

Mortality for Breast Cancer and the Conditions of Human Development in Brazil

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Mortalidade por Câncer de Mama e Condições de Desenvolvimento Humano no Brasil

Mortalidad por Câncer de Mama y Condiciones de Desarrollo Humano en Brasil

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Abstract

Introduction: Breast cancer is disease of relatively good prognostics if diagnosed and treated precociously, an average of 80% of the patients survive after five years of the diagnoses, however what we observe is that it is the second neoplasm in the world. **Objective:** To analyze the growth of breast cancer mortality rate and the conditions of human development in Brazil. **Method:** It is a descriptive study of temporary series along the two terms from 1998 to 2002 and 2008 to 2012. **Results:** When we analyze the mortality rates and the Human Development Index, comparing the first five years (from 1998 to 2002) with the second term of five years (2008 to 2012), we observed a growth in the mortality rate in the majority of the capitals, except from Maceió, Porto Alegre, Florianópolis and Palmas. There was a growth in the HDI in all capitals of the country. There was a growth in the Human Development Index in all capitals of the country. **Conclusion:** There was a general growth in the breast cancer rates in Brasil, although the conditions of Human Development nation wide. **Key words:** Breast Neoplasms/mortality; Social Conditions; Development Indicators.

Resumo

Introdução: O câncer de mama é considerado de relativo bom prognóstico se diagnosticado e tratado precocemente, com sobrevida média de 80% após cinco anos do diagnóstico, porém o que se observa é que se trata da segunda neoplasia mais incidente em todo o mundo. **Objetivo:** Analisar o crescimento da taxa de mortalidade por câncer de mama e as condições de desenvolvimento humano no Brasil. **Método:** Trata-se de um estudo descritivo de séries temporais nos dois períodos compreendidos entre 1998 a 2002 e 2008 a 2012. **Resultados:** Ao se analisarem as taxas de mortalidade e os índices de Desenvolvimento Humano (IDH), comparando o primeiro quinquênio (período de 1998-2002) com o segundo (período de 2008-2012), foi observado um aumento na taxa de mortalidade da maioria das capitais, com exceção de Maceió, Porto Alegre, Florianópolis e Palmas. Ocorreu um aumento do IDH em todas as capitais do país. **Conclusão:** Houve crescimento nos índices de câncer de mama no Brasil de forma geral mesmo havendo também uma melhoria das condições de desenvolvimento humano em todo o país.

Palavras-chave: Neoplasias da Mama/mortalidade; Condições Sociais; Indicadores de Desenvolvimento.

Resumen

Introducción: El cáncer de mama es considerado de relativo buen pronóstico si se diagnostica y tratado precozmente con sobrevida media del 80% después de cinco años del diagnóstico, pero lo que se observa es que se trata de la segunda neoplasia más incidente en todo el mundo. **Objetivo:** Analizar el crecimiento de la tasa de mortalidad por cáncer de mama y las condiciones de desarrollo humano en Brasil. **Método:** Se trata de un estudio descriptivo de series temporales en los dos períodos comprendidos entre 1998 a 2002 y 2008 a 2012. **Resultados:** Ao se analizaren las tasas de mortalidad y los IDH comparando el primer quinquenio (período 1998-2002) con el segundo, (Período 2008-2012), se observó un aumento en la tasa de mortalidad de la mayoría de las capitales con excepción de Maceió, Porto Alegre, Florianópolis y Palmas. Y hubo un aumento del IDH en todas las capitales del país. **Conclusión:** Se ha producido un crecimiento del cáncer de mama en Brasil de forma general, incluso habiendo también una mejora de las condiciones de desarrollo humano en todo el país.

Palabras clave: Neoplasias de la Mama/mortalidad; Condiciones Sociales; Indicadores de Desarrollo.

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INTRODUCTION

Breast cancer is one of the most feared neoplasms in women because of its high psychological, functional and social impact and its negative influence in self-image and perception of sexuality related issues. It is the most common type of cancer among women in the whole world, representing nearly 25% of all the cases of cancer¹⁻³.

In 2018 in Brazil, nearly 60 thousand women developed this disease according to the estimates of “Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA)”. With the exception of non-melanoma skin tumors, breast cancer is the most frequent in the Southeast, South, West-Central and Northeast regions, which shows its relation with the more urban life styles and environment. The higher mortality rates are seen in the Southern Region and in the States of Rio de Janeiro, São Paulo and Pernambuco³.

Though the incidence in high income countries is bigger, its mortality is lower and it is diminishing, differently from countries in development that have raising incidence and mortality^{4,5}. In medium and low income countries, where there are not effective screening programs for breast cancer, the diagnosis are done at the moment where there is no more therapeutic possibility for cure, the disease is in advanced staging and not even palliative care is able to diminish the impact of reduced survival and the prognosis of mortality⁴.

Poverty, poor education, living in rural area and, mainly, no access to health services are the social factors linked to breast cancer mortality. Mortality is attenuated as much as improvement of the access and diagnosis and therapeutic measures are offered^{5,6}.

In Brazil, in the period from 1980 – 2012, it was observed a gradual increase of breast cancer mortality in the country's five regions. In some capitals, it is seen a tendency of decline of the mortality rates from the end of 90's decade. This decline can be attributed to more chances of diagnoses of women living in certain capitals^{4,7}.

Therefore, the social-economic factors are key determinants for cancer incidence and mortality, being acknowledged as a potential condition for inequalities in cancer toll. The evidences show that the lower social-economic groups have been presenting elevated mortality because of a higher proportion of late diagnoses, more difficulty to proper diagnosis and treatment, worse prognosis, low survival and increased cancer death risk in general and by type of cancer potentially curable⁶.

The present study has the objective to analyze the growth of the breast cancer mortality and conditions of human development in the capitals of Brazil in the quinquennials 1998 to 2002 and from 2008 to 2012.

METHOD

It is a descriptive, retrospective, temporal series trial. Data were collected secondarily, extracted from death certificates of all the women who were classified per the International Classification of Diseases and Related Health Problems (CID-10), code C50 (breast malignant neoplasm) and its variables (C50-C50.9), registered in two periods of five years (quinquennials), the first from 1998 to 2002 and the second from 2008 to 2012 in every capital of Brazil and Federal District. These years were chosen because it was when the national research of Human Development Index (HDI) was carried out between 2000 and 2010, including two years before and two years after each research.

HDI data were collected through the “Atlas de Desenvolvimento Humano do Brasil” (Atlas of Human Development in Brazil) provided by “Instituto de Pesquisa Econômica Aplicada (IPEA)” and by “Instituto Brasileiro de Geografia e Estatística (IBGE)” for the capitals^{8,9}.

The mortality rate was calculated through the direct method with the formula of calculation of the mortality per specific cause with the number of breast cancer deaths in women over the number of deaths in women per 100.

The rates of mortality were calculated per age range, race/color, education and capitals of Brazil. The rates for the first quinquennial (1998 to 2002) were compared to the HDI of 2000 and of the second quinquennial (2008 to 2012), to the HDI of 2010.

For the capitals, it was adopted the HDI classification in three categories: low HDI (between 0 and 0.49), medium HDI (between 0.5 and 0.79) and high HDI (between 0.8 and 1) of the years 2000 and 2010¹⁰.

The data were analyzed with the software *Stata* version 12 (StataCorp. *College Station*, United States of America), organized and tabulated.

Only public access data were utilized without the identification of the names in the death certificates, in compliance with the ethical guidelines for clinical research and with Resolution 466/12 about research involving human subjects, ethical principles, confidentiality and anonymity.

RESULTS

The breast cancer mortality grew from 41.38% in the first quinquennial (1998 to 2002) to 58.62% in the second (2008 to 2012). Caucasian women represented 71.13% in the first quinquennial and 61.47% in the second. Brown women represented 20.32% and 28.43% followed by black women with 6.9% and 9.21%. The most frequent education level was from four to seven years

of formal education, representing 26.22% to 26.45%. The predominant age range amongst breast cancer deaths were women with 70 years old or older, a data observed in both quinquennials, with 46.21% and 50.29%, followed by women with 50 to 59 years old, representing 24.38% and 24.99% (Table 1).

The rate of mortality of breast cancer grew in 23 capitals in the two quinquennials. The cities with highest growth were Boa Vista (84.21%), Rio Branco (70.67%) and Porto Velho (58.59%) (Figure 1).

Separately analyzed, the quinquennials revealed that Brasília (2.88), Rio de Janeiro (2.05) and São Paulo (1.32) continued as the cities with the highest mortality rates from 1998 to 2002. The lower mortality rates were Palma (0.46), Boa Vista (0.41) and Rio Branco, São Luís and Florianópolis (0.59). In the second quinquennial, from 2008 to 2012, the capitals with the highest breast cancer mortality rates were Brasília (3.37), São Paulo (3.01), Rio de Janeiro (2.27) and Boa Vista (1.93). The lowest rates were Maceió (0.13), Florianópolis (0.36) and Palmas (0.37).

In relation to HDI, the cities with the best rates in 2000 were Florianópolis (0.76), Vitória and Curitiba with 0.75 and São Paulo with 0.73. In 2010, the best rates were Florianópolis and Vitória with 0.84, Brasília (0.82) Curitiba (0.76) and Belo Horizonte (0.57). The lowest rates were in 2000 and in 2010 were for the same cities: Maceió, Rio Branco, Manaus and Porto Velho.

Therefore, when the rates of mortality and HDI were analyzed comparing the first quinquennial (1998-2002) with the second (2008-2012), it was observed a raise of the mortality rate for the majority of the capitals, with

Table 1. Sociodemographic data of breast cancer death in the capitals of Brazil. Brazil 1998 to 2002 and 2008 to 2012

Variables	1998-2002		2008-2012	
	n	%	n	%
Race/Color				
Asian	272	1.56	215	0,81
Caucasian	12.387	71,13	16.377	61,47
Indian	15	0,09	22	0,08
Brown	3.539	20.32	7.575	28,43
Black	1.202	6,90	2.455	9,21
Total	17.415	100.00	26.644	100,00
Education				
≥12 years	2.561	17.77	3.794	18.20
8 to 11 years	3.394	23.55	5.191	24.91
4 to 7 years	3.778	26.22	5.515	26.46
1 to 3 years	3.216	22.32	4.274	20.51
None	1.461	10.14	2.067	9.92
Total	14.410	100.00	20.841	100.00
Age				
Until 19 years	3	0.02	4	0.01
20 to 39 years	1.750	8.85	2.059	7.35
40 to 49 years	4.033	20.40	4.799	17.12
50 to 59	4.819	24.38	7.005	24.99
60 to 69	29	0.15	67	0.24
≥70	9,135	46,21	14.098	50.29
Total	19.769	100.00	28.032	100.00

exception of Maceió, Porto Alegre, Florianópolis and Palmas. And in relation to HDI, there was growth in every capital of the country.

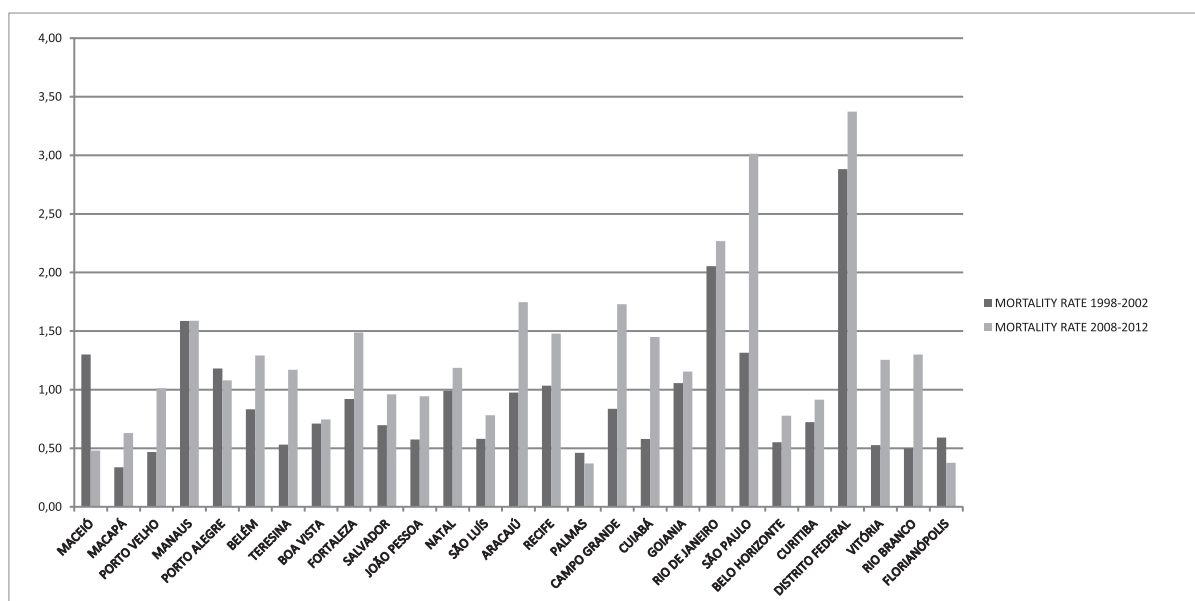


Figure 1. Breast Cancer rate of mortality. Brazil, 1998 to 2002 and 2008 to 2012

DISCUSSION

The rate of mortality was analyzed according to the sociodemographic indicators (Race/Color, Education and Age) that showed statistical significance between one period (1998-2002) and other (2002-2012) of $p < 0.001$.

In the present study it was identified high mortality in Caucasian women, a slight reduction between 1998-2002 and 2008-2012 from 71.13% to 61.47%. In the studies of Soares et al.¹⁰, about female breast cancer mortality according to color, it was also observed a higher frequency in the Caucasian female population. In addition, there was growth of the mortality for every race/color in the period studied by the author. According to IBGE⁹, the Brazilian population has high race miscegenation, with 48.2% Caucasian, 51.1%, brown and black, which can be one of the motives for the distribution of race/color encountered in this study.

Concerning age range, the predominant age of death in the two periods studied is of women with 70 years old or older (46.21% and 50.29%), followed by women of 50 and 59 years (24.38% and 24.99%). Meira et al.¹¹ conducted a study about the analysis of the age-period-cohort effect in the breast cancer mortality in Brazil and corroborated this study when they concluded that, in every geographic region, the breast cancer mortality rates increased considerably from the age range of 50 to 54 years, with high rates in women with 75 years and older. This same study concluded there were a growth in the age range of 75 years and older, from 1990 to 1994, persisting until 2000 to 2004.

It is acknowledged that mammography screening after 50 years old permits the reduction of mortality in more than 30%, showing a more favorable cost-benefit relation when compared to the screening conducted in other ages. But screening programs in Brazil initiated very late and with different coverages amongst the Regions¹¹. From 1995 and 2002, the percent of mammography done by the National Health System (SUS) varied between 17% and 54% of the total of women that needed to do the exam, which is well below the average recommended by the Ministry of Health, which is of 70%¹². In 2008, there was a coverage of 71.5%, reflecting the women who had access to the exam once in their lives, which explains in part the high rates of mortality in the age range above 60 years old encountered in both studies¹².

So, it seems evident the effect of age, since it continues as one of the most important risk factors for the rates of incidence and mortality making these discussions extremely important to define the proper public policies^{10,11}.

In relation to the mortality rate, there was raise in the majority of the cities studied, with higher differences in

Boa Vista, Rio Branco and Porto Velho. The only cities that showed reduction of their rates were Maceió, Palmas, Porto Alegre and Florianópolis. A study by Couto¹³ utilized the period between 1987 and 2013 to analyze the breast cancer mortality rate in Brazil and associated factors. In their studies, there was also a raise of the mortality rate in Brazil and in general. The Southeast region was the only one to reduce the mortality rate in the entire period. The West-Central, North and Northeast regions had a growth in the whole period. And in the Southern Region, there was raise between 1990 and 2000 and reduction between 2000 and 2010.

In the present research, the three cities with major growth of the mortality rate (Boa Vista, Rio Branco and Porto Velho) are located in the Northern and West-Central regions of the country, that were those with growth of mortality rate according to the studies of Couto¹³. This study corroborates the data of this author when identifying the Southern Region as the one with reduction of the mortality represented by the cities of Porto Alegre and Florianópolis, that had a significant reduction of the mortality rate when compared to other capitals. But this study demonstrated yet the reduction of the breast cancer mortality in the cities of Maceió and Palmas located in the Northeast region, as opposed to the author that indicated there was growth of mortality in this Region.

In a study by Barbosa et al.¹ and in another one carried out by Girianelli et al.⁴, it was identified an increase in every state of the Northeast Regions. But Girianelli et al.⁴ observed yet an opposite behavior when only the capitals were analyzed with reduction of the mortality, which corroborate the present study. According to the authors, the reversion of the mortality was possible because of the access to diagnosis and therapeutic, being more effective in the early stages of the disease.

While analyzing the mortality rates and HDI comparing different quinquennials, it was observed a raise of the mortality rate in the majority of the capitals, with the exception of Maceió, Porto Alegre, Florianópolis and Palmas. And there was an increase of the HDI in every capital of the country.

In 2000, the higher HDI were in Florianópolis (0.76), Vitória and Curitiba with 0.75. And in 2010, were Florianópolis and Vitória with 0.84 and Brasília with 0.82. These cities, with the exception of Brasília, were considered capitals with low mortality rate.

According to “Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico – VIGITEL¹², “Surveillance System of Risk Factors for Chronic Diseases per Phone Investigation” conducted by the Ministry of Health, Florianópolis is among the cities who present the highest frequency of

women between 50 and 69 years old that reported they have done mammography in the last two years (86.3%). This can signify that, further to a high adherence of women to this test, results of the improvement of the access and health conditions of the Regions¹⁴.

In all the low HDI capitals, the mortality rate raised, with the exception of Porto Velho and Maceió. Porto Velho is included in a high incidence region of breast cancer (North), is within the four cities with low HDI, but has a proportion of 81.8%^{12,15} of women between 50 and 69 years who had mammography exam. Maceió is one of the capitals whose mortality rate reduced more intensely from the first to the second quinquennial (from 0.6 to 0.13). The city has 72.9% of women between 50 and 69 years who had mammography once in their life or in the last two years¹². This can indicate that the cancer screening and prevention-driven policies are effective, even if it is not quite fully organized¹⁵.

In a study carried out by Couto¹³ there was no correlation between general HDI and mortality per mammary neoplasm, but there was a significant association when the indexes were analyzed separately. It was possible to observe positive association of the HDI income and longevity and negative association of HDI education.

A woman with low *per capita* income, no health insurance, without spouse, living in the rural area or in area without access to healthcare and exams as mammography, eventually has less chance for breast cancer screening with increase of mortality and mortality increase^{14,15}.

In a study conducted by Sandovsky et al.¹⁵ about the relation of HDI and prevention of breast cancer there was an increase of 6% of the proportion of mammography at each change of standard deviation of HDI which indicates a strong positive correlation between them. Therefore, these authors corroborate the present study since, particularly amongst the capitals with low HDI, it appears to exist a higher influence of factors that are related to the organization of health services and accessibility to prevention methods and screening of breast cancer.

The fact that the present study has utilized the “Sistema de Informação de Mortalidade – SIM) “Mortality Information System, can be seen as a limitation caused by the regional differences in coverage, completeness and quality of the information. Currently, the information obtained for the Southern, Southeast and West-Central regions are considered most reliable, which can in part explain some unclarified standards of temporal evolution. However, previous studies indicate that deaths by neoplasms are the most well registered and in addition, the Population-Based Cancer Registries have poor coverage, which makes SIM an important base for the formulation of strategies and policies of public health^{4,16}.

CONCLUSION

This study opens the possibility for similar works that can address the tendency of breast cancer mortality adjusted to each municipality. It is mandatory to think in differentiated strategies and strengthening of the national policies for prevention, early detection and treatment, mainly in cities with high mortality rate.

CONTRIBUTIONS

Larissa Di Leo Nogueira Costa contributed for the conception and planning of the study, collection and analysis of the data and wording of the manuscript. Rosângela Fernandes Lucena Batista contributed for the conception and planning of the study, analysis and interpretation of the data, wording and critical review of the article. Maria Ieda Gomes Vanderlei, Ana Hélia de Lima Sardinha and Pabline Medeiros Verzaro contributed for the collection and analysis of the data, wording and critical review of the article. Luciana Léda Carvalho Lisbôa contributed for the wording and critical review of the final version of the article. All the authors approved the final version of the manuscript.

DECLARATION OF CONFLICT OF INTERESTS

There are no conflict of interests to declare.

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