations (43.1%) and deaths (40) (Reis *et al.*, 2025). This convergence suggests not only a higher disease prevalence but also better diagnostic capacity in economically more developed regions, contrasting with probable underreporting in the North and Midwest regions.

Regarding the care profile, there was a clear predominance of elective procedures (mean = $9,519 \pm 3,114.5$) compared to urgent hospitalizations (mean = $3,003.9 \pm 495.19$; $p < 0.0001$). This scenario indicates the relative effectiveness of specialized outpatient care, aligned with ESHRE recommendations that therapeutic choices should be “shared with the patient, considering symptom severity, costs, and availability” (Eshre, 2022). The high proportion of scheduled surgeries may reflect partial adherence to this principle, but also highlights that many women still face prolonged diagnostic pathways. The average hospital stay of 16.45 ± 3.67 days, combined with annual costs exceeding R\$10.6 million, underscores the clinical and economic impact of the disease. These values surpass those reported by Da Costa *et al.*, who recorded a total of 173 deaths due to endometriosis between 2013 and 2022 (Da Costa *et al.*, 2023), suggesting that despite relatively low mortality, the disease imposes a substantial financial burden, especially due to the complexity and duration of hospitalizations.

It is important to emphasize that hospital costs represent only part of the total economic impact of endometriosis. As pointed out by Pardin *et al.*, “pain is one of the main factors negatively impacting the quality of life of women with endometriosis” (Pardin *et al.*, 2023). Chronic pain, infertility, and associated psychiatric comorbidities increase the social burden, reinforcing the need for integrated strategies of prevention, screening, and continuous care that can reduce both hospitalizations and indirect costs associated with the disease. In summary, the findings highlight the urgency of regional public policies that promote expanded access to diagnostic methods, professional training, and implementation of integrated

care pathways aligned with international recommendations. Reducing regional disparities and strengthening primary health care are essential strategies to decrease hospital admissions and mitigate the economic and psychosocial impact of endometriosis in Brazil.

This study has some limitations inherent to the use of secondary data from the Brazilian Unified Health System (SUS) information systems. The quality and completeness of records may vary across regions, potentially contributing to underreporting or inconsistencies, especially in areas with lower healthcare infrastructure. Additionally, the ecological nature of the research limits individual-level analysis, restricting the ability to assess specific clinical factors such as disease stage, treatment type, or associated comorbidities. Another important aspect is the absence of data on endometriosis prevalence in the general population, limiting direct comparison between hospitalization incidence and the true burden of disease in the community. Finally, the study does not include information on indirect costs and quality of life impact, which are essential for a more comprehensive understanding of the problem's magnitude.

5. CONCLUSION

This study demonstrated that endometriosis represents a significant burden on the Brazilian healthcare system, with substantial hospitalization rates and high associated costs, especially in regions with better infrastructure and diagnostic capacity. The predominance of elective hospitalizations highlights the importance of specialized outpatient care and advances in clinical management, although the journey to a definitive diagnosis remains lengthy for many women. Regional disparities point to the urgent need for public policies that expand access to early diagnosis and adequate treatment, particularly in the North and Central-West regions, where underreporting may mask the true magnitude of the problem.

Beyond the direct economic impact, endometriosis imposes a considerable psychosocial burden due to chronic pain, infertility, and associated comorbidities, reinforcing the necessity of integrated approaches involving prevention, screening, and continuous care. Expanding epidemiological knowledge of the disease, along with professional training and the implementation of evidence-based care pathways, can contribute to reducing hospitalizations and morbidity and mortality, as well as improving patients' quality of life. Finally, despite the inherent limitations of using secondary data and the absence of information on indirect costs and quality of life, this study provides important insights for formulating regional and national strategies aimed at promoting equity in care and strengthening primary healthcare in addressing endometriosis in Brazil.

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