

Research Article

Epidemiological Profile of Hysterectomies Within the Public Health System Across Different Regions of Brazil Between 2013 and 2023

Lorraine Purcino Schmitt¹ , Deborah Silva Fernandes¹ ,
Evelyn Purcino Ribeiro² , Marcio Castro Ferreira^{3,*} 

¹School of Medicine, Sao Camilo University Center, Sao Paulo, Brazil

²Health Science, Novoeste Brazil College, Campo Grande, Brazil

³HCor Academy, HCor, Sao Paulo, Brazil

Abstract

Objective: To evaluate the assistive care profile of hysterectomies, including the average length of hospital stay, average cost per procedure, and mortality rate among the five Brazilian regions. **Methods:** A total of 740,528 procedures were selected, encompassing the number of hospitalizations, average procedure cost, average length of stay, and mortality rate for total, subtotal, vaginal, puerperal, and videolaparoscopic hysterectomies performed in each unit of the Federation between January 2013 and December 2023. **Results:** Total hysterectomy was the most prevalent (78.30%), while puerperal hysterectomy was the least prevalent (0.80%). The Northeast region performed the most hysterectomies (42.6%), and the Central-West region performed the fewest (9.20%). Puerperal hysterectomy had the longest hospital stay (5.1 days), the highest mortality rate (567.15/10,000), and the highest average cost (R\$1,504.00). Videolaparoscopic hysterectomy was of low prevalence, despite being the least invasive, having the lowest mortality rate (2.91/10,000), and the shortest length of stay (2.30 days). It was the second procedure with the lowest average cost (R\$624.00), preceded by vaginal hysterectomy (R\$597.00). **Conclusion:** The region with the highest number of procedures was the Northeast, with total hysterectomy being the most prevalent type across Brazil. Puerperal hysterectomy presented the longest average length of stay, the highest average cost, and the highest mortality rate, and was most prevalent in the Southeast region. Videolaparoscopic hysterectomy had the shortest average length of stay and the lowest mortality rate.

Keywords

Hysterectomy, Epidemiology, Unified Health System, Hysterectomy, Public Health, Regional Disparities, Morbidity and Mortality

*Corresponding author: marciojoelho@gmail.com (Marcio Castro Ferreira)

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1. Introduction

Hysterectomy is a procedure widely performed for the treatment of dysfunctions in the female reproductive organ, such as myomatosis, adenomyosis, pelvic endometriosis, abnormal bleeding (like hydatidiform mole), benign and malignant gynecological neoplasms, and puerperal infections, among others. It is the second most frequent surgical procedure in women of reproductive age. Hysterectomy is defined by the total or partial removal of the uterus and can be performed via the abdominal, vaginal, or laparoscopic approach, depending on the patient's clinical condition, pathological profile, uterine volume, and comorbidities, as well as the surgical team's technical capacity. [1, 2].

Brazil is a country with continental dimensions and the 7th largest population in the world. [3] It is characterized by significant socioeconomic differences among its five geographic regions. The Brazilian Constitution of 1988 dictates that public health is a right for all and a duty of the State, which must guarantee universal and egalitarian access to health promotion and assistance actions and services. [4] Approximately 75% of the Brazilian population relies exclusively on the public health system. [5] Due to inter-regional socioeconomic disparities, economically less developed areas have a larger portion of the population dependent on the public health system (SUS), while more developed regions show a greater proportional use of the private health system (health insurance).

Given the reasons presented and the associated relevance of hysterectomy to public health, coupled with its financial and social impact on the female population, the present study analyzed the epidemiological data associated with this procedure in Brazil. The aim was to observe the epidemiological indicators of public care assistance for this specific health condition.

2. Methodology

The study was approved by the institutional Ethics Committee under CAAE: 83536124.2.0000.0060, Opinion No. 7.160.687.

Data available on the TabNet platform, belonging to the DATASUS system of the Brazilian Ministry of Health, [6] were analyzed. The data referred to total (0409060135), subtotal (0409060127), vaginal (0409060100), puerperal (0411020030), and videolaparoscopic (0409060151) hysterectomies performed between January 2013 and December 2023 across the five geographic regions (North, Northeast, Central-West, Southeast, and South). The care epidemiology

was based on the number of the female population aged over 15 years in each Brazilian Region, extracted from the National Census portal provided by the Brazilian Institute of Geography and Statistics (IBGE), and the percentage of the population dependent on the Public Health System in each Region. [7, 8] Population data for the years 2022 and 2023 were estimated using a linear regression method for trend analysis to predict values based on the existing data series.

Care and demographic data for each unit of the Federation (States) were analyzed, including: number of hospitalizations, total expenditure on the procedure, average cost per procedure, average length of stay (LOS), number of deaths, and mortality rate.

The chi-square test was performed to verify the existence of an association between the types of hysterectomies and Brazilian Regions. A two-factor ANOVA test was used to test the hypotheses of a significant difference in the average length of stay and mortality among the different types of hysterectomy, among the different regions, and the existence of an interaction between the type of hysterectomy and the region of hospitalization.

All analyses were performed at a 5% level of significance.

3. Results

A total of 740,528 hysterectomies were performed in Brazil during the study period. The quantity of hysterectomies showed a slight decrease starting in 2014 (94.4/100,000 women), with a sharp and representative sharp decline in the Southeast and Northeast Regions in 2020 (46/100,000 women), followed by a trend towards recovery in subsequent years, reaching 99.65/100,000 women in 2023 (Figures 1 and 2).

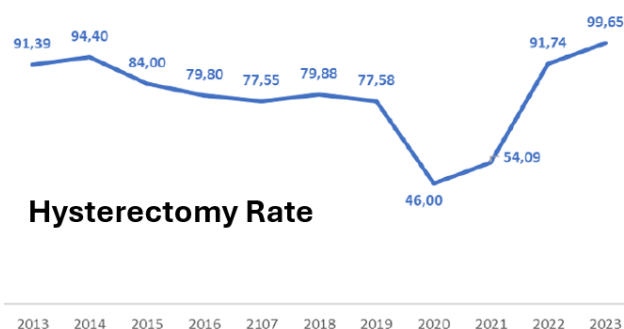


Figure 1. Hysterectomy rate per 100,000 women over 15 years of age in Brazil between 2013 and 2023.

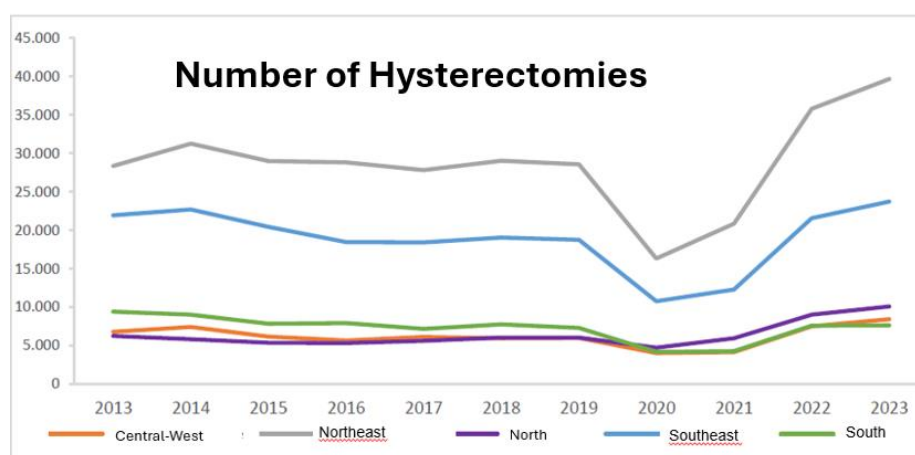


Figure 2. Number of hysterectomies performed by Brazilian Region between 2013 and 2023.

Table 1. Number of procedures by type of hysterectomy procedure in Brazil between 2013 and 2023.

PROCEDURE	NUMBER OF PROCEDURES	%
Total	579.733	78,3
Vaginal	83.465	11,3
Subtotal	64.512	8,7
Videolaparoscopic	6.876	0,9
Puerperal	5.942	0,8
Total	740.528	100

The most prevalent type of hysterectomy was total (78.3%), followed by vaginal (11.3%), subtotal (8.7%), videolaparoscopic (0.9%), and puerperal (0.8%) (Table 1). The Northeast region performed the highest number of procedures (42.6%), while the Central-West region performed the lowest number

(9.25%). Over the years, it is observed that until 2020, the South region had a higher number of procedures than the Central-West and North regions; after that year, the South region performed the lowest number of procedures (Table 2 and Figure 2).

Table 2. Number of hysterectomy procedures by Brazilian Region between 2013 and 2023.

PROCEDURE BY REGION	NUMBER OF PROCEDURE	%
Northeast	315,240	42,6
Southeast	207.792	28,1
South	79.681	10,8
North	69.927	9,4
Central-West	67.888	9,2
Total	740.528	100

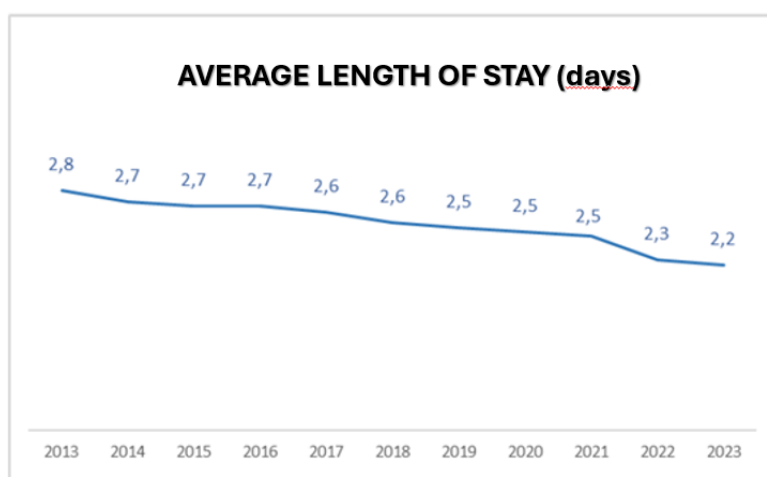


Figure 3. Average length of hospital stay for hysterectomies in Brazil between 2013 and 2023.

Average Length of Stay

The average length of hospital stay (LOS), for all procedure types, ranged from 2 to 3 days and showed a decreasing trend in all Regions during the study period, with an average reduction from 2.8 days in 2013 to 2.2 days in 2023 (Figures 3 and 4). The hysterectomy with the longest average LOS was puerperal (5.1 days), and the shortest was the videolaparoscopic technique (2.3 days).

scopic technique (2.3 days).

The North Region presented the longest average LOS among all Regions (3.1 days), with the exception of puerperal hysterectomy, for which the Central-West Region had the longest average LOS (5.9 days). The South and Northeast Regions presented the shortest average LOS for hysterectomies (2.4 days) (Figure 4 and Table 3).

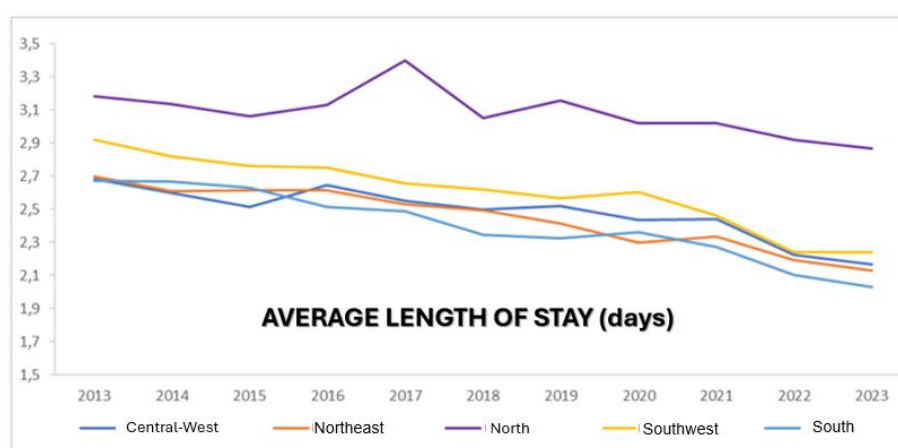


Figure 4. Average length of hospital stay for hysterectomies by Brazilian region between 2013 and 2023.

Table 3. Average length of stay in days by type of hysterectomy between 2013 and 2023 in the Brazilian Regions.

HYSTERECTOMY	NORTHEAST	NORTH	SOUTH	SOUTHEAST	CENTRAL-WEST
Total	2,4	3,1	2,5	2,6	2,4;
Subtotal	2,8	3,0	2,4	2,6	3,0
Puerperal	5,1	5,1	4,2	5,3	5,9
Vaginal	2,7	2,9	2,2	2,4	2,3
Videolaparoscopic	1,9	3,1	1,8	2,5	2,7
Avarage of all Prodedures	2,4	3,1	2,4	2,6	2,5

In general, a certain stability was observed in the average LOS for total and vaginal hysterectomy between 2013 and 2023. However, subtotal, videolaparoscopic, and puerperal procedures showed greater oscillation in the average LOS over the years and between regions, highlighting the Central-West and North regions. Additionally, the average LOS

for videolaparoscopic hysterectomy shows a discrepancy between regions, with the North region having the highest time at 3.1 days, while the South region, with the lowest time, presents 1.8 days—almost half the time of the North region (Figure 5 and Table 4).

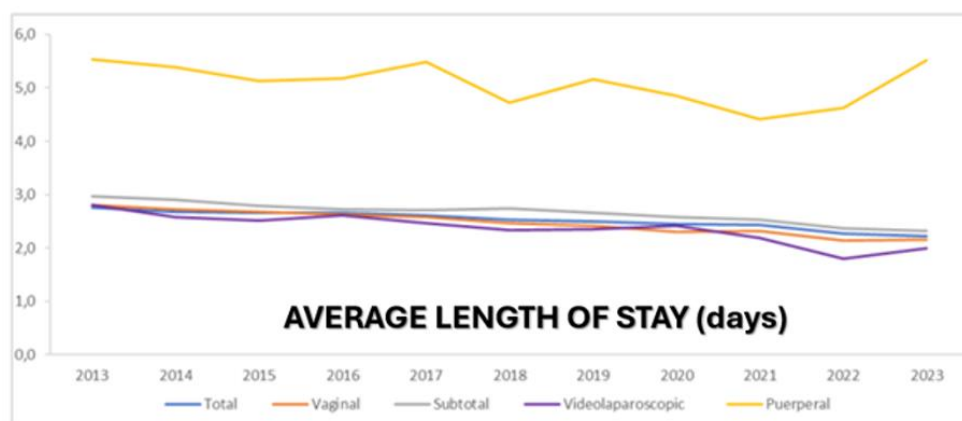


Figure 5. Average length of hospital stay by type of hysterectomy in Brazil between 2013 and 2023.

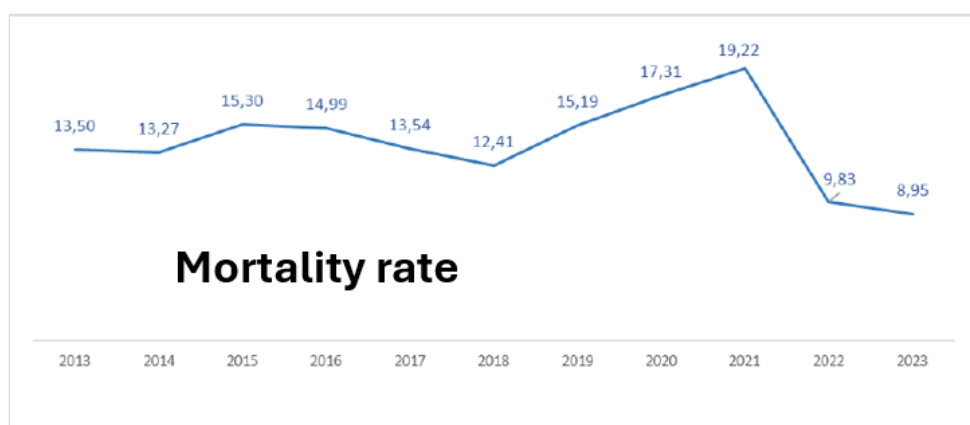


Figure 6. Mortality rate of hysterectomies per 10,000 women in Brazil between 2013 and 2023.

Table 4. Average mortality rate by type of hysterectomy per 10,000 women by region of Brazil between 2013 and 2023.

HYSTERECTOMY	NORTHEAST	NORTH	SOUTH	SOUTHEAST	CENTRAL-WEST	MORTALITY RATE
Total	5.04	5,59	11,44	11,93	7,97	7,52
Subtotal	70.69	21,1	17,24	19,95	39,3	27,44
Puerperal	676,81	371,75	508,62	537,21	699,77	567,15
Vaginal	7,4	6,3	5,8	4,63	1,05	5,27
Videolaparoscopic	0	0	6,45	2,91	0	2,91
Mortality Rate	8,01	9,74	18,2	19,15	13,26	

Mortality

A total of 996 deaths due to hysterectomy were recorded during the evaluated period. The mortality rate showed growth between 2013 and 2021, peaking at 19 deaths per 10,000 women. After this period, the mortality rate regressed and reached its lowest value in 2023, with 9 deaths per 10,000 women. The type of hysterectomy with the highest mortality rate was puerperal (567.15/10,000 women), accounting for 33.80% of deaths, and was notably high in the Central-West Region, with a rate of 699.77/10,000 women. Total hysterectomy was the modality responsible for the highest absolute

number of deaths (7.5/10,000 women; 43.8% of the total deaths from hysterectomy) and had the highest mortality rate in the Southeast Region (11.93/10,000 women). Videolaparoscopic hysterectomy was the technique with the lowest mortality index (2.90/10,000 women), corresponding to 0.20% of the total deaths resulting from hysterectomies (Figure 6 and Table 4).

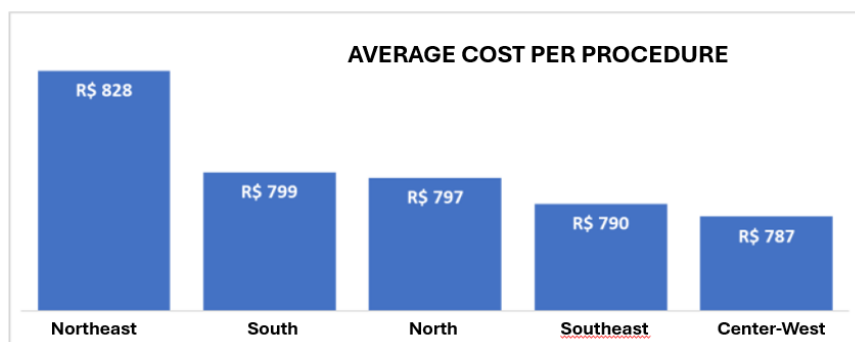


Figure 7. Average cost of hysterectomies by Brazilian Region between 2013 and 2023.

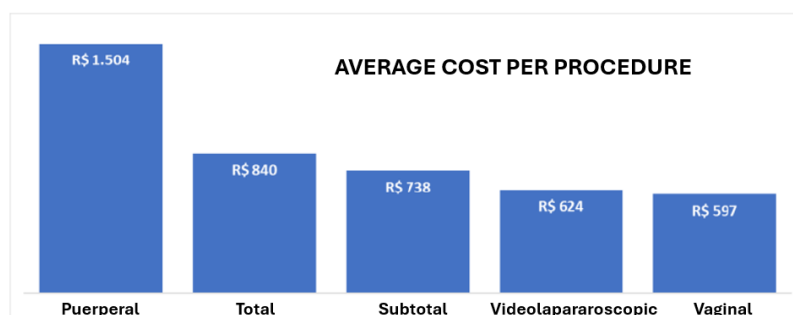


Figure 8. Average cost per type of hysterectomy by Brazilian Region between 2013 and 2023.

Average Cost of Hospitalization

The type of hysterectomy with the highest average cost was puerperal (R\$1,504), followed by total (R\$840), subtotal (R\$738), videolaparoscopic (R\$624), and vaginal (R\$597). Analyzing the average cost by Region, the Northeast region presented the highest average cost (R\$828), and the Central-West region presented the lowest average cost (R\$787). Over the years, the average cost behaved similarly across the regions, and all showed a sharp increase from 2022 to 2023. Among the types of hysterectomy, the average cost of most surgical types was similar over the years, except for the puerperal procedure, which was higher than the others (Figures 7 and 8).

4. Discussion

Hysterectomies are significant procedures for public health

in women due to their associated social impact on birth and mortality rates in the country, as well as their influence on women's psychological aspects, making epidemiological and care-related understandings relevant for study and analysis [9].

Over the eleven years analyzed (2013–2023), representative data were observed, particularly the significant disruption of care for hysterectomies in 2020, coinciding with the COVID-19 pandemic. This not only impacted the performance of surgeries [10] but also the diagnosis of cervical neoplasms [11] which often lead to Hysterectomy [1], a 40% drop in the hysterectomy rate was observed in Brazil. With the end of the pandemic and the return to standard care, there was likely an increase in diagnoses, [11] which may have motivated the 53.65% growth in the hysterectomy rate. By 2023, the annual number of procedures reached a quantity even higher than in the seven years preceding the peak of

COVID-19 in the public health system (SUS).

In the care profile of hysterectomies in Brazil, the Northeast Region stood out, accounting for 42% of all national hysterectomies. This region is the second most populous, and the vast majority of its population relies on the public health system [8]. Another relevant factor to highlight is that the level of economic development in a region directly impacts the population's access to the healthcare system. A survey conducted between 2003 and 2008 observed that the South and Southeast regions have higher coverage of private health plans and insurance [12]. Concurrently, the South Region showed a trend of deceleration in the absolute growth of hysterectomies starting in 2019, likely motivated by this population's greater access to the private care system [13].

Total hysterectomy, characterized by the removal of the uterine body and cervix, was highly prominent compared to other types. This may be due to the uterine cervix being one of the main sites of origin for malignant neoplasms. [14] Furthermore, a 2024 study by Oliveira et al. found that the Northeast and Southeast regions had the most hospitalizations due to uterine myoma [15] which are the same regions distinguished by a high number of total hysterectomy procedures. It is relevant to note a possible relationship observed between uterine myomas and food insecurity, low family income, low parental education levels, and conditions during intrauterine life and childhood. [15, 16] These factors may be linked to the high number of total hysterectomies performed in the Northeast, which is one of the regions presenting a high index of social vulnerability and where a large percentage of the population does not have access to medical insurance and relies exclusively on the SUS. [12].

Videolaparoscopic hysterectomy presented the best indicators for average length of stay (LOS) and mortality across all national Regions. The low number of deaths and shorter LOS in videolaparoscopic hysterectomy may stem from reduced bleeding, less need for blood transfusion, and lower complication rates provided by this surgical technique [17] Although this care modality does not have universal indications, it offers multiple benefits, including: short hospital stay, low mortality rate, and the second-lowest cost, only being surpassed by vaginal hysterectomy. However, despite its benefits, it is not widely used in Brazil because it depends on technological resources requiring greater investment in equipment and maintenance, as well as the technical training of surgeons. [18] Consequently, more developed areas of the country have easier access to this type of procedure. Nevertheless, the growing performance of videolaparoscopic hysterectomies, which occurred especially in the Southeast region, represents an important technological and care evolution and reflects better health outcomes without a significant increase in average cost. It would be opportune to develop cost-effectiveness studies in public care for hysterectomies in the SUS to determine if the investment in video procedures could be more optimized for public resources, based on volume, cost, mortality, and average length of stay, as already

demonstrated in other populations. [18].

Regarding the least prevalent hysterectomy, the puerperal type stands out. According to cases analyzed by Castaneda et al. between January 1967 and December 1995, this is predominantly an emergency procedure. [19] Puerperal hysterectomies are often associated with uterine atony, blood abnormalities (dyscrasias), and placental accreta, conditions reinforced by the indiscriminate indication of C-sections, which favors hemorrhagic disorders, the main causes of postpartum hemorrhage (PPH). [20] The prolonged average LOS in puerperal hysterectomies is justified by the greater risks and, consequently, deaths, which suggests that surgeons with sufficient operative volume accumulate the necessary skills and experience to improve surgical performance over their careers. [19, 21, 22] It is worth noting that many public hospitals are associated with medical residencies, and this fact may contribute to a steeper learning curve for care and less favorable outcomes. [23] These conditions are reflected in the highest average cost (R\$1,504.00) for these procedures, which is considerably higher than the others, given that the second-highest average cost is for total hysterectomy (R\$840.00). Another study conducted in a public hospital in the interior of the Northeast demonstrated that, of the women who underwent peripartum hysterectomy between 2020 and 2022, over 85% required blood transfusion, [24] a frequent complication in puerperal hysterectomies. Thus, it is believed that the puerperal hysterectomy has a higher average cost than the others because it is an emergency procedure with a risk of severe complications, necessitating a longer hospital stay for clinical control and patient monitoring for these potential post-partum and post-hysterectomy difficulties.

It is important to emphasize that LOS, costs, and mortality vary according to the need for perioperative care, and this study could not observe the clinical states and underlying pathologies associated with the studied epidemiological indicators.

Regarding the average cost, the Northeast region was observed to have the highest value. A study on Brazilian medical demographics found that the concentration of physicians per inhabitant in the Northeast (2.09/1,000 inhabitants) is lower than the national average (2.69/1,000 inhabitants). [25] The variation in costs between Regions may reflect the inequality of medical product costs, number of professionals, and regional socioeconomic factors.

The sharp increase in mortality observed in 2021 coincides with the peak of the COVID-19 pandemic. However, it is important to emphasize that the DATASUS database does not allow the identification of COVID-19 as a comorbidity in patients who underwent hysterectomy. Therefore, the observed increase in mortality should be interpreted in the context of indirect pandemic-related factors, such as delayed access to care, increased clinical severity at presentation, healthcare system overload, and reduced availability of specialized resources, rather than being attributed solely to the surgical procedure itself.

Given the markedly high mortality rate associated with

puerperal hysterectomy, these findings reinforce the need for targeted policy measures within the public health system, including the implementation of structured simulation-based training programs for residents, standardized emergency obstetric protocols, and the concentration of high-risk obstetric surgeries in reference centers with experienced multidisciplinary teams. Such strategies may contribute to mitigating the impact of learning curves and improving maternal outcomes in emergency settings.

The current study has some limitations, and its results should be interpreted critically by the reader. In Brazil, data collection and registration may not be uniform and accurate, especially in public services where infrastructure can vary significantly between different regions, potentially leading to difficulties in registration and access, thereby complicating comparative analysis. Practices and protocols for performing hysterectomies may vary according to the Region and Hospital Institution, as there is no National protocol defining care techniques for hysterectomies. The absence of data on patients' clinical conditions and underlying diseases for the procedures may also introduce bias into the interpretations of indicators for patient LOS, cost, and mortality across the different Regions of Brazil.

5. Conclusion

The analysis of hysterectomies performed in Brazil between 2013 and 2023 revealed that the COVID-19 pandemic added significant care disruption for these procedures in Brazil in 2020. Total hysterectomy was the most prevalent type performed, with the Northeast region being the highlight for the number of procedures performed. In contrast, puerperal hysterectomy, despite being the least performed, presented the highest mortality rates. Regarding the average length of stay, a decreasing trend was observed across all Regions, along with an increase in care costs starting in 2020.

Abbreviations

LOS Length of Stay

Conflicts of Interest

The authors declare that there are no conflicts of interest and that there was no form of subsidy or financial funding for the realization of this scientific research.

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