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Disparities in cervical and breast cancer mortality in Brazil

Os grandes contrastes na mortalidade por câncer do colo uterino e de mama no Brasil

ABSTRACT

OBJECTIVE: To analyze cervical and breast cancer mortality in Brazil according to socioeconomic and welfare indicators.

METHODS: Data on breast and cervical cancer mortality covering a 30-year period (1980-2010) were analyzed. The data were obtained from the National Mortality Database, population data from the Brazilian Institute of Geography and Statistics database, and socioeconomic and welfare information from the Institute of Applied Economic Research. Moving averages were calculated, disaggregated by capital city and municipality. The annual percent change in mortality rates was estimated by segmented linear regression using the joinpoint method. Pearson's correlation coefficients were conducted between average mortality rate at the end of the three-year period and selected indicators in the state capital and each Brazilian state.

RESULTS: There was a decline in cervical cancer mortality rates throughout the period studied, except in municipalities outside of the capitals in the North and Northeast. There was a decrease in breast cancer mortality in the capitals from the end of the 1990s onwards. Favorable socioeconomic indicators were inversely correlated with cervical cancer mortality. A strong direct correlation was found with favorable indicators and an inverse correlation with fertility rate and breast cancer mortality in inner cities.

CONCLUSIONS: There is an ongoing dynamic process of increased risk of cervical and breast cancer and attenuation of mortality because of increased, albeit unequal, access to and provision of screening, diagnosis and treatment.

DESCRIPTORS: Breast Neoplasms, mortality. Uterine Cervical Neoplasms, mortality. Health Services Accessibility. Time Series Studies.

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RESUMO

OBJETIVO: Analisar a evolução da mortalidade por câncer do colo uterino e de mama no Brasil, segundo indicadores socioeconômicos e assistenciais.

MÉTODOS: Foram analisados dados agregados de 30 anos (1980-2010) de mortalidade por câncer de mama e colo uterino. Os dados de óbitos foram extraídos do Sistema de Informações sobre Mortalidade, os denominadores populacionais, do Instituto Brasileiro de Geografia e Estatística, e os indicadores socioeconômicos e assistenciais do Instituto de Pesquisa Econômica e Aplicada. Foram calculadas as médias móveis desagregadas por capitais e municípios do interior dos estados. O percentual de mudança anual das taxas foi estimado a partir da regressão linear segmentada por *joinpoint*. Foi feita correlação de Pearson entre as taxas médias trienais do final do período e os indicadores selecionados das capitais e de cada estado brasileiro.

RESULTADOS: Houve queda da mortalidade por câncer do colo uterino em todo o período, exceto em municípios das regiões Norte e Nordeste fora das capitais. Houve declínio na mortalidade por câncer de mama nas capitais a partir do final da década de 1990. Os indicadores socioeconômicos positivos correlacionaram-se inversamente com a mortalidade de câncer do colo uterino. Observou-se forte correlação direta entre indicadores positivos e inversa com a taxa de fecundidade e a mortalidade por câncer de mama nos municípios do interior dos estados.

CONCLUSÕES: Encontra-se em curso um mecanismo dinâmico entre aumento de risco por câncer de mama e do colo uterino com atenuação da mortalidade em função da expansão de oferta e acesso ao rastreamento, diagnóstico e tratamento, porém de forma desigual.

DESCRIPTORIOS: Neoplasias da Mama, mortalidade. Neoplasias do Colo do Útero, mortalidade. Acesso aos Serviços de Saúde. Estudos de Séries Temporais..

INTRODUCTION

Breast and cervical cancer are the most common malignant neoplasms in women worldwide. Breast cancer, together with lung and colorectal cancer, are among the most common types in high income countries, while uterine cancer exceeds other types in low income countries.⁶

Increased incidence of breast cancer in various countries can be partially explained by demographic and lifestyle changes affecting reproductive factors, such as delayed first pregnancy, having fewer children and shorter duration of breastfeeding.¹⁷ Over the last few decades, mortality has declined in developed countries such as the USA, the United Kingdom, France and Australia. The fall in incidence in the USA from the year 2000 onwards is attributed to the reduction in hormone replacement therapy and the

decreased number of pre-clinical cases detected through screening, which began over 20 years ago.¹²

The introduction of cervical cancer screening in developed countries proved that this measure significantly reduces incidence of, and mortality from, this disease and prolongs patient survival. However, this has not been observed in low income countries where access to primary and specialized care is limited.¹⁶

In Brazil, the *Sistema de Informações sobre Mortalidade* (SIM – National Mortality Database) recorded 12,705 deaths from breast cancer and 4,986 from cervical cancer in 2010, together accounting for 21.4% of cancer deaths in that year.⁸ The indicators would be

⁸ Ministério da Saúde, Departamento de Informática do Sistema Único de Saúde. Informações das estatísticas de mortalidade e demográficas [cited 2013 Jan]. Available from: www2.datasus.gov.br/DATASUS/index.php?area=02

greater than those officially released if corrections referring to “undefined” causes and cases classified as “non-specified area of uterus” were made. Using these data to project expected number of new cases in this country, more than 50,000 women would be diagnosed with breast cancer annually, and around 20,000 with cervical cancer.

Analysis of temporal trends in mortality between 1980 and 2006 indicate that there are differentiated patterns to these cancers in Brazil, with a fall in cervical cancer and an increase in breast cancer.⁴ When data for state capitals and other municipalities are disaggregated, these trends are shown to have different inclinations. The decrease in cervical cancer in women in the Southeast, South and Central-West is clear. However, in the North and Northeast, such a fall is only apparent in the state capitals and rates in residents in the interior show statistically significant increases.

During the period, increases in mortality from breast cancer were verified in all five regions of Brazil, although a declining trend in the coefficients was observed in state capitals from the end of the 1990s onwards.

The great challenge for middle and low income countries is to ensure strategies that enable early diagnosis of these two types of cancer and to reduce trends in mortality. It would be possible to reduce cervical cancer incidence if all women with premalignant lesions had access to appropriate treatment.

It is essential that trends in incidence and mortality are monitored in order to evaluate the results of screening strategies which have been shown to be effective in other countries.

The aim of this study was to analyze the evolution of breast and cervical cancer mortality in state capitals and other Brazilian municipalities, according to socioeconomic and health care indicators.

METHODS

This is a study of breast and cervical cancer mortality in state capitals and other municipalities in the five Brazilian regions, using aggregated time series data from a 30-year-period (1980-2010). The data on deaths were obtained from the SIM, population data from Brazilian Institute of Geography and Statistics (IBGE) demographic censuses^a and socioeconomic and health care indicators from the Institute of Applied Economic Research (IPEA).^b Population data between the censuses were estimated using linear interpolation.

Between 1980 and 1995, the deaths included were those classified using the Manual of the International Statistical Classification of Diseases, Injuries, and Causes of death (ICD-9); and those occurring between 1996 and 2010, classified using the International Statistical Classification of Diseases and Related Health Problems (ICD-10). Breast cancer and cervical cancer correspond to codes: 174(ICD-9) and C50(ICD-10), 180(ICD-9) and C53(ICD-10), respectively, reported to the SIM and classified under these codes after correction.

Correction for breast and cervical cancer deaths was conducted by proportionally redistributing 50.0% of deaths classified as “undefined” (codes: 780-799 of the ICD-9 and R00-R99 of the ICD-10), using the World Health Organization (WHO) proportional redistribution methodology.^c Correction factors were calculated for each five-year-period, age and sex for capital and interior of each state. Cervical cancer deaths were corrected by redistributing all deaths classified as non-specified uterine cancer (codes 179 of the ICD-9 and C55 of the ICD-10), maintaining the same proportion of deaths from cervical and uterine cancer.⁹

Average breast and cervical cancer mortality rates (to the order of three) were calculated and standardized, corrected for age group using the direct method, taking the world population standard as a reference.^d The time trend was evaluated using joinpoint regression, version 3.4.3. Year of death was the independent variable and mortality rates the dependent variable, according to the following groupings: large regions, state capitals and other municipalities (interior). The models were adjusted assuming a different number of joinpoints, from zero (trend represented by one single segment of the line) to three; considering changes in the rates over time. Annual percentage changes (APC) were calculated for each type of cancer, period and geographic area.

The adjusted and corrected mean rates for the last three-year-period (2008 to 2010) were correlated with socioeconomic and health care indicators available for 2000 in the IPEA for state capitals and states. The indicators were classed as positive or negative. The positive corresponded to better living conditions: number of doctors/1,000 inhabitants, except for Teresina, PI, where this indicator was not available; proportion of individuals aged ≥ 25 with at least 11 years of schooling; proportion of individuals living in households with electricity; human development index (HDI); proportion of individuals living in households with plumbing. The negative

^b Instituto de Pesquisa Econômica Aplicada. Indicadores sociais [cited 2013 Jan]. Available from: www.ipeadata.gov.br

^c Mathers CD, Bernard C, Iburg KM, Inoue M, Fat DM, Shibuya K, Stein C, Tomijima N, Xu H. Global Burden of Disease in 2002: data sources, methods and results. Global Programme on Evidence for Health Policy Discussion Paper No. 54 World Health Organization December 2003 (revised February 2004).

^d Segi M. Cancer mortality for selected sites in 24 countries (1950-57). Sendai: Tohoku University School of Public Health; 1960.

indicators corresponded to worse conditions: proportion of population aged ≥ 25 who are illiterate; fertility rate; proportion of individuals living below the poverty line, i.e., on under half a minimum wage *per capita*; mortality rate in children $< 5/1,000$ live births; percentage of households headed by women, without partner and with children < 15 .

Pearson's correlation coefficients were calculated between the three-year average rates (2008-2010) in the Federal District and the state capitals and other municipalities in each state and the indicators in the capitals and states, respectively, using the R statistic program (version 2.7.1). Values between 0.70 and 1 were deemed strong correlation, moderate 0.30 to 0.69 and weak 0 to 0.29.

The research was approved by the Research Ethics Committee of the *Instituto de Medicina Social, Universidade do Estado do Rio de Janeiro* (Process CAAE 0027.0.259.000-09, 8/12/2009), and followed ethical standards.

RESULTS

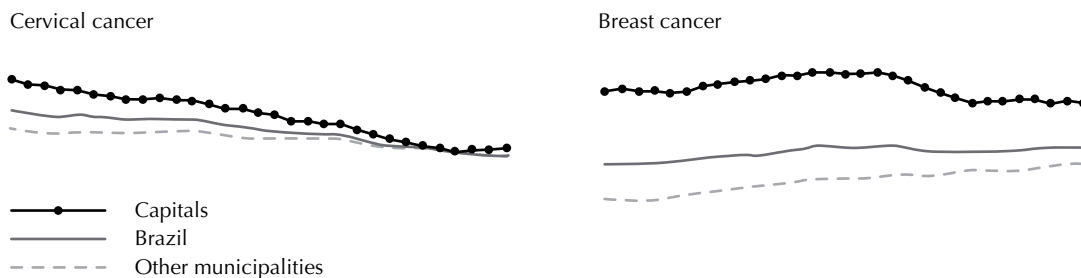
In the 1980s, the magnitude of breast cancer mortality in Brazilian women was similar to that of cervical cancer. However, breast cancer always weighed more heavily in state capitals (Figure 1). Patterns in mortality rates for the two types of cancer in Brazil differed over the 30 years: a clear fall in cervical cancer, more pronounced in state capitals, and an increase in breast cancer. From the end of the 1990s, number of deaths from this cancer began to decrease in women living in the state capitals.

The same comparison with data disaggregated by region shows a difference in magnitude and trends of mortality for these two types of cancer (Figure 2). In the North, cervical cancer mortality was higher than that of breast cancer throughout the period, and there was a fall in deaths among women living in the state capitals and an increase in those in the interior. Breast

cancer increased evenly in all municipalities. This profile differed in the Northeast, where breast cancer mortality rates exceeded those of cervical cancer at the end of the period, with a marked increase in women living in the interior. Cervical cancer mortality coefficients in the South and Southeast were lower than those of breast cancer and there was a clear trend of decline in the female population as a whole. A decline in deaths from breast cancer was noted in the state capitals of the South from the mid-1990s onwards, and in the Southeast from the end of that decade. In the Central-West, throughout the period, there was an increase in breast cancer mortality and a fall in cervical cancer mortality. The speed of the advance of breast cancer among women living outside the state capitals was considerable.

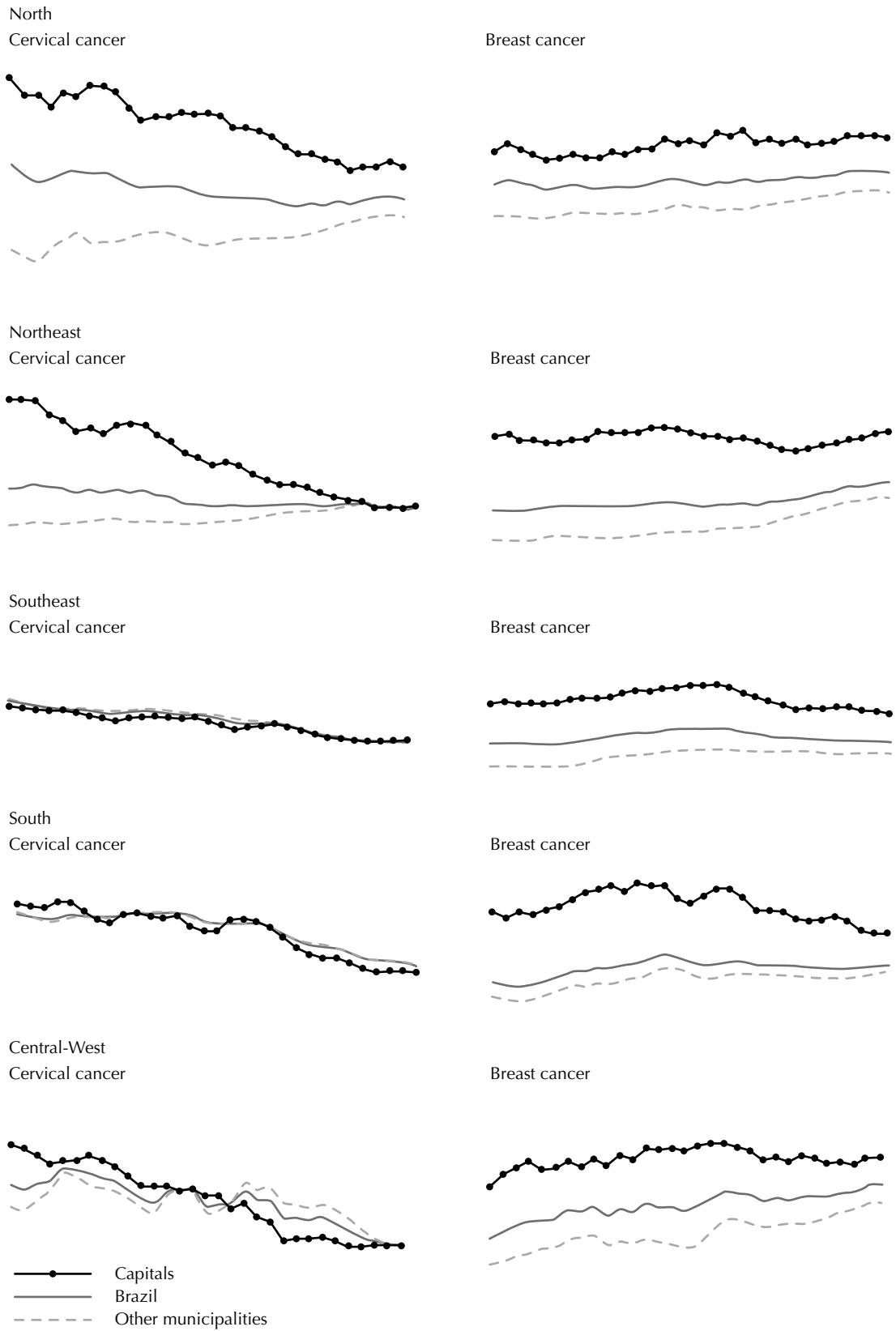
Regression analysis using joinpoint showed a significantly statistic drop in mortality rates from cervical cancer in the state capitals and other municipalities in the Southeast, South and Central-West (Table 1). In the North and Northeast, there was a fall in the state capitals and an increase in the interior. The largest drop was observed in state capitals in the Northeast (APC -3.3; 95%CI -3.5;-3.1).

The patterns of breast cancer mortality trends differed between the regions and between the state capitals and other municipalities (Table 2). There was an overall increase in rates in the first observation period, with the exception of in the interior of the North. Mortality rates for this cancer continued to grow in the interior of the North and Northeast and in the state capitals in the North. However, the rates began to fall in other regions, both in the state capitals and outside of them. The greatest growth was observed in the North, in municipalities in the interior, between 1999 and 2010 (APC = 5.0; 95%CI 3.3;6.8) and in the interior of the Northeast (APC = 4.9; 95%CI 4.4;5.5). The greatest annual drop was observed between 1997 and 2002 in the Southeast (APC = -2.8; 95%CI -3.7;-1.9).



^a per 100,000 inhabitants, adjusted for the population of the demographic census – Brazil 2010 and corrected (see Methods).

Figure 1. Breast and cervical cancer mortality. Brazil, overall and by state capitals and other municipalities, 1980 to 2010.



^a per 100,000 inhabitants, adjusted for the population of the demographic census – Brazil 2010 and corrected (see Methods).

Figure 2. Breast and cervical cancer mortality.^a Brazil, overall and by state capitals and other municipalities, 1980 to 2010.

Table 1. Joinpoint regression analysis of cervical cancer mortality trends. State capitals and other municipalities in the Brazilian regions, 1980 to 2010.

Region	Municipalities	Trend 1		
		Years	APC	95%CI
North	Capitals	1980 to 2010	-1.8	-2.0;-1.6
	Other municipalities	1980 to 2010	1.7	1.2;2.2
Northeast	Capitals	1980 to 2010	-3.3	-3.5;-3.1
	Other municipalities	1980 to 2010	1.0	0.8;1.3
Southeast	Capitals	1980 to 2010	-1.9	-2.2;-1.7
	Other municipalities	1980 to 2010	-2.2	-2.5;-2.0
South	Capitals	1980 to 2010	-2.7	-3.1;-2.2
	Other municipalities	1980 to 2010	-1.8	-2.1;-1.4
Central-West	Capitals	1980 to 2010	-3.1	-3.4;-2.8
	Other municipalities	1980 to 2010	-1.1	-1.6;-0.6
Brazil	Capitals	1980 to 2010	-2.2	-2.4;-2.0
	Other municipalities	1980 to 2010	-1.0	-1.2;-0.9

APC: annual percentage change.

Correlation analysis was conducted between some socioeconomic and health care positive and negative indicators (doctors/1,000 inhabitants) and mortality rates in residents in the state capitals or other municipalities in the states. A moderate direct relationship between three positive indicators and an inverse relationship, also moderate, were found with breast cancer. In the interior, there were strong correlations with almost all the positive indicators and, of the negative indicators, there was a strong correlation with fertility ($r = -0.92$; $p < 0.0001$) and the percentage of female head of household, single and with children under 15 ($r = -0.82$; $p < 0.0001$), with moderate correlation with the other three (Table 3).

Mortality indicators behaved differently for cervical cancer in the state capitals: of the five positive indicators, three were negatively correlated, and of the five negatives, three correlated positively. The indicators analyzed do not show correlation with cervical cancer mortality rates in the interior, with the exception of percentage of individuals living below the poverty line ($r = 0.46$; $p = 0.017$).

DISCUSSION

The results suggest there is a dynamic mechanism between determining risk exposures in the appearance of breast and cervical cancer. At the same time,

Table 2. Joinpoint regression analysis of breast cancer mortality trends. State capitals and other municipalities in the Brazilian regions, 1980 to 2010.

Region	Municipalities	Trend 1			Trend 2			Trend 3		
		Years	APC	95%CI	Years	APC	95%CI	Years	APC	95%CI
North	Capitals	1980 to 1984	-2.1	-7.3;3.4	1984 to 2010	1.0	0.6;1.3	-	-	-
	Other municipalities	1980 to 1999	3.1	2.4;3.9	1999 to 2010	5.0	3.3;6.8	-	-	-
Northeast	Capitals	1980 to 1992	0.4	-0.3;1.1	1992 to 2010	-0.5	-0.8;-0.1	-	-	-
	Other municipalities	1980 to 1997	1.5	1.2;1.9	1997 to 2010	4.9	4.4;5.5	-	-	-
Southeast	Capitals	1980 to 1997	0.9	0.8;1.0	1997 to 2002	-2.8	-3.7;-1.9	2002 to 2010	-0.6	-0.9;-0.2
	Other municipalities	1980 to 2010	0.6	0.4;0.8	-	-	-	-	-	-
South	Capitals	1980 to 1991	1.6	1.1;2.2	1991 to 2010	-1.3	-1.5;-1.1	-	-	-
	Other municipalities	1980 to 1993	1.9	1.6;2.2	1993 to 2010	-0.2	-0.4;0.0	-	-	-
Central-West	Capitals	1980 to 1996	1.4	1.0;1.8	1996 to 2010	-0.9	-1.4;-0.4	-	-	-
	Other municipalities	1980 to 2010	2.4	2.0;2.8	-	-	-	-	-	-
Brazil	Capitals	1980 to 1997	0.7	0.6;0.8	1997 to 2003	-2.6	-3.2;-1.9	2003 to 2010	0.0	-0.4;0.5
	Other municipalities	1980 to 2010	1.1	1.0;1.2	-	-	-	-	-	-

APC: annual percentage change

Table 3. Correlation between breast and cervical cancer mortality rates and selected socioeconomic and health care indicators. Capitals and other municipalities in Brazil, 2008 to 2010.

Indicators	Breast cancer				Cervical cancer				
	Capitals		Other municipalities		Capitals		Other municipalities		
	Correlation	p	Correlation	p	Correlation	p	Correlation	p	
Positive									
Human development index (HDI)	0.32	0.0990	0.58	0.0020	-0.38	0.0502	-0.38	0.0585	
Doctors (per thousand inhabitants) ^a	0.61	0.0008	0.81	< 0.0001	-0.51	0.0084	-0.29	0.1581	
% individuals aged ≤ 25 with more than 11 years of schooling	0.51	0.0063	0.78	< 0.0001	-0.57	0.0018	-0.37	0.0636	
% individuals in households with electricity	0.36	0.0635	0.71	< 0.0001	-0.17	0.3828	-0.36	0.0745	
% individuals in households with plumbing	0.53	0.0047	0.82	< 0.0001	-0.40	0.0404	-0.36	0.0689	
Negative									
% population aged ≤ 25 who are illiterate	-0.22	0.2764	-0.47	0.0155	0.18	0.3588	0.27	0.1893	
Fertility rate (%)	-0.59	0.0013	-0.92	< 0.0001	0.52	0.0056	0.35	0.0754	
% individuals living below the poverty line	-0.26	0.1878	-0.62	0.0007	0.45	0.0198	0.46	0.0173	
Mortality rate in children < 5 per 1,000 LB	-0.16	0.4283	-0.40	0.0429	0.36	0.0613	0.39	0.0508	
% female head of household, single and with children aged ≤ 15	-0.44	0.0223	-0.82	< 0.0001	0.33	0.0895	0.24	0.2421	

LB: live births

^a Except for Teresina, PI, as the indicator was not available.

mortality is attenuated due to better access to diagnostic and treatment measures. The fall in cervical cancer mortality occurred in women all over the Southeast and South, the most developed regions of the country, whereas for women in the North and Northeast it only occurred in the state capitals. Likewise, deaths from breast cancer began to decrease in women living in the state capitals in the South and Southeast from the mid-1990s onwards.

Declining cervical cancer mortality may reflect the protection provided by the Pap smear test. This was not observed in the interior of the North and Northeast.

Breast cancer mortality increased, partly, due to increased incidence of the disease. This may be explained by the increasing adoption of urban lifestyles among women, which directly affects the degree of exposure to reproductive factors. The large annual increase in mortality rates in the North and Northeast suggests that changes in reproductive and sexual behavior, initiated in large urban centers, were rapidly adopted by women in other municipalities, even those in low income areas. On the other hand, the reversal in mortality rates that began in the capitals was possible

due to access to diagnostic and treatment measures, more effective at the initial stages of the disease.

Brazilian studies have shown overall rates of HPV infection varying between 13.7% and 54.3%.³ The number of women infected is growing in all regions of the country, probably accompanying early onset of sexual activity.^c

This is a malignant neoplasm that can be prevented by screening for intraepithelial neoplastic lesions. Thus, the fall in mortality that began in the more developed regions of Brazil, moving thence to the state capitals in other regions, indicates certain success in screening interventions. The increased availability of the Papanicolaou test may have partially reversed the risk of death in women with access to preventative measures.

Actions to control cervical cancer began in the 1980s. They intensified between 1999 and 2002, period in which two campaigns of the *Viva Mulher* program were conducted,^f leading to a substantial increase in provision of the Papanicolaou test in all regions of Brazil.^g

However, a fall in mortality from this cancer had been detected in several states even before these initiative

^c Ministério da Saúde. Pesquisa Nacional Demografia e Saúde da Criança e da Mulher (PNDS-2006). Brasília (DF); 2008.^f Instituto Nacional do Câncer. Viva Mulher. Câncer do Colo do Útero: informações técnico-gerenciais e ações desenvolvidas. Rio de Janeiro: INCA; 2002.^g Lago TG. Políticas nacionais de rastreamento do câncer do colo uterino no Brasil: análise do período 1998 a 2002 [doctoral thesis]. Campinas: Instituto de Filosofia e Ciências Humanas da UNICAMP; 2004.

commenced. Decreases in cervical cancer deaths had been recorded in the municipality of Sao Paulo between 1980 and 1999,⁸ between 1984 and 2003² and between 1987 and 1998 in the municipalities of Campinas, Piracicaba and Sao Joao da Boa Vista,¹⁸ all in the state of Sao Paulo. Similar declines were identified in Paraná⁵ and in Minas Gerais between 1980 and 2005.¹ Actions to organize screening for the disease at a state and local level, in the case of Sao Paulo and Paraná, may have encouraged the start of the fall in mortality in the South and Southeast.

Data from household surveys confirm an increase in preventative examinations that became part of national policy for controlling cancer over the last decade. Data from the *Pesquisa Nacional de Amostras de Domicilio* (PNAD – National Household Survey) estimated 82.6% coverage of preventative gynecological examinations in women aged 25 to 59 in 2003.^h This estimate was 87.1% in 2008, an increase across all income classes, although of a more marked nature among the poorest.

Correlation analysis confirms what has been shown in the literature.^{4,6,9} Cervical cancer mortality coefficients in the state capitals are inversely correlated with indicators of better socioeconomic status and directly correlated with negative indicators. This indicates that it is more difficult for women living in state capitals to have cervical cancer screening tests done. In the interior, only the percentage of individuals living below the poverty line was related to increased mortality from this type of cancer. Are we faced with a situation in which women, outside of urban centers, who do not undergo cervical cancer screening are living in worse conditions? Is inequality in access concentrated in those who live in extreme poverty, while barriers also affect others on low incomes in the capitals?

Breast cancer mortality rates rose in Brazil according to increased positive socioeconomic indicators and decreased as negative indicators, such as fertility rates, increased. This relationship appears better in the interior, suggesting that rates outside of the capitals were not attenuated by women diagnosed with the disease receiving treatment.

The main breast cancer risk factors are related to sexual and reproductive history.¹⁴ The fall in mortality in developed countries is attributed to improved survival due to awareness, early detection and improved treatment.¹¹ The demographic transition taking place in Brazil, with falling birth rates and having children later,ⁱ weighs significantly in increased incidence of the disease.

Mortality accompanied this increase, which occurred homogeneously in women in different regions of the country. Lifestyle changes appear to be reflected in reproductive factors and rapidly affect women in the interior. Decreased breast cancer deaths in the South and Southeast may show the results of better access to mammography and specialist treatment services, benefiting women diagnosed when the disease is in its early stages. In Brazil, this phenomenon is more recent than the Pap smear examination.

Although some breast cancer screening proposals were included in the intensification stage of the *Viva Mulher* program in 2002, it was in 2004 that the Ministry of Health launched the breast cancer control consensus, recommending that women aged between 50 and 69 have a mammogram every two years.^j

PNAD data^g from 2003 and 2008 confirm increased numbers of mammograms in women in the Ministry of Health target age group (50 to 69 years old), especially among those on higher incomes and with higher levels of education and who have health insurance. Although the percentage of women between 50 and 69 who reported having a mammogram increased from 54.6% in 2003 to 71.5% in 2008, among those with household income > 5 minimum wages, the increase was from 76.6% to 80.7%. These percentages were 20.2% in 2003 and 29.1% in households on an income of < 25.0% minimum wage in 2008, demonstrating considerable inequality in access by socioeconomic level. Residents in metropolitan areas are three times more likely to have the examination than those in other areas.¹⁵

The study was based on SIM data, which could pose a significant limitation due to regional differences in the coverage, completeness and quality of the information.⁷ However, previous studies indicate that cancer deaths are better recorded, although some of them may be included in the undefined causes categories, which have decreased markedly in this country.¹³ The decision to correct 50.0% of undefined deaths, together with moving averages and joinpoint regression meant that the trends in cancer mortality coefficients could be approximated.

The effect of screening on reducing breast cancer mortality is lower than that which occurred with cervical cancer. Recent studies indicate that the impact of mammography screening on mortality is less than hoped¹⁰ and that the large reduction in mortality in developed countries is attributable to recent advances in treatment.¹¹ This reality is compatible with countries

^h Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios: um panorama da saúde no Brasil: acesso e utilização dos serviços, condições de saúde e fatores de risco e proteção à saúde - PNAD 2008. Rio de Janeiro; 2010.

ⁱ Minamiguchi MM. Segunda transição demográfica: o que se pode dizer da situação brasileira? [dissertação de mestrado]. Rio de Janeiro: Escola Nacional de Ciências Estatísticas; 2011.

^j Instituto Nacional de Câncer, Coordenação de Prevenção e Vigilância. Controle do câncer de mama no Brasil: documento de consenso. Rio de Janeiro; 2004 [cited 2012 Dec]. Available from: <http://www1.inca.gov.br/publicacoes/Consensointegra.pdf>

in which it is not so difficult to access cancer diagnosis and treatment services. The obstacles are enormous for Brazil's socioeconomically deprived population.

Urgent measures are needed to guarantee that all women have access to the best diagnosis and treatment available.

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