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BREAST CANCER MORTALITY IN ELDERLY WOMEN IN SOUTHERN BRAZIL: AN OVERVIEW FOR THE PERIOD 1996 TO 2020

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ABSTRACT

Breast cancer is the leading cause of cancer death among women worldwide. Despite decades of medical initiatives and public policies, the disease's mortality rates remain high in Brazil. The aim of this article is to analyze breast cancer mortality in Southern Brazil among elderly women aged 60 to 80 years or older, over the period 1996–2020. Data were drawn from the Mortality Information System (SIM) of the Department of Informatics of the Unified Health System (Datasus), in accordance with the International Classification of Diseases (ICD), and from the Brazilian Institute of Geography and Statistics (IBGE). Breast cancer is considered the most common type among women in almost all Brazilian regions, except in the North, where cervical cancer ranks first.

Keywords: Breast Cancer. Mortality. Elderly women.

INTRODUCTION

Currently, the main causes of morbidity and mortality in the global population are noncommunicable diseases (NCDs). Cardiovascular diseases remain prominent, followed by neoplasms. Among these, breast cancer continues to lead in both incidence and deaths.

Breast cancer arises when there is excessive and disordered cell proliferation resulting from genetic changes that stimulate increased estrogen levels. Women are more predisposed than men due to a greater amount of breast tissue. Early prevention and detection measures should be adopted, as the disease has a high mortality rate.

Excluding non-melanoma skin tumors, female breast cancer is the most frequent cancer in all Brazilian regions, with an estimated risk of 81.06 per 100,000 in the Southeast; 71.16 per 100,000 in the South; 45.24 per 100,000 in the Center-West; 44.29 per 100,000 in the Northeast; and 21.34 per 100,000 in the North (INCA/MS, 2020).

Access to health services differs across Brazilian states; consequently, there is wide variation in mortality rates due to disparities in the timing of diagnosis, treatment, and follow-up.

Starting in the 1980s, Brazil developed public policies regarding breast cancer, notably through the "Viva Mulher" Program, introduced in 1998. During this period, the federal government began supporting actions for Breast Cancer Control aimed at reducing exposure to risk factors, improving quality of life for patients with this condition, and lowering mortality. All these objectives align with the current guidelines of the national cancer control policy published in Ordinance GM/MS1 No. 874 of 2013 and with the National Policy for Cancer Prevention and Control (INCA, 2015).

From the 1990s onward, changes in the clinical presentation and management of breast cancer cases emerged, including the implementation of screening with mammography, effective hormonal treatments, chemotherapy, and advances in surgery and radiotherapy (AUTIER, 2010).

In many countries, these innovations contributed to reduced mortality and increased survival from breast cancer.

Moreover, unlike what occurs in most developed countries—where there is an upward trend in incidence but a reduction in breast cancer mortality (SIEGEL et al., 2014)—studies conducted in previous decades indicated that breast cancer mortality increased in Brazil (SILVA et al., 2011; MARTINS et al., 2013; GIRIANELLI et al., 2014).

Thus, studies on this pathology have gained even greater prominence in the national context because Brazil is undergoing rapid population aging, which has directly increased the incidence and mortality of noncommunicable chronic diseases (PEREA et al., 2018).

According to the World Health Organization (WHO), the number of people over the age of 60 in Brazil will reach 2 billion by 2050. Therefore, it is imperative that the government implement public policies that efficiently serve the population when health issues and/or deaths occur.

Consequently, monitoring mortality trends over time and understanding future mortality patterns are relevant for planning and evaluating cancer control policies as well as for implementing early detection and treatment methods directed toward the most vulnerable areas.

Conceptualization and Risk Factors

Breast cancer is a multifactorial disease in which age is considered an important risk factor. However, other factors increase the risk of developing the disease, such as: obesity, physical inactivity, alcohol consumption, frequent exposure to ionizing radiation; reproductive and hormonal history (early menarche at age 11 or younger, nulliparity, first pregnancy after age 30, late menopause after age 55, use of hormonal contraceptives); and,

finally, genetic and hereditary factors: a family history—especially in first-degree relatives—of breast cancer before age 50; bilateral breast cancer; male breast cancer; a previous history of breast cancer/benign breast disease; a first-degree relative with ovarian cancer at any age; and genetic alterations, particularly in the BRCA1 and BRCA2 genes (INCA, 2019).

Cancer already represents a serious public health problem throughout Brazil. Widely disseminated knowledge shows advanced age as one of the main risk factors associated with this disease. Therefore, we must encourage and promote breast cancer prevention among women through sound nutrition, physical activity, judicious use of medications, and adherence to screening.

Diagnosis

The main signs and symptoms of breast cancer are a lump in the breast and/or armpit, which may be painless or cause breast pain, and skin changes covering the breast, such as retractions with an appearance similar to an orange peel; transparent or bloody nipple discharge, unilateral or bilateral.

For early detection of breast cancer, the Brazilian National Cancer Institute (INCA/MS) recommends:

- Annual screening with clinical breast examination for all women starting at age 40. This procedure is considered part of comprehensive women's health care and should be performed at all clinical visits regardless of age;
- Screening with mammography in women aged 50 to 69, with a maximum interval of two years between exams;
- Annual clinical breast exam and mammography starting at age 35 for women belonging to population groups at high risk of developing breast cancer;
- Guaranteed access to diagnosis, treatment, and follow-up for all women with abnormalities on exams.

According to INCA/MS, the following are defined as population groups at high risk for developing breast cancer:

1. Women with a family history of at least one first-degree relative (mother, sister, or daughter) diagnosed with breast cancer before age 50;
2. Women with a family history of at least one first-degree relative (mother, sister, or daughter) diagnosed with bilateral breast cancer or ovarian cancer at any age;
3. Women with a family history of male breast cancer;
4. Women with a histopathological diagnosis of proliferative breast lesion with atypia or lobular carcinoma in situ.

According to the Ministry of Health, the most effective forms of early detection are clinical breast examination (CBE) and mammography (MMG). Ultrasound may be performed as a diagnostic adjunct, and fine-needle aspiration (FNA) and core biopsy can provide sufficient data for clinical staging of the tumor and definition of treatment. However, many women at risk do not have access to these exams, as the health system in some parts of Brazil operates slowly and is extremely bureaucratic.

When breast cancer is diagnosed at an early stage ("in situ" cancer), the chances of cure are high, with 5-year survival reaching 97%.

The most widely used method for evaluating outcomes in oncology and even in epidemiology is patient survival. Mortality rates in historical series have high analytical significance, making it possible to discuss statistical techniques of survival analysis based on observations obtained from health service records (INCA/MS, 2018).

METHODOLOGY

An ecological, retrospective time-series study was conducted using secondary data collected from the Mortality Information System (SIM) of the Department of Informatics

of the Unified Health System (Datasus), analyzing deaths due to malignant neoplasm of the breast occurring in Southern Brazil from 1996 to 2020. Demographic data from the Brazilian Institute of Geography and Statistics (IBGE) were also used, based on census information (2000 and 2010), the 1996 population count, and population estimates for the remaining years.

To analyze temporal trends in mortality, the Joinpoint Regression Program was used. This program computes and analyzes rate trends in segments, providing models that summarize behavior over the period (National Cancer Institute, 2015).

The specifications used in the program were: model log(y) = b×x, where Y is the mortality rate and X is the year of death. Constant variance was assumed, with a maximum of four joinpoints. The joinpoint determination method used was Grid Search (LGS), and the model selection method was the permutation test.

Two-tailed tests were used for all calculations with a significance level of 5%. Epidat software version 4.1 (Epidat, 2014) was used to calculate confidence intervals and rate adjustments.

RESULTS AND DISCUSSIONS

The SIM (Mortality Information System) was important and contributed to this study. Information contained in death certificates is essential for describing the national mortality profile.

The World Health Organization (WHO), which compiles the latest available data for each country on deaths due to ill-defined causes (IDC), indicated a proportion of 10.14% for Brazil in 2015. Other South American countries—such as Argentina (16.66%), Ecuador (11.81%), Paraguay (14.41%), and Uruguay (15.96%)—have higher values than Brazil, whereas Peru (6%), Guyana (8.72%), Colombia (4.69%), and Chile (4.6%) have values below 10% for deaths due to ill-defined causes (WHO, 2019).

In Brazil, however, deaths due to ill-defined causes have decreased in recent decades across all regions, especially in municipalities outside state capitals.

Table 01 shows a gradual and marked decline in the percentage of deaths from ill-defined causes, indicating improved data quality recorded by the Mortality Information System. Nevertheless, there are still significant values for deaths from ill-defined causes in the North and Northeast regions, according to data from the Ministry of Health (Saúde Brasil 2005).

Regarding malignant neoplasms with unspecified primary site, women in all age groups studied (under 60; 60–69; 70–79; and 80+) had similar percentages, and all results decreased from 1997 to 2020.

Table 01: Indicators of information quality by age group in the South region between 1997 and 2020.

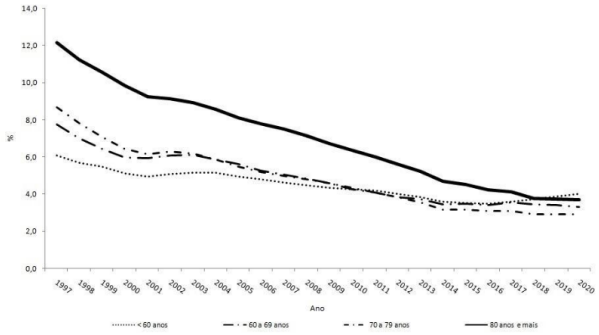
Sexo / faixa etária (anos)	Causas mal definidas (%)			Neoplasias malignas sem especificação de local – C80 (%)		
	1997	2008	2020	1997	2008	2020
< 60	6,1	4,5	4,0	3,8	3,4	1,8
60 - 69	7,7	4,8	3,3	3,9	3,5	1,8
70 - 79	8,7	4,8	2,9	3,9	3,6	2,1
≥80	12,1	7,1	3,7	4,4	3,6	2,0
Total	8,1	5,3	3,5	3,9	3,5	1,9

Source: Mortality Information System – SIM / Ministry of Health.

In Figure 01, there is a sharp decrease in the percentage of ill-defined causes in all age groups over the years, especially from 2014 onward.

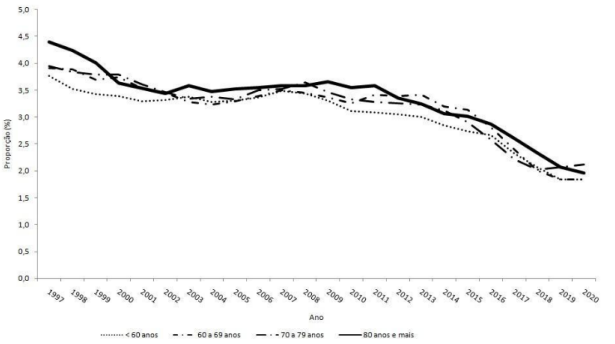
In Figure 02, the percentage of neoplasms with unspecified primary site is similar across all age groups in the early years up to 2016, with a subsequent decrease through 2020.

Figure 01 – Proportion of ill-defined causes in the South region by age group, 1996–2020.



Source for both figures: Mortality Information System – SIM / Ministry of Health.

Figure 02 – Proportion of neoplasms with unspecified primary site in the South region, 1996–2020.



Source for both figures: Mortality Information System – SIM / Ministry of Health.

Table 02 presents the crude rate and the rate ratio of breast-cancer mortality in the South region by age group in the periods 1997–2008 and 2009–2020. Mortality rates were calculated per 100,000 inhabitants/year.

Findings from this study showed a slight increase in breast-cancer mortality among elderly women in all age groups (60–69; 70–79; 80+). In 1997, women aged 60–69 had a crude rate of 46.45, with progressive increases in 2008 and 2009, reaching 49.11 in 2020. Women aged 70–79 had a crude rate of 74.03 in 1997, which decreased substantially in 2008, then rose again in 2009 and, despite a slight increase, reached a lower rate of 68.16 in 2020. Women aged 80 and older had a crude rate of 108.55 with a slight, progressive increase over the years, reaching 116.74 in 2020.

Analyzing the mortality rate ratio shows a slight reduction in the 60–69 age group, and a slight increase in the 70–79 and 80+ age groups.

Table 02: Crude mortality rate and mortality rate ratio for breast cancer in the South region by age group, 1997–2008 and 2009–2020.

Faixa etária (anos)	Taxa de mortalidade*				Razão da taxa de mortalidade (IC95%)	
	1997	2008	2009	2020	1997-2008	2009-2020
60 – 69	46,45	49,73	51,18	49,11	1,07 (0,92; 1,24)	0,95 (0,85; 1,07)
70 – 79	74,03	64,24	66,31	68,16	0,86 (0,73; 1,02)	1,02 (0,89; 1,17)
≥80	108,30	108,99	107,53	116,63	1,00 (0,81;1,24)	1,08(0,93; 1,26)
Total	62,05	63,12	64,43	65,66	1,01 (0,92; 1,12)	1,01(0,94; 1,09)
	**p<0,001	** p<0,001	** p<0,001	**p<0,001		

Source: Mortality Information System – SIM / Ministry of Health.

Note: * Mortality rate per 100,000 inhabitants/year; ** χ^2 for trends; # Significant rate ratio ($p < 0.05$).

Table 03 shows the mortality rate and mortality rate ratio for breast cancer in the South region by age group between 1997 and 2020. It presents the 95% confidence intervals for 1997, 2008, 2009, and 2020: in the 60–69 group, value of 1.00; in the 70–79 group, values of 1,59 (1997); 1,29 (2008); 1,29 (2009); 1,38 (2020); and in the 80+ group, values of 2,33 (1997); 2,19 (2008); 2,09 (2009); 2,37 (2020).

Table 03: Crude mortality rate and mortality rate ratio for breast cancer in the South region by age group, 1997–2020.

Faixa etária (anos)	Taxa de mortalidade*	Razão da taxa de mortalidade (IC95%)
1997		
60 – 69	46,45	1,00
70 – 79	74,03	1,59(1,34 - 1,89)·
≥80	108,30	2,33(1,89 - 2,86)·
	P<0,001	P<0,001
2008		
60 – 69	49,73	1,00
70 – 79	64,24	1,29 (1,11 - 1,48)·
≥80	108,99	2,19(1,88 - 2,55)·
	P<0,001	P<0,001
2009		
60 – 69	51,18	1,00
70 – 79	66,31	1,29(1,13 - 1,48)·
≥80	107,53	2,09(1,80 - 2,43)·
	P<0,001	P<0,001
2020		
60 – 69	49,11	1,00
70 – 79	68,16	1,38 (1,24 - 1,55)·
≥80	116,63	2,37(2,11 - 2,66)·
	P<0,001	P<0,001

Source: Mortality Information System – SIM / Ministry of Health.

Note: *Mortality rate per 100,000 inhabitants/year; **χ^2 for trends; # Significant rate ratio ($p < 0.05$).

Data in Table 04 present the results of trend analyses in temporal series of mortality coefficients, performed with the Joinpoint program, considering crude and age-adjusted mortality rates per 100,000 inhabitants/year for breast cancer in the South region for the 60–69, 70–79, and 80+ age groups over 1997–2020. These are expressed as APC (Annual Percent Change) values: for women aged 60–69, 1997–2012 (APC = 0.8) and 2012–2020 (APC = −0.8). For women aged 70–79: 1997–2002 (APC = −1.3), 2002–2005 (APC = 5.1), 2005–2008 (APC = −7.4), 2008–2018 (APC = 1.6), and 2018–2020 (APC = −5.3). Finally, for women aged 80 and older, 1997–2020 (APC = 0.1). The Average Annual Percent Change (AAPC) for 1997–2020 was 0.2 for women 60–69; −0.5 for women 70–79; and 0.1 for women 80+.

Table 04 – Joinpoint analysis of crude and age-adjusted mortality rates per 100,000 inhabitants/year for breast cancer in the South region by age group, 1997–2020.

Faixa etária (anos)	Tendência 01		Tendência 02		Tendência 03		Tendência 04		Tendência 05		AAPC§
	Período	APC§	Período	APC§	Período	APC§	Período	APC§	Período	APC§	1997-2020
60 - 69	1997-2012	0,8*	2012-2020	-0,8*							0,2 (-0,1;0,5)
70 - 79	1997-2002	-1,3	2002-2005	5,1	2005 - 2008	-7,4	2008 - 2018	1,6*	2018 - 2020	-5,3	-0,5 (-2,7; 1,8)
≥80	1997-2020	0,1									0,1 (-0,3; 0,6)
Total	1997-2020	0,1									0,1 (-0,1; 0,4)

Source: Mortality Information System – SIM / Ministry of Health.

Note: § Average Annual Percent Change; & Annual Percent Change; † APC significantly different from 0 ($p < 0.05$); # AAPC significantly different from 0 ($p < 0.05$).

DISCUSSION OF RESULTS

According to the Brazilian Society of Oncology and the Brazilian Society of Mastology, breast cancer is the malignant neoplasm that most commonly affects women worldwide.

Knowledge about the incidence and mortality of neoplasms supports public policy structures aimed at early diagnosis and appropriate treatment of these diseases, as well as their associated comorbidities (DUTRA; PARREIRA; GUIMARÃES, 2018).

In recent decades, Brazil has experienced demographic and epidemiological changes that have consequently been reflected in the profile of diseases and conditions, with increased life expectancy. In this context of epidemiological and demographic transition, the Brazilian population shows a high prevalence of cardiovascular and chronic-degenerative diseases, including cancer (AMARO et al., 2013).

One of the most important aspects to be evaluated in Brazil is the distribution of health services across different regions of the country. Deficiencies are related to screening performance, diagnosis, the stage of disease at diagnosis, the treatment methods available, and, as a consequence, survival outcomes (RENCK et al., 2014).

Lifestyle changes over the years have accompanied the rise in cancer incidence and mortality. However, disparities between nations related to socioeconomic and cultural characteristics affect prevention policies, control strategies, and quality of life after diagnosis. While developed countries have reduced cancer incidence and mortality rates, poorer and developing countries—such as Brazil—concentrate 80% of the world's noncommunicable diseases, and cancer will be the leading cause of morbidity and mortality in the coming decades in these regions (BRAY et al., 2012).

CONCLUSION

Southern Brazil accounts for 6,76% of Brazilian territory. It is the country's smallest region, displays high levels of industrialization, and its population has the best quality-of-life indicators in the country.

Nevertheless, the present study demonstrated that increasing age favors a rising trend in breast-cancer mortality in Southern Brazil.

The analysis of breast-cancer mortality among elderly women in Southern Brazil from 1996 to 2020 reveals a worrisome and persistent scenario. Despite advances in medicine, awareness campaigns, and expanded access to early diagnosis, death rates remain high,

especially among women over 70. This picture reveals not only gaps in the effectiveness of public policies targeting elderly women's health, but also the urgent need for more targeted strategies that consider the specificities of this age group.

It is essential that health managers intensify prevention, screening, and treatment actions with a focus on regional equity and strengthening primary care. In addition, investment in continuing education for health professionals and encouragement of research on breast cancer in aging populations may contribute significantly to reversing this situation.

Therefore, this study reinforces the importance of a multidisciplinary and integrated approach that values aging with dignity and promotes the reduction of inequalities in cancer care in Brazil.

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