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Original Article

Incidence, prevalence, mortality, and case fatality rates of breast cancer in Brazilian women

Taxas de incidência, prevalência, mortalidade e letalidade de casos de câncer de mama em brasileiras

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RESUMO

Objetivo: comparar as taxas de incidência, prevalência, mortalidade e letalidade de casos de câncer de mama em mulheres brasileiras. **Métodos**: estudo ecológico descritivo que utilizou dados disponibilizados pelo Departamento de Informação e Informática do Sistema Único de Saúde sobre a ocorrência de casos diagnosticados e mortalidade por câncer de mama. Foram estimadas taxas em mulheres de 15 a 39 anos e 40 anos ou mais, no período de 2013 a 2024, considerando as regiões do Brasil. **Resultados**: foi observada alta ocorrência de câncer de mama, com maior incidência e prevalência em mulheres com 40 anos ou mais e na Região Sul. A maioria dos óbitos também foi nesta faixa etária, principalmente nas Regiões Sul e Sudeste. A letalidade geral foi maior no Centro-Oeste e Sudeste. **Conclusão:** as taxas de incidência e prevalência do câncer de mama foram elevadas, principalmente em mulheres com 40 anos ou mais, e na Região Sul. Observou-se aumento progressivo dos casos na faixa etária de 15 a 39 anos. A maioria dos óbitos ocorreu em mulheres com 40 anos ou mais e a letalidade geral foi maior no Centro-Oeste e Sudeste. **Contribuições para a prática:** os resultados destacam a importância da detecção precoce e da ampliação do acesso às medidas de rastreamento.

Descritores: Neoplasias da Mama; Epidemiologia; Programas de Rastreamento.

ABSTRACT

Objective: to compare the incidence, prevalence, mortality, and case fatality rates of breast cancer in Brazilian women. **Methods**: this was a descriptive ecological study using data made available by the Information and Informatics Department of the Unified Health System on the occurrence of diagnosed cases and mortality from breast cancer. Rates were estimated for women aged 15 to 39 and 40 and over from 2013 to 2024, considering the regions of Brazil. **Results**: a high occurrence of breast cancer was observed, with a higher incidence and prevalence in women aged 40 and over and in the South. Most deaths were also in this age group, mainly in the South and Southeast. Overall, lethality was higher in the Midwest and Southeast. **Conclusion:** breast cancer incidence and prevalence rates were high, especially among women aged 40 and over and in the South. There was a progressive increase in cases in the 15-39 age group. Most deaths occurred in women aged 40 or over, and overall lethality was higher in the Central-West and Southeast. **Contributions to practice:** the results highlight the importance of early detection and expanding access to screening measures.

Descriptors: Breast Neoplasms; Epidemiology; Mass Screening.

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Introduction

Cancer is one of the biggest public health challenges and is one of the leading causes of death, ranking first or second among premature deaths (before the age of 70) in most countries. The increase in the incidence and mortality rate related to cancer is growing rapidly on the international scene. It is a consequence of the world's demographic and epidemiological changes[1-2].

Among the different types of cancer, breast cancer is the most frequently diagnosed, accounting for 11.6% of all cases, which highlights its epidemiological importance. Its origin may be associated with genetic predisposition, lifestyle, reproductive habits, and the environment. The disease predominantly affects women and is the fourth leading cause of cancer deaths worldwide, accounting for the highest incidence in 157 countries and the highest mortality in 112[2].

In 2020, breast cancer accounted for 24.5% of all cancer cases in women in Brazil, excluding non-melanoma skin cancers. For the three years from 2023 to 2025, 73,610 new cases are expected, resulting in a rate of 66.54 cases per 100,000 women[3].

In Brazil, the public breast cancer screening program is mainly aimed at women between the ages of 50 and 69, with the recommendation to have mammograms every two years. There is no structured public screening program for young women, especially those under 40. Breast cancer is less common in this age group, and diagnosis usually occurs through clinical assessment, considering individual risk factors and family history[4].

However, there has been an increase in the incidence of breast cancer in young women in Brazil (under 40), accounting for approximately 5-7% of cases[5]. It is noteworthy that the diagnosis in young women tends to occur at more advanced stages of the disease. A study that analyzed 12,689 cases of breast cancer in women aged 18-39 in Brazil revealed that 62.8% of cases were diagnosed at an advanced stage. The presence of larger tumors characterizes this, greater lymph node involvement, and a worse response to initial treatment[6].

The epidemiological analysis of breast cancer in Brazil showed that 4.4% of patients were under 35. In addition to the increasing prevalence, breast cancer cases in young women have characteristics. Young patients often have more aggressive tumors, with a higher risk of positive lymph nodes at diagnosis. This means that the disease may have spread to the lymph nodes, which may indicate a more advanced stage of the cancer at the time of diagnosis[7].

Considering the importance of the subject and the scarcity of research evaluating the behavior of this disease in younger women, this study aimed to compare the incidence, prevalence, mortality, and case fatality rates of breast cancer in Brazilian women.

Methods

This was a descriptive ecological study using data available *online* from the Department of Information and Informatics of the Unified Health System, using Brazilian regions as the unit of analysis. The data was collected in January 2025 by consulting PAINEL-Oncology, which monitors the time between diagnosis and the start of cancer treatment in the Brazilian Unified Health System and the Mortality Information System, both of which are accessible.

The exposure variables included in the study were categorized by geographic region of Brazil (North, Northeast, Southeast, South, and Midwest) and by two age groups: 15–39 years and 40 years or older. The choice of these age groups was based on the guidelines of the National Cancer Institute, which highlights the increased incidence and mortality of breast cancer from the age of 40[8]. In the mortality analysis, variables such as race and schooling were considered, while in the diagnosis, data on therapeutic modality, treatment time, and disease staging were analyzed.

The outcome variables were the occurrence of diagnosed cases and mortality from breast cancer, classified by the topographic code C50 of the International Classification of Diseases (ICD-10), in women

between 2013 and 2024. The analyses covered data from all regions of Brazil. In the case of mortality, all deaths attributed to breast cancer between 2013 and 2023 were considered since data for 2024 was not yet available.

The data was tabulated, reviewed, and pre-coded in Microsoft Office Excel® and analyzed using descriptive statistics, absolute and relative frequencies, and R software. The study population was described using absolute and relative frequencies. Population data were obtained from the Brazilian population projection platform[9], segmented by age group, year, and region of analysis. The prevalence rate was calculated per 100 people and the incidence and mortality rates per 100,000 inhabitants, according to the variables analyzed. Lethality was determined by the proportion of deaths among cases diagnosed during the analysis period, stratified by age group.

The study was conducted following the ethical guidelines for research with secondary health data, respecting national and international data protection standards. As the data was secondary and non-nominal, with access in the public domain on the Department of Information and Informatics of the Unified Health System website, the study did not need to be approved by the Human Research Ethics Committee.

Results

Between 2013 and 2024, 458,744 cases of breast cancer were diagnosed in women in Brazil. Of these, 407,232 (88%) occurred in the group aged 40 and over, which also recorded the highest prevalence rate. However, throughout the period, there was a gradual increase in these rates in all regions and both age groups, with a peak in 2023. The South consistently had the highest prevalence rates in both age groups (Figure 1).

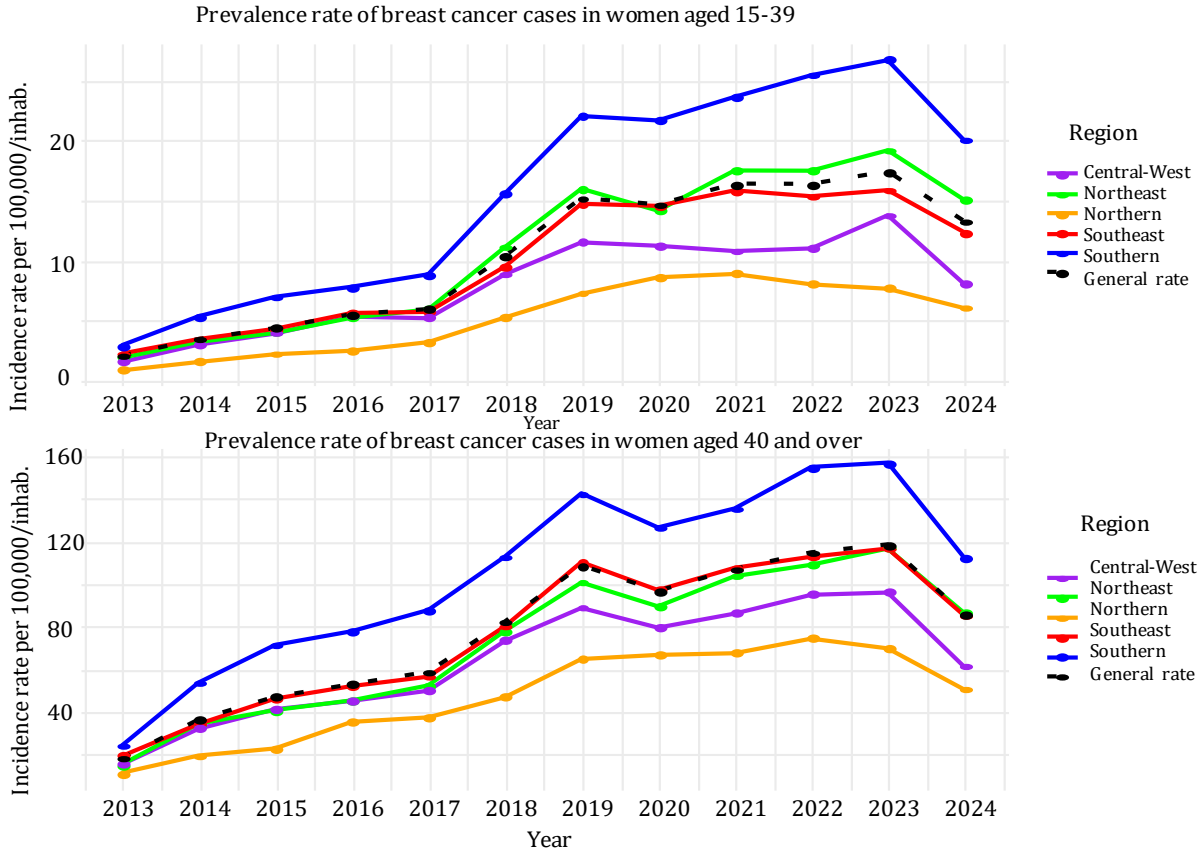

Figure 1 – Prevalence rate of breast cancer cases in women by age group (15 to 39 years and 40 years and over) and region between 2013 and 2024. Maringá, PR, Brazil, 2025

Since 2017, there has been a significant increase in diagnosed cases of breast cancer, with the highest peak in 2023, when it reached an incidence rate of 17.38/100,000 inhabitants in the 15-39 age group and 118.42/100,000 inhabitants in the 40+ age group. In 2020, there was a decline in the number of cases diagnosed in both age groups, possibly because of the restrictive measures in health care during the pandemic of the new coronavirus (COVID-19).

The South region stood out with the highest incidence rate of breast cancer cases in women of both age groups during the years analyzed, even surpassing the overall incidence rate for the period. In 2023, the incidence rate in the South for women aged 15-39 was 26.76/100,000 inhabitants, and for those aged 40 and over it was 156.96/100,000 inhabitants (Figure 2).

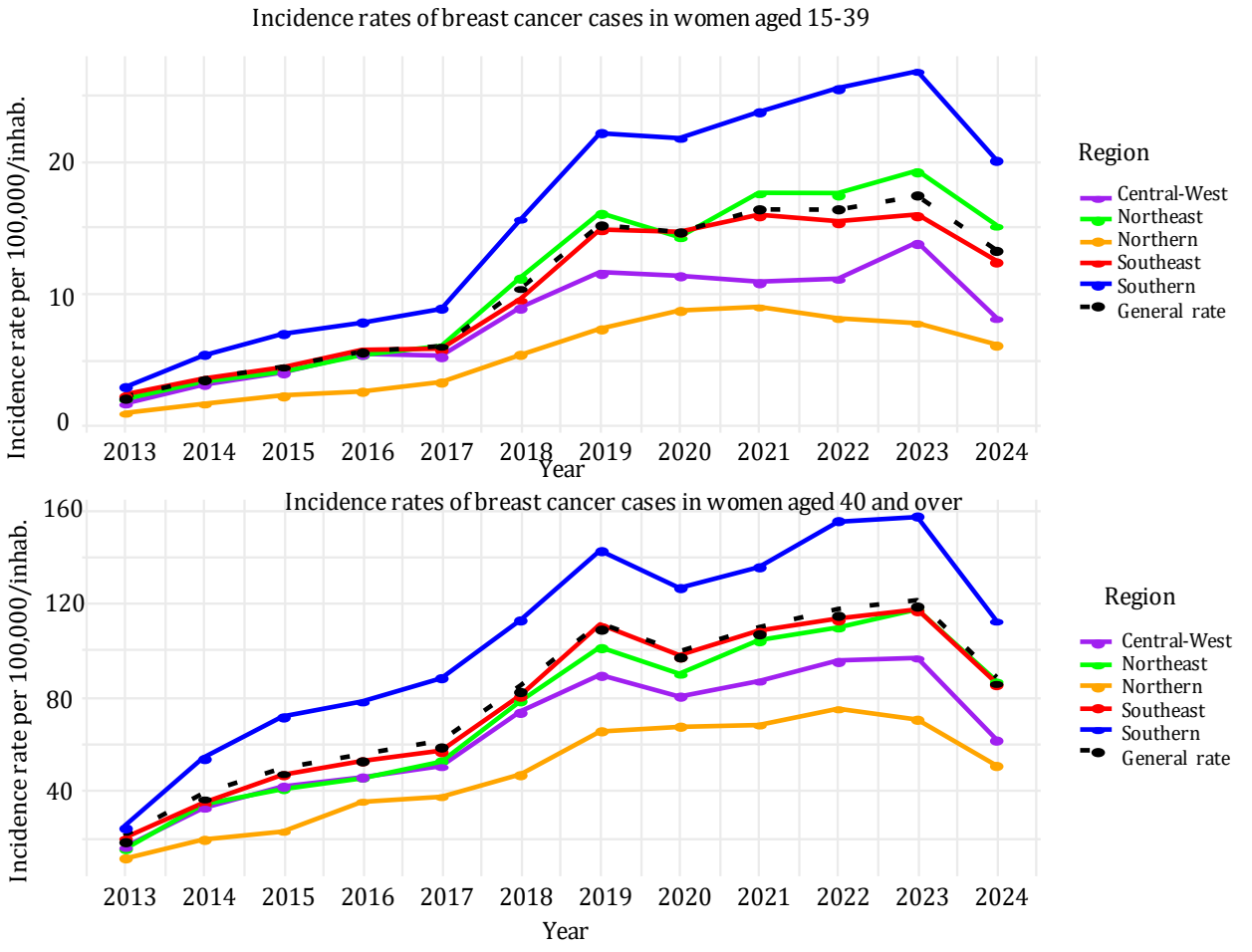

Figure 2 – Incidence rates of breast cancer cases in women by age group (15 to 39 years and 40 years and over) and region between 2014 and 2023. Maringá, PR, Brazil, 2025

When analyzing the characteristics of breast cancer cases in women in the period under study, there was a high proportion of advanced stages (3 and 4) in total, which was higher in the group of women aged 15 to 39. Early stages of breast cancer were observed in a higher proportion in the group of women aged 40 or over, almost double that found in cases of women aged 15 to 39. There were more cases with "not applicable" or "ignored" staging in both groups, which may reflect difficulties in early diagnosis or flaws in the records. In turn, the proportion of cases.

Surgery and chemotherapy were the most common therapeutic modalities used to treat breast cancer cases in the two age groups analyzed. Howe-

ver, a high proportion of cases had no information on treatment. A higher proportion of cases were treated 60 days after diagnosis in both groups, especially in women aged 40 or over (Table 1).

Between 2013 and 2023, there were 187,881 deaths from breast cancer, of which 13,257 (7.1%) were in women aged 15 to 39 and 174,624 in women aged 40 and over (92.9%). Although the mortality rate is around 10 times higher among women aged 40 and over, both age groups showed an upward trend. Furthermore, the south and southeast regions had higher rates than the national average in both groups (Figure 3).

Table 1 – Staging, treatment adopted, and treatment time of women diagnosed with breast cancer between 2013 and 2024. Maringá, PR, Brazil, 202

Variables	15 to39 years (n=51,512) n (%)	>40 years (n=407,323) n (%)	Total (n=458,744) n (%)
Disease staging			
Initial stage (0 and 1)	3,744 (7.3)	61,238 (15.0)	64,982 (14.2)
Intermediate stage (2)	8,138 (15.8)	76,132 (18.7)	84,270 (18.4)
Advanced stage (3 and 4)	18,190 (35.3)	122,937(30.2)	141,127 (30.8)
Not applicable	8,939 (17.4)	76,794 (18.9)	85,733 (18.7)
Ignored	12,501 (24.3)	70,131 (17.2)	82,632 (18.0)
Therapeutic Modality			
Chemotherapy	8,939 (17.4)	76,794 (18.9)	85,733 (18.7)
Surgery	28,899 (56)	243,962 (59.9)	272,861 (59.5)
Radiotherapy	1,154 (2.2)	15,897 (3.9)	17,051 (3.7)
Chemotherapy and Radiotherapy	19 (0.1)	448 (0.1)	467 (0.1)
No treatment information	12,501 (24.3)	70,131 (17.2)	82,632 (18)
Time to start treatment (days)			
Up to 30	9,873 (17.2)	68,256 (16.8)	78,129 (17.0)
31 - 60	6,817 (11.9)	50,772 (12.5)	57,589 (12.6)
>60	22,321 (38.8)	218,073 (53.6)	240,394 (52.4)
No treatment information	12,501 (21.7)	70,131 (17.2)	82,632 (18.0)

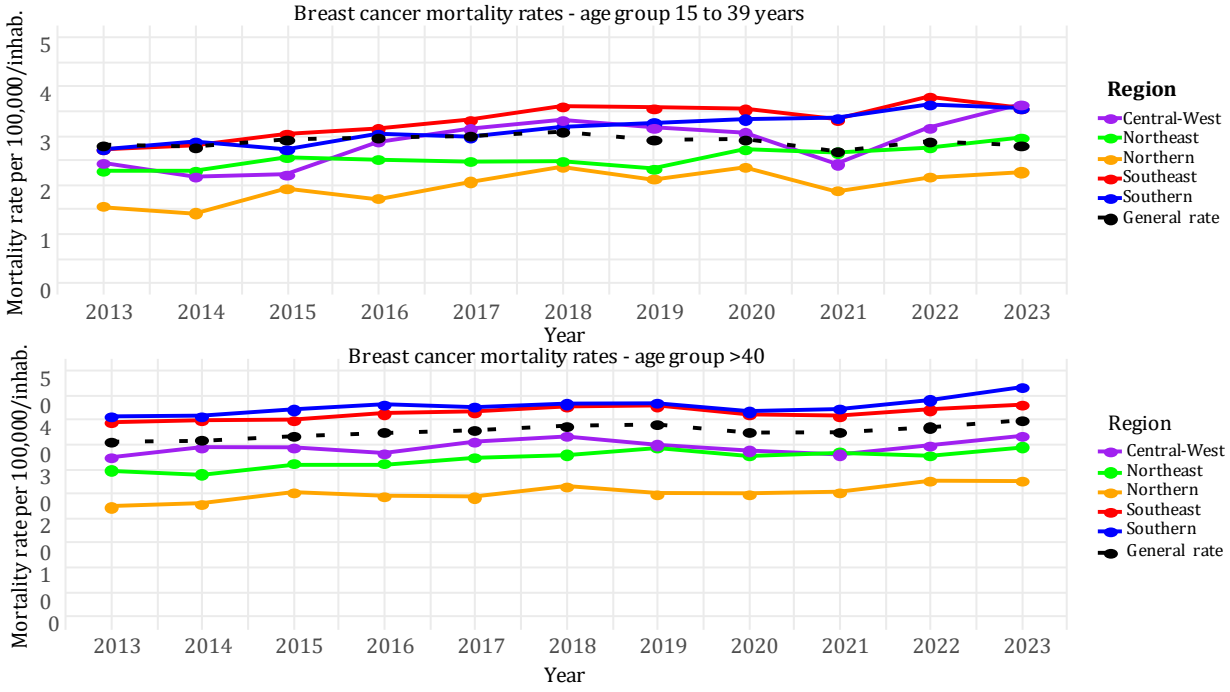

Figure 3 – Mortality rates of breast cancer cases in women by age group (15 to 39 years and 40 years and over) and region between 2013 and 2024. Maringá, PR, Brazil, 2025

Regarding the characteristics of breast cancer deaths in women, there was a general predominance of the white race/color group, especially in the Southeast and South regions. Brown women stood out in the North, Northeast, and Central-West regions.

As for education, there was a predominance of deaths among women with eight to 11 years of education in all regions. The high proportion of women with no education in the Northeast and North and the total number of deaths without information on this variable are noteworthy.

The overall lethality rate from 2013 to 2023 was 38%, with the highest rates in the Central-West (54%) and Southeast (51%), followed by the North (49%), Northeast (41%) and South (38%). In the 15 to 39 age group, the North had the highest lethality rate (38%) and the South the lowest (21%). In the 40 and over age group, lethality was higher in all regions, with the Southeast (48%) and Central-West (47%) standing out, followed by the North (46%), Northeast (39%) and South (36%) (Table 2).

Tabela 2 – Caracterização sociodemográfica dos casos de óbitos por câncer de mama em mulheres brasileiras entre 2013 e 2024. Maringá, PR, Brasil, 2025

Variables	Northern	Northeast	Southeast	Southern	Midwest	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Race/color						
White	258 (27.6)	1,393(30.8)	6,006 (61.9)	3,089(85.8)	626 (44.5)	11,372(48.0)
Black	43 (4.6)	428 (9.5)	1,001(10.3)	162 (4.5)	120 (8.5)	1,754 (7.0)
Yellow	3 (0.3)	14 (0.3)	77 (0.8)	17 (0.5)	6 (0.4)	117 (0.5)
Brown	607 (64.9)	2,574(57.0)	2,466(25.4)	304 (8.4)	638 (45.3)	6,589 (28.0)
Indigenous	12 (1.3)	11 (0.2)	7 (0.1)	1 (0.0)	4 (0.3)	35 (0.1)
Ignored	12 (1.3)	97 (2.1)	148 (1.5)	26 (0.7)	14 (1.0)	297 (1.0)
Education (years)						
None	842 (10.5)	5,623(13.6)	5,227 (5.6)	1,787 (5.4)	1,026 (8.2)	14,505 (7.7)
1 to 3	1,327(16.5)	8,018(19.4)	18,500(19.8)	5,660(17.3)	1,849(14.8)	3,535(18.8)
4 to 7	1,630(20.2)	6,915(16.8)	17,947(19.2)	8,175(24.9)	2,533(20.3)	37,200(19.8)
8 to 11	2,502(31.1)	9,318(22.6)	23,559(25.3)	8,241(25.1)	3,285(26.4)	46,905(25.0)
>12	1,183(14.7)	4,408(10.7)	13,822(14.8)	4,062(12.4)	1,992(16.0)	25,467(13.6)
Ignored	566 (7.0)	7,001(17.0)	14,243(15.3)	4,873(14.9)	1,767(14.2)	28,450(15.1)

Discussion

The results of the study show that breast cancer has a distinct epidemiological behavior in the two age groups under study, with a much higher incidence, prevalence, mortality, and lethality rate among women aged 40 and over.

Although breast cancer is predominantly found in older women, the number of cases diagnosed in younger women is worrying. It is the most common type of cancer among women aged 20 to 49 in 162 countries, and incidences are increasing in countries undergoing economic transition[10]. In this study, 7.1% of deaths occurred in women aged up to 39, which highlights the importance of specific strategies for early detection and targeted support for these patients.

In Brazil, mammogram is the primary screening measure adopted by the Ministry of Health and recommended by the Breast Cancer Early Detection Guidelines. This is indicated for women aged 40 and over at high risk or from the age of 50 for women who are not at high risk. This condition can lead to late diagnosis in young women who depend on the Unified Health System. In addition, screening can be carried out opportunistically, taking advantage of the woman's visit to the unit for other demands, but this practice is generally not adopted by health institutions[11].

The prevalence rate of breast cancer in Brazil

shows marked differences between age groups and regions, being considerably lower among younger women (15 to 39 years old). However, over time, there has been a gradual increase in this type of cancer in this age group. This trend can be attributed to a combination of factors, such as improvements in screening and early detection programs, as well as changes in the epidemiological patterns of the disease[12]. The expansion of these programs has contributed to early diagnosis among young women. It is an essential strategy, since everyday habits such as poor diet and a sedentary lifestyle contribute to an increase in the incidence of breast cancer.

The increase in the incidence rate of breast cancer since 2017 observed in this study, especially among women aged >40, may be related to the rise in mammograms. Between 2017 and 2023, 19,651,969 mammograms were carried out in Brazil, an increase of 4.65% in the number of tests carried out in the country and making it possible to diagnose more women[13].

However, the number of mammograms has not increased in all years. An epidemiological study in 2020 found a decrease of approximately 40% in the number of mammograms performed compared to the previous year, representing a reduction of 1,705,475 exams[14]. This reveals that the COVID-19 pandemic has had a significant impact on cancer diagnosis in Brazil, resulting in a substantial decrease in screening procedures and early detection of the disease.

This condition was confirmed when comparing 2019 to 2020, where a reduction was observed in the number of mastology consultations (46.3%), breast ultrasounds (34.8%), mammograms (41.5%), biopsies (49.6%), new diagnoses (45.7%) and surgeries (34.6%). Interestingly, in the following year, most of these services significantly increased, returning to pre-pandemic levels, except for consultations with a hematologist and surgeries[15]. In terms of Brazil, in 2022, 4,239,253 mammograms were performed on women in the Unified Health System, of which 382,658 were mammograms, and 3,856,595 were screening mammograms, but only 5,615 were performed on women under 30[16].

Furthermore, regarding the incidence rate, the results found differ from the document drawn up by the Ministry of Health in 2022, which shows that the highest risk of breast cancer is in the Southeast, followed by the South. However, this may have been influenced by the COVID-19 pandemic and the regional structures of health services to meet demands[17].

In addition, the higher incidence in the South and Southeast may be related to better access to diagnostic equipment. A study that verified breast cancer screening coverage in all Brazilian states between 2008 and 2017 concluded that there was a lack of uniformity between the different regions and states[18].

It is important to note that although a diagnosis of breast cancer is traumatic for women of all age groups, younger women tend to be more psychosocially compromised, as they usually have children of school age. Thus, despite all the impacts of this diagnosis and experiencing fragility and various negative feelings, worrying about their children and the desire to return to their previous life. They recognize their responsibility for the treatment and redefine their concepts about the future and their prospects[19].

Regarding regional differences, the South had the highest incidence and prevalence rates in the two age groups under study, which may be related to the oncological structure available. However, the North and Center-West regions recorded the lowest prevalence rates, possibly due to limited access to health services. These regions also showed an increase in incidence over time[20].

It is noteworthy that, despite the high number of diagnoses of the disease in the South, especially among women aged 40 and over, lethality in this region was relatively low when compared to other areas. This reinforces the thesis that higher incidence rates are related to greater diagnostic availability. Inequality in access to healthcare and knowledge about prevention are determining factors for regional variations in breast cancer diagnosis and prevalence rates[21].

Correct disease staging with timely diagnosis is essential, with repercussions on patients' quality of life. In numerous instances, therapeutic decisions depend on tumor classification, which assesses the extent, local involvement, and presence or absence of distant metastasis. Establishing tumor staging is crucial to defining the prognosis and the most appropriate treatment[8]. For breast cancer, a standardization for mammograph reports has been established nationwide, adopting the Breast Imaging Reporting and Data System (BI-RADS™) model, which the American College of Radiology already uses. This classification was created to standardize mammogram reports, facilitating interpretation and avoiding ambiguities[22].

In terms of staging, the data found suggests that there are still significant obstacles that make it difficult for some women to be diagnosed at an early stage. A study found that the overall prevalence of diagnoses made at an advanced stage (III and IV) was 43.67%[18]. These data reveal a concern with staging since a late diagnosis compromises the choice of therapy and has repercussions on the prognosis because the treatment needs to be more aggressive, resulting in less favorable responses for the patients. Early diagnosis is crucial for a favorable prognosis, as it allows treatments to be more effective[23].

Factors such as unequal access to health care, especially in more remote regions or in populations with less access to screening programs, can contribute to this and the lack of a program for young women. On the other hand, the increase in the number of diagnoses at early stages (0 and 1) for women aged 40 and over reflects a significant advance in screening and early diagnosis strategies. This is especially evident with the adoption of screening mammogram programs and improvements in the quality of the exams[4].

A retrospective cohort of 477 women diagnosed with breast cancer in the southeastern region of Brazil found that 80.5% of women started treatment within 60 days of diagnosis (median time 32 days) and that this was significantly lower for women receiving private healthcare[24]. Based on records from a hospital referral service in the west of Paraná for 2021 and 2022, which provided both public and private care. It was found that Unified Health System patients face more significant challenges in terms of access. This results in diagnoses at more advanced stages and, consequently, less favorable prognoses[25].

Also, concerning the time between diagnosis and the start of treatment, the data obtained is at odds with Law No. 12,732, which states that the right to first treatment must be within 60 days. The oncology panel's report, published in 2024, shows that between 2013 and 2019, there was a significant decrease in women who started treatment more than 60 days before; however, it reveals that, although the law was created more than a decade ago, the country still doesn't have the structure to comply with what is proposed[26].

The predominance of the surgical approach and chemotherapy as the most frequently used therapeutic resources corroborates what has been identified in literature, which points out that among the most widely used therapeutic options are surgery, radiotherapy, hormone therapy, immunotherapy, and antineoplastic chemotherapy[27-28].

These therapies can arouse various feelings in women who, as well as experiencing a disease with the stigma of death, have a new body image. The removal of the breast and the presence of alopecia, as well as the possibility of early menopause and decreased libido[27,29].

Study limitations

Possible limitations of this study are related to the type of study, which does not allow individual factors that interfere with early diagnosis to be captured. This, in turn, is reflected in the incidence, prevalence, mortality, and lethality rates. Furthermore, secondary data, subject to missing and inconsistent records, can compromise the results' accuracy.

To mitigate the biases resulting from the ecological design, the measures studied were stratified by age group, preventing the higher proportion of cases

in women aged 40 or over from influencing the results in a generalized way.

Contributions to practice

The results of this study have significant implications for the health sector. They show an increase in the number of cases diagnosed and, consequently, in the prevalence, incidence, mortality, and lethality rates of breast cancer in women aged 40 and over. In addition, the consistent increase in incidence rates among younger women reinforces the need for effective strategies for early detection and greater availability of screening resources.

In this context, nursing plays an important role, as it can take advantage of different opportunities in health services to raise awareness and encourage women of various ages about the importance of screening, including the practice of breast self-examination. Educational campaigns can also be extended to different contexts, such as workplaces and academic institutions, contributing to a broader information reach.

Furthermore, based on the results, health managers and professionals can direct their efforts more efficiently toward implementing measures aimed at facilitating access to screening measures, including broadening the age range of women to be covered by these measures. Finally, they can focus more on reducing gaps in information records, allowing publicly available data to be more faithful to the reality found.

Conclusion

It was observed that the incidence and prevalence rates of breast cancer cases were high, especially among women aged 40 and over, and that the disease has progressively increased among those aged 15 and 39. The increasing prevalence of cases in both age groups, especially from 2023 onwards, reflects advances in diagnosis and patient survival. Many deaths were among women aged 40 or over in the South and Southeast, with higher overall case-fatality rates in the Central-West and Southeast.

Authors' contribution

Conception and design or analysis and interpretation of data; final approval of the version to be published; responsibility for all aspects of the text in ensuring the accuracy and integrity of any part of the manuscript: Garcia GMC, Silva MEP, Logullo VV, Moura DRO, Marcon SS. Writing of the manuscript or relevant critical revision of the intellectual content; final approval of the version to be published; responsibility for all aspects of the text in ensuring the accuracy and integrity of any part of the manuscript: Gomes BJO, Nogueira LA.

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