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Temporal Trends in Mammography Examinations in Brazil from 2013 to 2023

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ABSTRACT

Introduction: Breast cancer is the most common cancer among Brazilian women and a leading cause of death in the 30–59 age group. Due to its high incidence and mortality rates, mammography is a key strategy for early detection and mortality reduction. This study aimed to analyze the time trend of mammography exams conducted in Brazil between 2013 and 2023, considering age group, region, clinical indication, prior mammogram frequency, type of screening, and Breast Imaging Reporting and Data System (BI-RADS®) categories. **Methods:** This ecological time-series study used secondary data from the Cancer Information System (SISCAN, *Sistema de Informação de Câncer*). Mammograms performed on women aged ≥30 years from 2013 to 2023 were included. Variables analyzed were age group, region, clinical indication (screening or diagnostic), prior exam history, type of screening (target population, high risk, treated patient), and BI-RADS® classification. Time trend analysis was conducted using the Joinpoint Regression Program, version 5.0.2, applying annual percentage change and average annual percentage change, with 95% confidence intervals and a significance level of $p<0.05$. **Results:** A total of 25,713,333 mammograms were performed, with a 33.92% increase overall. Of these, 97.8% were for screening purposes. The 65–69 age group had the highest growth with average annual percentage change of 3.63%. Prior exam frequency rose to 72.85%. BI-RADS 2 (49.92%) and 1 (35.37%) were the most prevalent. Diagnostic exams rose from 2013 to 2020 (5.94%) and declined from 2020 to 2023 (-12.75%). **Conclusion:** Mammography use increased in Brazil over the decade, with greater adherence among target populations, improved follow-up, and persistent regional and age disparities.

KEYWORDS: prevalence; mammography; preventive medicine; early detection of cancer; breast neoplasms.

INTRODUCTION

Demographic changes have occurred in the last decades of the 20th century, such as rapid demographic transition, declining fertility, and increased life expectancy. These changes have been accompanied by a rise in non-communicable chronic diseases—including cancer, diabetes, cardiovascular and respiratory conditions—which have become increasingly prevalent, significantly impacting population health and quality of life[1]. In this context, cancer has emerged as one of the greatest global public health challenges, with an exponential increase in incidence and mortality rates[1]. It is characterized by disorganized and abnormal cell growth, resulting from genetic mutations associated with external factors[2,3].

According to the National Cancer Institute (INCA)[4], the estimated number of new cancer cases for each year of the 2023–2025 triennium is 704,000, with breast cancer being the most incident among women (with 73,000 new cases per year in this period, representing 30.1% of all female neoplasms), excluding non-melanoma skin cancer. The World Health Organization (WHO) recognizes more than 20 different subtypes of breast cancer, highlighting its heterogeneity in terms of morphology and clinical manifestations[5]. Thus, the natural history of the disease and survival vary among individuals due to factors such as tumor doubling time, metastatic potential, and hormonal and nutritional influences[5].

INCA states that breast cancer is the leading cause of death among women in the third to fifth decades of life[6], with an age-adjusted mortality rate of 11.84 deaths per 100,000 women worldwide in 2020[7]. Regarding geographic distribution in Brazil, the highest crude incidence rates occur in the Southeast and South regions, while the North region has the lowest frequency of this neoplasm[4].

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Due to its high incidence and mortality, the importance of disease control measures and the need for effective early detection strategies are emphasized[6]. Population screening, especially through mammography, remains one of the most effective methods for early diagnosis, contributing to the reduction in mortality[6]. Screening consists of performing exams on asymptomatic women to identify radiological signs suggestive of the disease[7]. An American epidemiological study showed that mammography has a sensitivity of 84.4% and specificity of 90.8%, with a recall rate of 9.4%[7].

Given the epidemiological relevance of breast cancer, this study aimed to analyze the time trend of mammography exams performed in Brazil from 2013 to 2023, considering age group, region, and clinical indication. In addition, it aimed to describe the frequency of previous mammograms, the type of screening mammography, and the categorization according to the Breast Imaging Reporting and Data System (BI-RADS®) during the same period, using data from the Cancer Information System (SISCAN, *Sistema de Informação de Câncer*). In this way, the study is designed to assess compliance with the Ministry of Health protocol, provide support for public policy planning, and encourage research on breast cancer screening.

METHODS

This is an ecological time-series study using secondary data extracted from SISCAN (cervical and breast cancer), managed by the Ministry of Health and made available by the Department of Informatics of the Unified Health System (DATASUS), a publicly accessible online platform that provides data through TABNET at http://www.datasus.gov.br, with files downloadable in comma-separated value (CSV) format.

The study included mammography exams performed on women aged 30 years or older from 2013 to 2023, the complete years accessable. The proportion of exams performed was analyzed according to age group (30–34 years; 35–39 years; 40–44 years; 45–49 years; 50–54 years; 55–59 years; 60–64 years; 65–69 years; 70–74 years; 75–79 years; over 79 years), region (North; Northeast; Southeast; South; Midwest), and clinical indication (screening; diagnostic). In addition, the frequency of previous mammograms (yes; no), the type of screening mammography (target population; high-risk population – family history; previously treated breast cancer patient), and the categorization according to BI-RADS® (categories 0 to 6) were also analyzed.

Data were publicly available online, and files were downloaded in CSV format. Raw data on mammograms performed each year and their outcomes were tabulated in Excel and imported into the free Joinpoint Regression Program, version 5.0.2, for time trend analysis. The independent variable was the year of occurrence, and the dependent variable was the number of mammograms × 100, calculated directly in the software and standardized following the previously described logarithmic criteria.

Annual percentage change (APC) was calculated with a 95% confidence interval (95%CI), where a negative APC indicates a decreasing trend and a positive value indicates an increasing trend. At the end of the period, the average annual percentage change (AAPC) was obtained, showing how the change occurred over the study period. If there is more than one inflection point, the AAPC considers all for its calculation; otherwise, the AAPC value equals the APC. The model was adjusted assuming that the number of inflection points could vary from zero (only one segment) to one (two segments) throughout the years.

A significance level of 5% was established to test the null hypothesis that the APC and AAPC of the series are equal to zero. Thus, both APC and AAPC results are considered significant if $p<0.05$ or if the 95%CI is entirely positive (indicating an increasing trend) or entirely negative (indicating a decreasing trend).

This study was conducted exclusively with secondary and aggregated data, publicly available and in accordance with the Brazilian National Health Council (CNS) Resolution Nº 466, of December 12, 2012, and the guidelines and standards of CNS Resolution Nº 510/2016, Article 1, Sole Paragraph, Items II, III, and V. Therefore, the study was exempt from review by a research ethics committee.

RESULTS

Between 2013 and 2023, a total of 25,713,333 mammograms were conducted in Brazil, rising from 1,794,522 (6.98%) exams in 2014 to 3,532,418 (13.74%) in 2023. The results of the Joinpoint Regression analysis demonstrated an annual growth pattern of 311.36% (95%CI 75.94; 589.66) from 2013 to 2015, while the period from 2015 to 2023 showed a stationary pattern ($p>0.05$). Throughout the entire period (2013–2023), there was a significant increase in the proportion of mammograms performed in Brazil by 33.92% (95%CI 17.06; 47.45) (Figure 1).

When analyzing data regarding previous mammograms, it was found that 72.85% (18,731,715) of the total were performed on women who had previously undergone the exam. Conversely, 17.79% (4,573,565) of the mammograms were conducted on women who had never undergone the exam, and 9.36% (2,408,053) of the women did not know or could not confirm whether they had ever undergone the procedure.

In 2013, 64.64% of the women had previous mammograms. The highest percentage of women with previous exams was observed in 2022 (75.47%). Regarding women with no prior mammogram, in 2021, that number accounted for 399,059 (14.93%), increasing to 609,479 (17.25%) in 2023.

Among the 25,713,333 mammograms, approximately 97.80% (25,146,785) were screening mammograms, and only 2.20% (566,548) were diagnostic. Diagnostic mammograms exhibited a significant annual growth of 5.94% (95%CI 4.51; 7.01) between 2013 and 2020, followed by a decline of 12.75% (95%CI -23.81; -7.04)

between 2020 and 2023. In contrast, screening mammograms showed a significant decline from 2013 to 2020 (APC= -0.12*; 95%CI -0.17; -0.11) and an increase from 2020 to 2023 (APC= 0.30*; 95%CI 0.14; 0.59). Over the entire period, both diagnostic and screening mammograms showed a stationary trend.

The variable regarding screening mammogram type refers to indications such as target population, high-risk population (family history), and patients previously treated for breast cancer. Among all screening mammograms performed in Brazil from 2013 to 2023, the target population was the most represented, totaling 23,533,745 out of 25,146,785, corresponding to 91.52%, peaking in 2023 with 3 million exams. Next, the high-risk population, characterized by a positive family history of breast cancer, accounted for 4.60% of the screening mammograms, and patients previously treated for breast cancer accounted for 1.67%, totaling 429,867 procedures (Table 1).

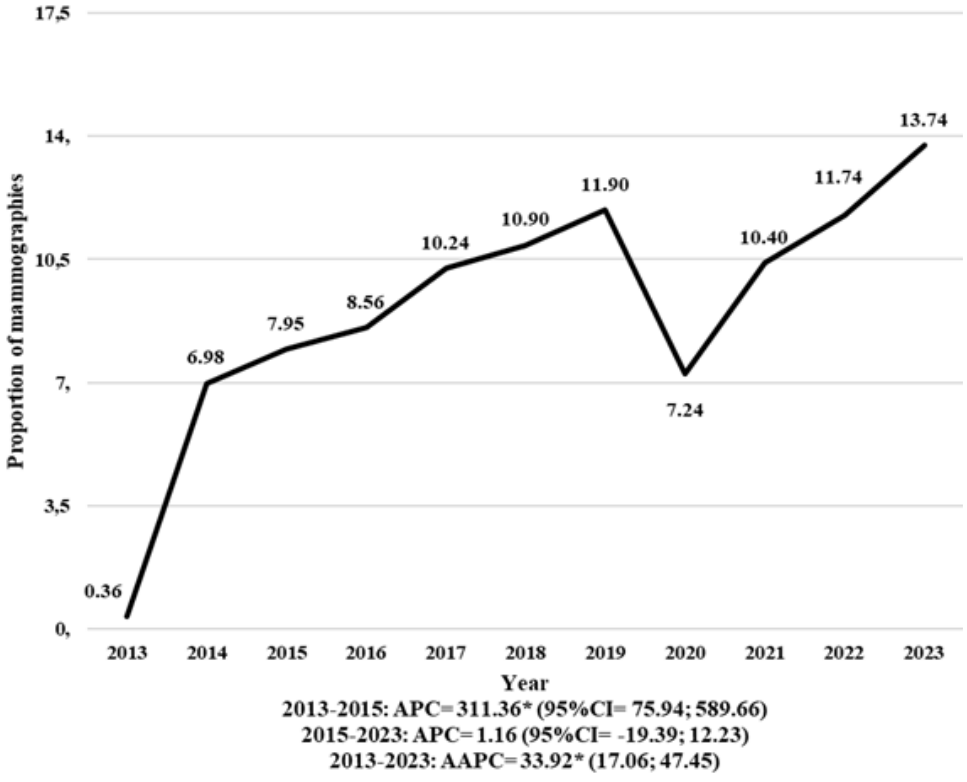
Regarding BI-RADS® categories, presented in Table 2, the most prevalent was category 2 with 12,835,400 (49.92%), followed by category 1 with 9,094,725 (35.37%), category 0 with 2,943,774 (11.45%), and then, categories 4, 5, and 6 with low rates not exceeding 1%: B4 with 201,100 (0.78%); B5 with 36,627 (0.14%); and B6 with 15,134 (0.06%).

Category 1 had a high prevalence, peaking in 2023 with over one million mammograms. In the same context, category 2 became the most prevalent in the country, with an average of 1,166,854 mammograms between 2013 and 2023. From category B3 onwards, the number of reports did not exceed 2.28% of the total, with category 6 being the least prevalent of them all.

Table 3 presents the pattern of mammograms performed in Brazil from 2013 to 2023 by age group. The 30–34 age group showed a significant decline of 26.20% per year (95%CI -36.67; -26.20) between 2013 and 2015, and a reduction of 8.38% per year over the entire period (95%CI -11.58; -6.45). In the 35–39 group, there was a decline of 20.34% (95%CI -24.29; -17.19) between 2013 and 2015, 7.46% (95%CI -9.07; -4.15) from 2015 to 2023, and 10.19% (95%CI -11.34; -9.56) throughout the entire period.

In the 40–44 age group, the decline was 8.29% (95%CI -12.02; -7.78) from 2013 to 2017 and 3.01% (95%CI -3.85; -2.63) over the entire period. The 45–49 age group showed a significant decline of 5.24% per year (95%CI -9.25; -4.61) from 2013 to 2017 and 2.10% (95%CI -2.99; -1.68) for the entire period.

For the 50–54 age group, there was significant growth of 5.76% (95%CI 3.85; 8.42) from 2013 to 2016, a decrease of 1.17% (95%CI -3.00; -0.15) from 2016 to 2023, and overall growth of 0.85% (95%CI 0.25; 1.25). Significant growth was also seen in the 55–59 age group, with 4.63% per year (95%CI 3.77; 6.44) from 2013 to 2017 and 2.00% (95%CI 1.60; 2.34) over the full period. Between 2013 and 2015, the 60–64 age group had a growth of 9.08% (95%CI 4.53;



CI: confidence interval; APC: annual percentage change; AAPC: average annual percentage change.

Figure 1. Temporal trend of the proportion of mammograms performed in Brazil from 2013 to 2023.

10.37) per year and 3.34% (95%CI 2.13; 3.60) across the full period. A significant increase also occurred in the 65–69 age group from 2013 to 2017 (APC=7.49*; 95%CI 6.31; 9.53) and throughout the entire period (AAPC=3.63*; 95%CI 3.07; 4.11).

The 70–74 age group presented a significant decline between 2013 and 2021 (APC= -0.10*; 95%CI -1.65; -0.01), followed by a significant growth of 4.81% (95%CI 0.53; 7.46) from 2021 to 2023, and an overall growth pattern for the entire period (AAPC= 0.86*; 95%CI 0.07; 1.13).

There was a significant reduction in mammograms performed in the 75–79 and over 79 years groups (APC/AAPC= -2.31; 95%CI -3.36; -2.18 and APC/AAPC= -2.75; 95%CI -3.57; -2.56, respectively).The results of the Joinpoint Regression analysis revealed a significant annual growth pattern in all regions from 2013 to 2015 and throughout the entire study period (Table 4). The Northeast region showed the highest APC (515.05*; 95%CI = 115.39; 984.43) and AAPC (45.89*; 95%CI 23.71; 62.19). The South region had the lowest APC (235.30*; 95%CI 71.18; 379.86) and lowest AAPC (24.49*; 95%CI 12.53; 33.30).

DISCUSSION

Brazil demonstrated a significant growth pattern in the number of mammograms conducted between 2013 and 2023, with particular emphasis between 2013 and 2015. Until 2013, epidemiological data on these examinations were derived from SISMAMA,

Table 1. Frequency distribution of screening mammogram types by year in Brazil from 2013 to 2023.

Variables		Type of screening	mammography (%)	
Reference year	Indication 1	Indication 2	Indication 3	Indication 4
Total	91.52	4.60	1.67	2.20
2013	89.63	7.75	0.83	1.79
2014	92.99	4.07	1.08	1.86
2015	92.05	4.47	1.28	2.20
2016	91.98	4.46	1.42	2.14
2017	91.64	4.53	1.50	2.32
2018	91.50	4.55	1.62	2.34
2019	91.07	4.76	1.67	2.49
2020	90.08	4.77	2.43	2.72
2021	90.81	4.92	2.08	2.20
2022	91.38	5.02	1.71	1.88
2023	91.99	4.21	1.81	1.99

Indication 1: target population; Indication 2: high-risk population (family history); Indication 3: previously treated breast cancer patients; Indication 4: Unknown.

Table 2. Frequency distribution of Breast Imaging Reporting and Data System (BI-RADS®) categories by year in Brazil from 2013 to 2023.

Reference year	Category 0		Category 1		Category 2		Category 3		Category 4		Category 5		Category 6	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total	2,943,774	11.45	9,094,725	35.37	12,835,400	49.92	1,586,545	2.28	201,100	0.78	36,627	0.14	15,134	0.06
2013	9,838	10.62	41,050	44.32	38,677	41.76	2,176	2.35	748	0.81	99	0.11	11	0.01
2014	196,140	10.93	729,260	41.75	795,207	44.31	40,026	2.23	11,250	0.63	2,085	0.12	554	0.03
2015	224,304	10.97	832,759	40.74	919,872	45.00	50,377	2.46	13,543	0.66	2,570	0.13	660	0.03
2016	243,724	11.07	867,148	39.40	1,016,320	46.18	56,135	2.55	14,044	0.64	2,648	0.12	701	0.03
2017	288,794	10.97	1,001,816	38.05	1,253,761	47.62	67,509	2.56	17,005	10.97	3,163	0.12	838	0.03
2018	311,918	11.13	1,024,885	36.56	1,373,930	49.01	67,489	2.41	20,666	0.74	3,637	0.13	1,053	0.04
2019	339,841	11.11	1,075,276	35.15	1,541,450	50.39	71,923	2.35	24,293	0.79	4,317	0.14	1,677	0.05
2020	225,564	12.11	612,838	32.90	955,374	51.29	46,645	2.50	17,307	0.93	3,272	0.18	1,665	0.09
2021	329,182	12.31	866,707	32.42	1,390,825	52.02	57,021	2.13	23,127	0.87	4,535	0.17	2,152	0.08
2022	357,127	11.84	938,824	31.11	1,629,949	54.02	57,991	1.92	26,324	10.87	4,802	0.16	2,489	0.08
2023	417,342	11.81	1,084,162	30.69	1,920,035	54.35	69,253	1.96	32,793	0.93	5,499	0.16	3,334	0.09

which was later replaced by SISCAN, as established by Ordinance Nº 3.394[8,9]. The transition between national systems led to a loss of continuity in epidemiological data collection during the implementation period[10]. As a result, the apparent surge in mammograms observed from 2013 to 2015 may reflect a data artifact rather than a true increase. From 2015 to 2023, the trend stabilized, although a substantial drop occurred in 2020, which may be attributed to decreased demand for breast cancer screening among women. This highlights the need for improved screening programs in a country marked by profound social inequality and structural challenges in public healthcare[11-13]. Furthermore, during the COVID-19 pandemic, mammography procedures decreased by 42% nationwide, according to the Outpatient and Hospital Information Systems and SISCAN[14].

Data analysis revealed that most mammograms were performed on women who had previously undergone the examination, accounting for 72.85% of procedures between 2013 and 2023. This pattern may be interpreted as a positive outcome of public health policies, indicating progress in continuous screening, aligned with WHO targets that propose 70% coverage of the target population to reduce breast cancer mortality in this age group[15]. The increase in the number of mammograms over the years may also reflect improvements in integrated healthcare service delivery encouraged by the Strategic Action Plan for Confronting Noncommunicable Diseases (2011–2022), which underscores the importance of continuous health monitoring and promotion[16]. Nevertheless, despite the increase in mammography rates in 2022 (75.47%), challenges remain, particularly regarding long-term adherence to screening[15]. Various factors hinder continuity, including geographic barriers, scheduling difficulties, and lack of standardization in test requests by healthcare professionals in some Brazilian states[17]. This situation is exacerbated by the persistence of opportunistic screening rather than a systematic population-based approach, as recommended by the 2015 Guidelines[18].

The results showed that the vast majority of mammograms performed between 2013 and 2023 were for screening purposes (97.80%), while diagnostic mammograms accounted for only 2.20%.

Table 3. Annual percentage change and average annual percentage change of the proportion of mammograms performed in Brazil from 2013 to 2023, by age group.

Age group (years)	Trend 1		Trend 2		2013–2023
	Period	APC (95%CI)	Period	APC (95%CI)	AAPC (95%CI)
30–34	2013–2015	-26.20* (-26.20; -36.67)	2015–2023	-3.29 (-7.83; 10.25)	-8.38* (-11.58; -6.45)
35–39	2013–2015	-20.34* (-24.49; -17.19)	2015–2023	-7.46* (-9.07; -4.15)	-10.19* (-11.34; -9.56)
40–44	2013–2017	-8.29* (-12.02; -7.78)	2017–2023	0.67 (-1.32; 3.17)	-3.01* (-3.85; -2.63)
45–49	2013–2017	-5.24* (-9.25; -4.61)	2017–2023	0.04 (-1.76; 3.52)	-2.10* (-2.99; -1.68)
50–54	2013–2016	5.76* (3.85; 8.42)	2016–2023	-1.17* (-3.00; -0.15)	0.85* (0.25; 1.25)
55–59	2013–2017	4.63* (3.77; 6.44)	2017–2023	0.29 (-1.33; 1.28)	2.00* (1.60; 2.34)
60–64	2013–2015	9.08* (4.53; 10.37)	2015–2023	1.95 (-1.14; 2.74)	3.34* (2.13; 3.60)
65–69	2013–2017	7.49* (6.31; 9.53)	2017–2023	1.13 (-0.89; 2.52)	3.63* (3.07; 4.11)
70–74	2013–2021	-0.10* (-1.65; -0.01)	2021–2023	4.81* (0.53; 7.46)	0.86* (0.07; 1.13)
75–79	2013–2023	-2.31* (-3.36; -2.18)	-	-	-2.31* (-3.36; -2.18)
Over 79	2013–2023	-2.75* (-3.57; -2.56)	-	-	-2.75* (-3.57; -2.56)

CI: confidence interval; APC: annual percentage change; AAPC: average annual percentage change. *APC and AAPC are significantly different from zero (p<0.05).

Table 4. Annual percentage change and average annual percentage change of the proportion of mammograms performed in Brazil from 2013 to 2023, by region.

Regions	Trend 1		Trend 2		2013–2023
	Period	APC (95%CI)	Period	APC (95%CI)	AAPC (95%CI)
North	2013–2015	281.89* (50.00; 565.08)	2015-2023	13.71 (-24.99; 30.38)	44.89* (22.92; 60.72)
Northeast	2013–2015	515.05* (115.39; 984.43)	2015–2023	1.81 (-22.62; 17.42)	45.89* (23.71; 62.19)
Southeast	2013–2015	313.60* (76.49; 587.13)	2015–2023	1.94 (-18.45; 14.14)	34.89* (17.92; 48.23)
South	2013–2015	235.30* (71.18; 379.86)	2015–2023	-2.81 (-16.02; 6.25)	24.49* (12.53; 33.30)
Central-West	2013–2015	371.81* (69.05; 848.58)	2015–2023	1.53 (-26.65; 16.00)	38.05* (16.53; 56.51)

CI: confidence interval; APC: annual percentage change; AAPC: average annual percentage change. *APC and AAPC are significantly different from zero (p<0.05).

This reflects the prioritization of screening as a primary strategy in breast cancer control in Brazil, as outlined in the Guidelines for Early Detection of Breast Cancer, which recommend biennial exams for women aged 50 to 69 as the target population[18]. However, the rise in diagnostic mammograms until 2020 (+5.94% per year), followed by a decline over the past three years (-12.75%), may suggest a positive expansion in screening coverage from 2020 to 2023, indicating earlier detection of suspicious cases. Conversely, the inverse pattern observed between 2013 and 2020—with a decrease in screening and an increase in diagnostics—suggests possible deficiencies in early monitoring and implementation strategies during the initial study period. These gaps may be associated with the lack of specific mammography indicators in the Brazilian National Program for Improving Access and Quality of Primary Care (PMAQ, *Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica*)[18]. To ensure a balanced distribution between screening and diagnostic mammograms, it is essential to strengthen infrastructure, train professionals, and monitor diagnostic indicators within the PMAQ framework[18].

The majority of screening mammograms performed between 2013 and 2023 targeted the population specified by national guidelines (91.52%), reflecting adherence to INCA recommendations, which prioritize women aged 50 to 69 for biennial screening due to strong evidence of mortality reduction in this age group[19]. This trend, peaking in 2023, suggests that the screening strategy has partially achieved its goals, although it still occurs predominantly through opportunistic rather than organized programs[20]. High-risk women, defined as those with a family history of breast cancer, accounted for only 4.60% of screening mammograms. This finding indicates challenges in properly identifying and following this group, which may be compounded by the absence of active outreach strategies and limited knowledge of protocols among healthcare professionals[21]. Mammograms performed on women previously treated for breast cancer represented only 1.67%. Despite guidelines recommending annual follow-up imaging for women treated with breast-conserving surgery or mastectomy, the low adherence may be explained by failures in the referral system, lack of awareness, or logistical barriers[22].

Regarding BI-RADS® category analysis over the past ten years, categories BI-RADS® 1 and 2—representing benign findings—were the most prevalent, while categories associated with malignancy (BI-RADS® 4, 5, and 6) had a low prevalence of just 1%. These findings are consistent with the study by Tomazelli et al.[23] and the 2019 National Mammography Database from the American College of Radiology, which also reported predominance of BI-RADS® 1 and 2. For BI-RADS® 4 and 5, our findings were lower than those reported in the Breast Cancer Surveillance Consortium and São Paulo studies, which presented respective rates of 1.71% and 1.61%[24,25]. BI-RADS® 0 ranked third in prevalence, likely reflecting the national trend of substituting mammography with ultrasonography in clinical screening practice[23].

This study also found a significant increase in mammograms among the target population (50–69 years), as recommended by INCA[18], aligning with findings by Alcântara et al.[10], who observed a rise in screening exams between 2010 and 2019. These trends indicate prioritization of the target population by the Unified Health System (SUS, *Sistema Único de Saúde*) breast cancer screening program, thus demonstrating its effectiveness[26]. In contrast, mammograms among women aged 30 to 39 declined over the study period, particularly between 2013 and 2015. This pattern may be explained by the shift in prioritization toward asymptomatic women aged 50 to 69 for screening[27]. Until 2013, mammograms were funded by the Strategic Actions Fund (FAEC), which incentivized exams for asymptomatic women aged 35 and older[27]. Furthermore, women aged 70 to 74 showed a significant decrease in screenings from 2013 to 2021, indicating neglect of elderly women, even though about 20% of patients over 70 with early-stage disease die from it, and at age 75, the risk of developing breast cancer is estimated to be twice that of a 50-year-old woman[28]. Clinical barriers and limited availability of appropriate treatment may explain this trend[28]. It is important to note that while INCA guidelines recommend screening up to age 69[26], the Brazilian Society of Mastology extends recommendations up to age 74[22].

Regional analysis revealed significant disparities in mammography trends between 2013 and 2023. The Northeast region had the highest average annual percentage variation, reflecting recent efforts to improve access in historically underserved areas, where challenges such as limited mammography equipment and reduced availability of specialized services persist[29,30]. Conversely, the South region had the lowest variation, benefiting from ample access to mammography equipment and strong healthcare networks, contributing to stabilization of screening indicators[31]. The relative balance of access in these regions suggests that recent initiatives have had less impact compared to more underserved regions. These regional disparities emphasize the need for public policies aimed at reducing inequalities in access to mammography, especially in less advantaged areas like the Northeast. To this end, investments in service decentralization and professional training are essential to ensure timely diagnoses and reduce breast cancer mortality[32,33].

This study has limitations inherent to the use of secondary databases, such as underreporting and the presence of incomplete or inaccurate records. Despite these limitations, the findings reinforce the relevance of mammography in Brazil and the need for strategies that promote equitable access to early diagnosis, thereby contributing to reduced breast cancer mortality.

CONCLUSIONS

The analysis of temporal trends in mammography procedures in Brazil from 2013 to 2023 revealed a significant increase in the proportion of screening exams. The majority of

mammograms were conducted for screening purposes, with a declining trend observed between 2013 and 2020, followed by a subsequent increase. Conversely, diagnostic mammography showed consistent growth until 2020, with a notable reduction in the years that followed. Data also indicated a growing proportion of women undergoing repeat mammograms over time. The target population represented the majority of cases. Regarding BI-RADS® classification, categories 1 and 2 were predominant.

With respect to age distribution, mammograms increased among women aged 50–69, while younger age groups (30–49 years) showed a significant decline. The regional analysis revealed growth in all areas of the country, with the Northeast showing the highest average annual percentage change.

AUTHORS' CONTRIBUTION

VQC: Conceptualization, Investigation, Project administration, Writing – original draft. LENT: Conceptualization, Investigation, Project administration, Writing – original draft. FCS: Conceptualization, Data Curation, Formal Analysis, Methodology, Supervision, Validation, Writing – review & editing.

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