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National Trends and Geographic Disparities in Hip and Knee Arthroplasties in Brazil During 2021-2024: A Descriptive Epidemiological Comparison of Public and Private Healthcare Systems

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Abstract

Background: Hip and knee arthroplasties are among the most commonly performed orthopedic procedures worldwide. However, there is a significant gap in the understanding of their epidemiology in Brazil, particularly regarding geographic variation, differences between healthcare systems, and demographic patterns.

Methods: This descriptive observational epidemiological study analyzed national administrative data from both the public healthcare system (Unified Health System (SUS)) and the private healthcare sector. All hip and knee arthroplasties performed in Brazil between January 2021 and December 2024 were included. Data were evaluated according to age, sex, geographic distribution, procedure type, and underlying diagnosis, with comparisons between public and private systems.

Results: A total of 322,611 arthroplasties were identified, including 207,670 hip and 114,941 knee procedures. The most affected age group was 70-79 years, with a predominance of female patients. Hip arthroplasties were more frequent overall. The distribution between public (48.09%) and private (51.91%) sectors was relatively balanced. Notable differences were observed between systems: hip arthroplasties predominated in the public sector, largely associated with fracture-related cases, whereas knee arthroplasties were more common in the private sector. Substantial geographic variability was identified across Brazilian states.

Conclusions: Arthroplasty utilization in Brazil differs markedly between the public and private healthcare systems and across regions. Hip arthroplasty predominated overall, driven disproportionately by public-sector trauma cases, while the private sector showed a more balanced hip-knee distribution, a pattern that differs from high-income countries. These descriptive findings, which were not adjusted for age, sex, disease burden, or differences in population coverage between sectors, should be interpreted as observed utilization patterns rather than established evidence of access disparities.

Categories: Orthopedics, Epidemiology/Public Health
Keywords: brazil, epidemiology, geographic variation, health disparities, hip arthroplasty, knee arthroplasty, private healthcare, public health system

Introduction

Total hip arthroplasty (THA) and total knee arthroplasty (TKA) are among the most frequently performed orthopedic procedures worldwide. In countries with well-established national registries, such as the United States, Canada, Australia, the United Kingdom, and Scandinavian nations, these procedures have shown consistent growth over time, with well-documented demographic patterns, including higher prevalence among older adults and women, as well as significant regional and temporal variations [1-3]. These data play a crucial role in healthcare planning, resource allocation, and forecasting future demand.

Despite the high volume of procedures performed globally, important gaps remain in the epidemiological understanding of arthroplasty utilization in many countries. As highlighted by Hilibrand et al. [1] and Koh et al. [2], national-level analyses are often limited, particularly regarding geographic distribution, demographic characteristics, and longitudinal trends. In some settings, even where procedure volumes are substantial, comprehensive nationwide data remain incomplete or fragmented. For instance, in South Korea, Koh et al. [2] demonstrated a significant increase in TKA utilization but noted the absence of consolidated national data describing long-term trends. Similarly, Worlicek et al. [3] reported that incomplete registry data in

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Germany hindered a comprehensive understanding of arthroplasty patterns, requiring the use of large administrative databases to bridge these gaps.

In Brazil, this challenge is even more pronounced. The country has a unique dual healthcare system composed of the public Unified Health System (SUS), which provides universal access, and a private supplementary healthcare sector, funded through insurance plans. These systems differ substantially in terms of resource availability, patient demographics, and patterns of care delivery. Despite the large number of arthroplasties performed annually, few studies integrate data from both public and private sectors to comprehensively evaluate how these procedures are distributed across the country. This study aims to provide a nationwide analysis of hip and knee arthroplasties in Brazil to understand the arthroplasty epidemiology across the country by comparing arthroplasty procedure patterns across different healthcare sectors, procedure types, clinical indications, geographic region, age range, and sex from both the public and private healthcare sectors during 2021-2024.

Materials And Methods

Study design

This study is a descriptive observational epidemiological analysis based on national administrative data from both the public and private healthcare sectors in Brazil. The study utilized secondary, anonymized data, with no individual patient identification, and therefore did not require institutional review board approval according to national regulations.

Data sources

Data from the public healthcare system were obtained from the Hospital Information System of the Unified Health System (SIH-SUS), accessed through DATASUS [4]. It is the technology agency of the Brazilian Ministry of Health responsible for collecting, storing, and processing health data nationwide. The SIH-SUS provides anonymized information on hospital admissions registered through Hospital Admission Authorizations (AIH). Procedures are coded according to the SIGTAP system (Management System of Procedures, Medications, and Orthotic, Prosthetic and Special Materials), which organizes the unified SUS procedure table. The denominator population for the public sector comprises all hospital admissions funded by the SUS and recorded in the SIH-SUS for the geographic area and period under analysis, with the unit of analysis being the hospital admission. Diagnoses are classified using the International Classification of Diseases, 10th Revision (ICD-10) [4].

For the private healthcare sector, aggregated data were collected from supplementary health insurance providers, available through the Brazilian National Regulatory Agency for Private Health Insurance and Plans (ANS) [5]. The ANS centralizes information mandatorily submitted by all health insurance operators through different systems. For coding definitions, procedures in this dataset are classified according to the Unified Supplementary Health Terminology (TUSS), allowing differentiation between primary and revision arthroplasties [5]. The denominator population for the supplementary sector comprises all active beneficiaries of private health plans with medical-hospital coverage registered in the Beneficiary Information System (SIB) for the same geographic area and period, with the unit of analysis being the beneficiary or the assisted procedure, depending on the specific ANS system used.

Study population

All hip and knee arthroplasties performed in Brazil between January 1, 2021, and December 31, 2024, were included. Procedures were categorized as follows: THA, TKA, and primary and revision procedures (available only in the private sector via TUSS classification).

Hip and knee arthroplasties performed within SUS were identified using seven SIGTAP procedure codes: 0408040084 (primary cemented THA), 0408040092 (primary uncemented/hybrid THA), 0408040068 (conversion THA), 0408040076 (revision THA), 0408040050 (partial/hemi-hip arthroplasty), 0408050063 (primary TKA), and 0408050055 (revision TKA). Partial/hemi-hip arthroplasty was included within the THA category because it is commonly used as definitive treatment for femoral neck fractures in elderly patients within SUS; this category therefore combines total and partial hip replacement. Hip and knee arthroplasties performed within the supplementary private sector were identified using TUSS procedure codes 30724058 (primary THA: any technique or type), 30724082 (partial primary hip arthroplasty, e.g., Thompson), 30724279 (revision THA with component removal and replacement), 30726034 (primary TKA) and 30726255 (revision TKA), which allowed differentiation between primary and revision procedures.

The underlying etiology of each procedure was determined based on ICD-10 codes and grouped into the following: elective procedures for osteoarthritis (M16 (hip osteoarthritis) and M17 (knee osteoarthritis)), urgent procedures for fracture (S72 (proximal femur fracture)), and other diagnoses (cases not classified under the categories above).

The "other diagnoses" category included conditions distinct from osteoarthritis and proximal femur fracture

(e.g., osteonecrosis, rheumatoid arthritis, and post-traumatic arthropathy), as well as administrative records in which the diagnosis code registered did not correspond to the expected joint for the procedure performed (e.g., a hip-related ICD-10 code associated with a knee arthroplasty or vice versa), reflecting known limitations of administrative coding discussed further in the Limitations section. A quantified breakdown of this category, including the proportion of records with no ICD-10 code recorded, is reported in the Discussion.

Each hospital admission (SUS) or insurance claim (private sector) was treated as an independent procedure episode. Because the administrative databases used do not allow patient-level linkage across records, cases in which the same patient underwent staged bilateral procedures, or a revision following a primary procedure within the study period, were counted as separate procedures.

Variables and data analysis

Data were analyzed according to patient age, sex, type of procedure, underlying diagnosis, and geographic distribution by Brazilian state. Age groups were stratified into predefined categories, and sex distribution was assessed across all procedures.

Geographic analysis included all 26 Brazilian states and the Federal District. Population-adjusted incidence rates were calculated for each state as the total number of procedures performed between January 2021 and December 2024, divided by the average resident population of that state over the same period (estimated using the Instituto Brasileiro de Geografia e Estatística (IBGE) intercensal estimates and the 2022 Census), multiplied by 100,000 inhabitants [6].

Comparisons were performed between the public and private healthcare systems to evaluate differences in procedure distribution, indications, and demographic patterns.

Statistical analysis

Categorical variables such as sex, age group, procedure type (THA/TKA), underlying diagnosis, healthcare system (SUS or private), and prosthesis type (primary/revision) were described as absolute and relative frequencies. Associations between categorical variables were assessed using the chi-squared test of independence; when more than 20% of expected cell counts were below 5, Fisher's exact test was used instead. Effect sizes were reported as Cramér's V. A two-sided significance threshold of $\alpha = 0.05$ was adopted. Statistical analyses were performed using the R software (R Foundation for Statistical Computing, Vienna, Austria), and choropleth maps were generated using Microsoft Excel's map chart feature (Microsoft Corp., Redmond, WA, USA).

Ethical considerations

All data used in this study were publicly available or derived from anonymized administrative databases, with no possibility of patient identification. In accordance with Brazilian regulations, studies based exclusively on secondary, de-identified data are exempt from ethical committee approval and informed consent requirements.

Results

Demographic characteristics

A total of 322,611 arthroplasty procedures were performed in Brazil between 2021 and 2024, including 207,670 (64.37%) THA and 114,941 (35.63%) TKA.

The demographic characteristics of the study population are summarized in Table *1*. The majority of patients were older adults, with the highest frequency observed in the 70-79-year age group. Patients aged 60 years or older accounted for the largest proportion of procedures. A predominance of female patients was observed, representing 59.17% of all cases.

Variable	Hip	Knee	Total
Total N	207,670	114,941	322,611
Age group mode (SD)	70-79 years	70-79 years	-
Age 60-69 years	48,633 (15.07%)	43,251 (13.41%)	91,884 (28.48%)
Age 70-79 years	52,475 (16.27%)	44,436 (13.77%)	96,911 (30.04%)
Age ≥80 years	46,714 (14.48%)	9,905 (3.07%)	56,619 (17.55%)
Others	59,848 (18.55%)	17,349 (5.38%)	77,197 (23.93%)
Female sex, n (%)	112,520 (34.88%)	78,354 (24.29%)	190,874 (59.17%)
Male sex, n (%)	94,652 (29.34%)	36,133 (11.20%)	130,785 (40.54%)

TABLE 1: Demographic characteristics of patients undergoing hip and knee arthroplasties in Brazil (2021-2024)

Values are expressed as n (%), where percentages are calculated relative to the total sample (N = 322,611). Student's t-test: p-value 0.490.

Procedure volume and distribution

The total number of arthroplasty procedures and their distribution over time are presented in Figure *1*, which demonstrates a progressive increase in both hip and knee arthroplasties throughout the study period.

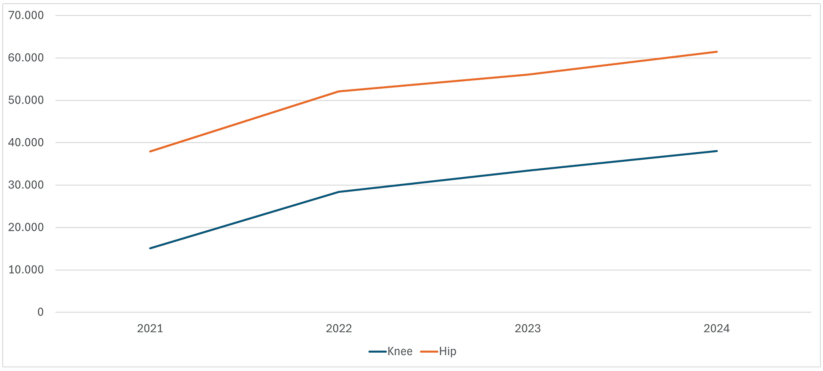


FIGURE 1: Line chart showing the annual trend of hip and knee arthroplasties in Brazil (2021-2024)

Overall, hip arthroplasties were more frequently performed than knee arthroplasties. When stratified by healthcare system, 155,130 procedures (48.09%) were performed in the public system (SUS), while 167,481 (51.91%) occurred in the private sector. The distribution of procedures by type and healthcare system is illustrated in Figure *2*.

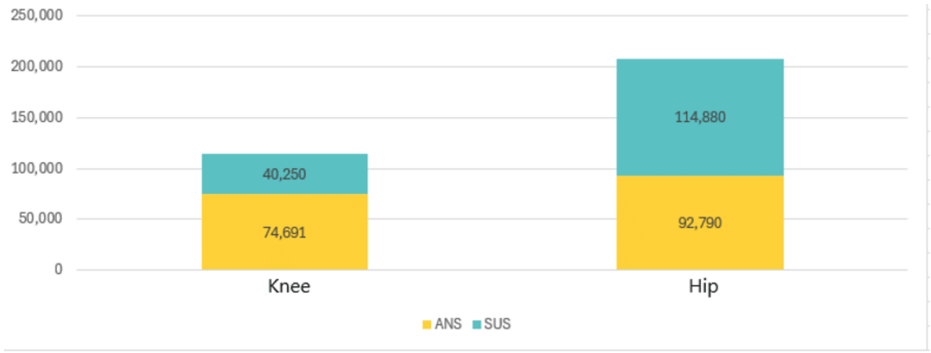


FIGURE 2: Grouped bar chart showing the distribution of hip and knee arthroplasties by healthcare system (SUS vs. private sector) in Brazil (2021-2024)

ANS: Brazilian National Regulatory Agency for Private Health Insurance and Plans; SUS: Unified Health System

Etiological distribution

The distribution of underlying diagnoses according to ICD-10 codes is presented in Table 2. THA showed a mixed etiological profile, including both elective procedures for osteoarthritis (M16) and a substantial proportion of urgent surgeries related to proximal femur fractures (S72). In contrast, TKA was performed almost exclusively for osteoarthritis (M17), reflecting its predominantly elective nature.

ICD-10/diagnosis	Hip arthroplasty (THA)	Knee arthroplasty (TKA)	Total
M16/hip osteoarthritis	69,594 (21.57%)	418 (0.13%)	70,012 (21.70%)
M17/knee osteoarthritis	520 (0.16%)	68,676 (21.29%)	69,196 (21.45%)
S72/proximal femur fracture	71,411 (22.13%)	194 (0.06%)	71,605 (22.19%)
Others	66,145 (20.50%)	45,653 (14.15%)	111,798 (34.65%)
Total	207,670 (64.37%)	114,941 (35.63%)	322,611 (100%)

TABLE 2: Distribution of diagnoses (ICD-10) by type of arthroplasty in Brazil (2021-2024)

Values are expressed as n (%), where percentages are calculated relative to the total sample (N = 322,611). Chi-squared test of independence: $\chi^2(3) = 199{,}933.40$; $p < 0.001$; Cramér's V = 0.787.

ICD-10: International Classification of Diseases, 10th Revision; THA: total hip arthroplasty; TKA: total knee arthroplasty

The distribution of these diagnoses by healthcare system is presented in Table 3. Fracture-related procedures were predominantly observed in the public healthcare system, highlighting its central role in trauma care. Conversely, elective procedures for osteoarthritis were more frequently performed in the private sector, particularly for knee arthroplasties.

ICD-10/diagnosis	Public system (SUS)	Private sector	Total
M16/hip osteoarthritis	38,993 (12.09%)	31,019 (9.61%)	70,012 (21.70%)
M17/knee osteoarthritis	34,753 (10.77%)	34,443 (10.68%)	69,196 (21.45%)
S72/proximal femur fracture	58,046 (17.99%)	13,559 (4.20%)	71,605 (22.19%)
Others	23,338 (7.23%)	88,460 (27.42%)	111,798 (34.65%)
Total	155,130 (48.09%)	167,481 (51.91%)	322,611 (100%)

TABLE 3: Distribution of diagnoses (ICD-10) by healthcare system (SUS vs. private sector) in Brazil (2021-2024)

Values are expressed as n (%), where percentages are calculated relative to the total sample (N = 322,611). Chi-squared test of independence: $\chi^2(3) = 66,105.93$; $p < 0.001$; Cramér's V = 0.453.

ICD-10: International Classification of Diseases, 10th Revision; SUS: Unified Health System

Geographic distribution

The geographic distribution of arthroplasty procedures is illustrated in Figure *3* and Figure *4*. Figure *3* presents the relative proportion of hip and knee arthroplasties across Brazilian states, while Figure *4* shows population-adjusted incidence rates.



FIGURE 3: Proportion of knee and hip arthroplasties by federative unit in Brazil (2021-2024)

Thematic map depicting the relative proportion of knee and hip arthroplasties across the 27 Brazilian federative units, calculated based on the total number of procedures performed during the study period. Color gradients indicate the predominance of each type of arthroplasty: green shades represent a higher proportion of knee arthroplasties, orange shades indicate a higher proportion of hip arthroplasties, and blue tones represent similar proportions between the two procedures. The map images were generated using the built-in map chart feature available in Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

AC: Acre; AL: Alagoas; AP: Amapá; AM: Amazonas; BA: Bahia; CE: Ceará; DF: Federal District; ES: Espírito Santo; GO: Goiás; MA: Maranhão; MT: Mato Grosso; MS: Mato Grosso do Sul; MG: Minas Gerais; PA: Pará; PB: Paraíba; PR: Paraná; PE: Pernambuco; PI: Piauí; RJ: Rio de Janeiro; RN: Rio Grande do Norte; RS: Rio Grande do Sul; RO: Rondônia; RR: Roraima; SC: Santa Catarina; SP: São Paulo; SE: Sergipe; TO: Tocantins

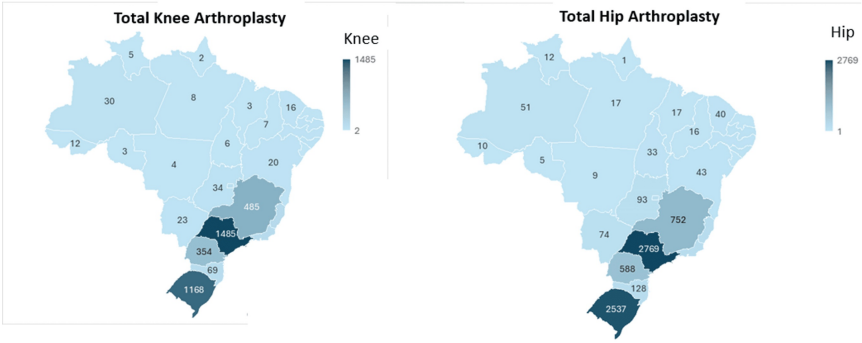


FIGURE 4: Population-adjusted rates of hip and knee arthroplasties by state (per 100,000 inhabitants) in Brazil (2021-2024)

Incidence rates of new surgeries over the entire study period, adjusted for population (per 100,000 inhabitants), for hip arthroplasties (on the right) and knee arthroplasties (on the left) across Brazilian federative units. Rates were calculated using the estimated population of each state during the study period. The color gradient indicates the relative intensity of each procedure. The map images were generated using the built-in map chart feature available in Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

There was marked regional heterogeneity, with hip arthroplasties predominating in most states. Only a small number of states, such as Espírito Santo and Amapá, demonstrated a higher proportion of knee arthroplasties. Population-adjusted rates further highlighted disparities in access and utilization across regions.

Public vs. private healthcare comparison

A comparison between healthcare systems revealed distinct patterns in procedure distribution. In the public system (SUS), hip arthroplasties accounted for the majority of procedures (74.05% THA vs. 25.95% TKA). In contrast, the private sector showed a more balanced distribution (55.40% THA vs. 44.60% TKA).

The proportion of procedures performed in the public versus private sectors across Brazilian states is shown in Figure *5*, demonstrating substantial variability and reflecting regional differences in healthcare access and insurance coverage.

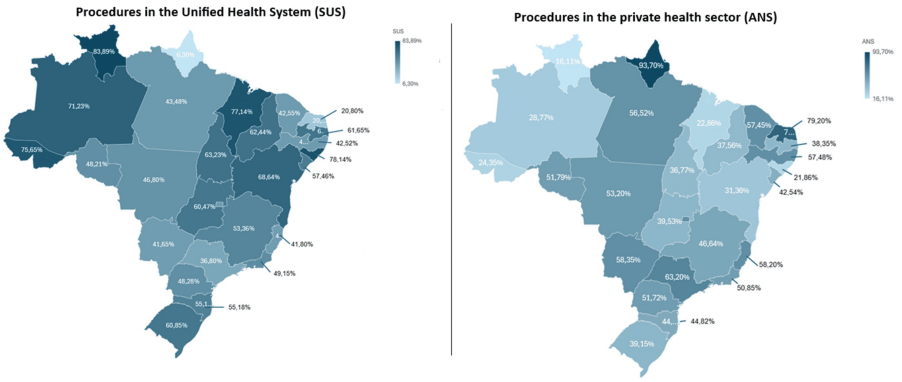


FIGURE 5: Thematic map illustrating the relative proportion of arthroplasties performed in each sector in Brazil (2021-2024)

Thematic map illustrating the relative proportion of arthroplasties performed in the Unified Health System (SUS) (on the left) and in the private health sector (on the right). The map images were generated using the built-in map chart feature available in Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

ANS: Brazilian National Regulatory Agency for Private Health Insurance and Plans

Type of prosthesis (private sector)

The distribution of prosthesis types in the private sector, based on TUSS codes, is presented in Table *4*. Primary arthroplasties accounted for the vast majority of procedures, while revision surgeries represented a

smaller proportion. This pattern is consistent with findings from international arthroplasty registries.

Prosthesis type	Hip arthroplasty (THA)	Knee arthroplasty (TKA)	Total
Primary	84,743 (50.60%)	70,021 (41.81%)	154,764 (92.41%)
Revision	8,047 (4.80%)	4,670 (2.79%)	12,717 (7.59%)
Total	92,790 (55.40%)	74,691 (44.60%)	167,481 (100%)

TABLE 4: Type of prosthesis (private sector only) in Brazil (2021-2024)

Values are expressed as n (%), where percentages are calculated relative to the total number of procedures performed in the private sector (N = 167,481), identified via TUSS procedure codes. Chi-squared test of independence: $\chi^2(1) = 345.36$; $p < 0.001$; Cramér's V = 0.045.

THA: total hip arthroplasty; TKA: total knee arthroplasty; TUSS: Unified Supplementary Health Terminology

Discussion

The results of this study demonstrate that hip and knee arthroplasties in Brazil present a well-defined demographic profile, with a predominance of patients aged between 70 and 79 years and a higher frequency among females. This pattern is widely described in the international literature and is associated with both population aging and the higher prevalence of osteoarthritis among women [2,7].

A higher occurrence of THA compared to TKA was observed, a finding that differs from the pattern reported in several high-income countries. In settings such as the United States and Germany, studies have demonstrated a more pronounced increase in TKA, which often equals or surpasses THA volumes [1,3]. This difference may be attributed to the distinct clinical indications of these procedures. TKA is predominantly elective and associated with advanced osteoarthritis and the chronic progression of the disease [8]. In contrast, THA has more heterogeneous indications, including both degenerative conditions and acute situations such as proximal femur fractures and osteonecrosis [9]. In this context, the higher frequency of hip arthroplasties in Brazil may reflect the significant contribution of acute conditions requiring immediate surgical intervention.

The overall distribution of procedures between the public health system (SUS) and the supplementary health sector was similar, reflecting the dual structure of the Brazilian healthcare system [10]. This balance likely results from the high demand for arthroplasties, driven by population aging and the high prevalence of degenerative joint diseases and fractures in older adults [1,7]. However, when analyzing the nature of the procedures, relevant differences between the systems emerge. In the SUS, there is a predominance of THA, consistent with its role in urgent trauma care, particularly proximal femur fractures. In contrast, TKA, which is mostly elective, is more frequent in the private sector. Differences in specialist availability and waiting times for scheduled surgeries are plausible contributing factors, but were not directly measured in this study and should be regarded as hypotheses rather than established explanations.

This discrepancy becomes even more evident when considering that, in the SUS, THA procedures are approximately three times more frequent than TKA, whereas in the private sector the distribution between the two procedures is considerably more balanced (55.40% THA vs. 44.60% TKA, compared with 74.05% THA vs. 25.95% TKA in the SUS). The overall predominance of hip arthroplasty in the national sample is therefore driven disproportionately by SUS trauma-related cases, particularly among patients aged 80 years or older, rather than reflecting a generalized national preference for hip arthroplasty. This finding reinforces the role of the SUS as the main provider of care in acute situations, while the supplementary sector concentrates a higher proportion of elective procedures [1,11].

The analysis of ICD-10 codes showed a homogeneous pattern for the diagnosis of gonarthrosis (M17) across both systems. In contrast, codes related to coxarthrosis (M16) and proximal femur fractures (S72) were more frequent in the SUS. Approximately one-third of the records (111,798/322,611; 34.65%) were classified as "Others" (Table *2* and Table *3*). Of these, 48,763 procedures (43.6% of the "Others" category, 15.1% of the full sample) had no ICD-10 code recorded at all, rather than corresponding to a genuine alternative diagnosis. The remaining 63,035 records were distributed across 664 distinct ICD-10 codes; the 10 most frequent, including complications of internal prosthetic devices (T84), other osteoarthritis (M19), surgical aftercare (Z48), osteonecrosis (M87), and internal knee derangement (M23), accounted for 78.7% of this subgroup and are clinically coherent, orthopedics-adjacent diagnoses rather than random noise. Inconsistencies in the association between diagnosis and procedure, such as knee arthroplasties recorded with hip-related ICD codes and vice versa, were also observed. These findings reflect inherent limitations of administrative databases, including missing and potentially erroneous coding and variability in the registration process [12]. Additional factors, such as differences in coder training, case complexity, the presence of multiple

diagnoses, and institutional variability, may also impact data accuracy [13,14].

Geographical analysis revealed marked regional heterogeneity, with a predominance of hip arthroplasties in most states and a higher proportion of knee arthroplasties only in a few federative units, such as Espírito Santo and Amapá. This pattern is consistent with the literature and may be explained by a combination of demographic, epidemiological, and structural factors, including population aging, the incidence of fractures in older adults, and the organization of healthcare networks. Socioeconomic factors and the regional coverage of supplementary health insurance may also play a role in this heterogeneity; however, as beneficiary-level denominators for the private sector were not available, this association should be regarded as a hypothesis for future research rather than an established finding [1,15].

Overall, the SUS remains the main provider of these procedures, reflecting its universal nature and central role in the Brazilian healthcare system. The regional differences observed in procedure volume and type are consistent with known geographic variation in healthcare infrastructure and supplementary insurance coverage across Brazil [15,16]. However, because this study used raw procedure counts without adjustment for age, sex, disease burden, or differences in population coverage between SUS (which serves the entire population) and the private sector (which serves only ANS beneficiaries), these regional differences should not, by themselves, be interpreted as evidence of disparities in access to care.

Regarding the type of prosthesis, there was a predominance of primary procedures compared to revisions, a pattern consistent with international arthroplasty registries [7]. The lower frequency of revision surgeries is associated with late complications such as aseptic loosening, infection, or component wear and may also be explained by the time required for these complications to develop, as they often occur years after the primary procedure.

Internationally, demand for arthroplasty continues to grow, driven largely by population aging and the rising prevalence of osteoarthritis [17,18]. The United States shows continued growth in both THA and TKA with projections of substantial further increases [7,11], while most European and Asian health systems report an increasing share of TKA relative to THA [2,3]. Differences in healthcare system organization, from predominantly private, insurance-based models to universal public systems, likely contribute to the differing elective-versus-urgent procedure mix observed across countries, including the comparatively higher proportion of THA seen in Brazil [19].

This study has several limitations inherent to its ecological, aggregate-level design, which precludes patient-level causal inference. The data are drawn from secondary administrative databases and may be subject to coding errors, underreporting, and inconsistencies in clinical information, which may affect the accuracy of epidemiological analyses [12]. As detailed above, 15.1% of records had no ICD-10 code recorded, and the remaining "Others" diagnoses, while clinically coherent, were not individually validated against clinical records. It was not possible to assess individual clinical variables such as comorbidities, disease severity, or postoperative outcomes. The SIGTAP coding system used by SUS does not differentiate between primary and revision implants, unlike the private-sector TUSS classification; consequently, revision rates could only be assessed within the private sector, and the true national revision burden, including that occurring within SUS, remains unknown. Age and sex standardization was not performed for the regional comparisons. Finally, beneficiary-level denominators for the private (ANS-regulated) sector were not available, preventing adjustment of public-private and regional comparisons for differences in population coverage; consequently, observed differences in procedure counts and distribution should be interpreted as descriptive findings rather than as direct evidence of disparities in healthcare access.

Conclusions

This nationwide study describes clear differences in the distribution of hip and knee arthroplasties between Brazil's public and private healthcare systems, as well as marked regional variation. Hip arthroplasty predominated overall, driven disproportionately by SUS trauma-related cases, while the private sector showed a more balanced distribution between hip and knee procedures, a pattern that differs from trends reported in several high-income countries, where knee arthroplasty is often more prevalent. These descriptive findings reflect the combined influence of demographic factors, injury epidemiology, and healthcare system structure. Because this study did not adjust for age, sex, disease burden, or differences in population coverage between SUS and the private sector, these findings should be interpreted as a description of observed utilization patterns rather than direct evidence of disparities in access to care. Future studies incorporating standardized, population-adjusted rates and ANS beneficiary denominators are needed to confirm whether true disparities in access exist. In the meantime, these findings can inform resource allocation and monitoring of arthroplasty provision across Brazil's dual healthcare system.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Carolina Tsen, Tainá Zanella, Raphael M. Macedo, Maria E. Boas, Guilherme M. Gigante, Leon A. Silva, Alessandro R. Zorzi

Acquisition, analysis, or interpretation of data: Carolina Tsen, Leon A. Silva, Alessandro R. Zorzi

Drafting of the manuscript: Carolina Tsen, Tainá Zanella, Raphael M. Macedo, Maria E. Boas, Guilherme M. Gigante, Leon A. Silva, Alessandro R. Zorzi

Critical review of the manuscript for important intellectual content: Carolina Tsen, Tainá Zanella, Raphael M. Macedo, Maria E. Boas, Guilherme M. Gigante, Leon A. Silva, Alessandro R. Zorzi

Supervision: Alessandro R. Zorzi

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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