

CANCER MORTALITY TRENDS IN BRAZILIAN STATE CAPITALS, 1980-2004

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ABSTRACT

OBJECTIVE. Cancer mortality rates began to decline in developed countries in the 1990s, but their behavior in developing countries is less well-known. An earlier study on cancer mortality in Brazil showed a declining mortality trend for cancer as a whole, but the quality of data raised some criticism as to the validity of the results. Information on mortality pertaining to Brazilian state capitals has a better quality than those pertaining to the country as a whole, which enables a more accurate analysis of the trends.

METHODS. Mortality and population data were collected from the Ministry of Health's databases (SIM/DATASUS and IBGE, respectively). Age-adjusted (world standard) and age-specific mortality rates were calculated for both sexes. Linear regression was used to investigate changes in trends.

RESULTS. Mortality rates caused by cancers in general declined throughout the study period for both men and women (-4.6% and -10.5%, respectively). Stomach cancer showed the most significant decrease for both sexes. Among men, lung cancer death rates presented a slight reduction, while prostate cancer rates increased. Among women, not otherwise specified uterine cancer presented a downward trend, while lung cancer rates increased. The trend for breast cancer remained stable, and cervical cancer rates showed a slight increase at the end of the period.

CONCLUSION. As already observed in developed countries, all cancer mortality rates tended to decline in Brazilian state capitals over the period 1980-2004, a trend largely due to a decline in stomach cancer death rates for both sexes.

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INTRODUCTION

After decades of constant increases, cancer mortality rates started to show a trend to decline in recent years, in several developed countries, such as the United States of America and most of Western European countries.^{1,2}

For developing countries, however, there are not many studies revealing cancer mortality trends. In 2002, a work was published analyzing a historical series on cancer mortality in Brazil, finished in 1995, and showed a decrease in rates.³ Nevertheless, the quality of information on mortality for Brazil as a whole was unsatisfactory, so the study was the subject of some criticism. Because of that, we decided to conduct a study on the evolution of cancer mortality in Brazilian state capitals, to investigate whether the decreasing trends in rates would be confirmed with the inclusion of data pertaining only to state capitals, in which the coverage and quality of deaths records are superior to those of the country as a whole, as demonstrated by the lower proportion of undefined causes in relation to the whole number of deaths (12.4% for the country as a whole and 5.7% for the capitals).⁴ In addition, unlike that study, the current one presents results for up to 2004.

METHODS

Crude data on deaths were obtained from the Information System on Mortality (Sistema de Informações sobre Mortalidade – SIM), of the Brazilian Ministry of Health, available on the DATASUS web pages. Information contained in the SIM include year and place of occurrence of the death, place of residence, age, sex, and underlying cause of death, based on death certificates according to rules of international usage, normalized and standardized by the World Health Organization (WHO). The deaths of capital residents taking place from 1980 to 2004 (inclusive) were studied.

Population information was also obtained from the DATASUS web pages, which draw data from censuses, projections, and estimates published by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística - IBGE). The total population of the 26 state capitals and of the Federal District was estimated at 42,625,695 inhabitants in 2004, corresponding to around one fourth of the country's total population.

Specific rates were calculated by age and sex, in addition to adjusted rates for age, for the set of combined cities, and for each of the 25 years of the series. The chosen age groups were

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0-9 years, 40-69 years and 70-more. The ages between 10 and 39 years were not selected for the study due to their low cancer mortality.

Adjustment (standardization) by age was performed by the direct method, using the 'world' standard population, created by Segi in 1960, and modified by Doll in 1966, and still in use today by the International Agency for Research on Cancer (IARC) of the World Health Organization in its publications.

Tests of linear regression were employed to evaluate the significance of trends. Thus, regression coefficients were obtained, and the significance of results was evaluated using the statistical software Stata version 9.0.⁷

RESULTS

Cancer mortality rates adjusted for age and age-specific rates

Adjusted rates for all cancer types in females decreased from 105.0 to 94.0 per 100,000 inhabitants between 1980 and 2004, a reduction of 10.5%; in males, in the same period, the decrease was of 4.6% (from 147.4 to 140.6 per 100,000 inhabitants). Both reductions were statistically significant in the linear regression analysis (Figure 1).

Age-specific mortality rates revealed a decreasing trend for the pediatric age group (0-9 years), as well as for the 40-69 years' age group, and for both sexes. On the other hand, mortality rates showed an upward trend in the ages of 70 years or more, for both sexes. All trends were statistically significant.

Mortality due to the most frequent types of cancer, by sex
Female sex

Stomach cancer presented a clearly declining trend in women between 1980 and 2004; on the other hand, lung cancer rates increased during the period, as well as colon and rectum cancer rates. All these trends were significant.

Specifically for the female sex, breast cancer showed stability in rates, while cervical cancer presented an upward behavior, even though it was not statistically significant. On the other hand, not otherwise specified uterine cancer presented a significant decrease (Figure 2).

Male sex

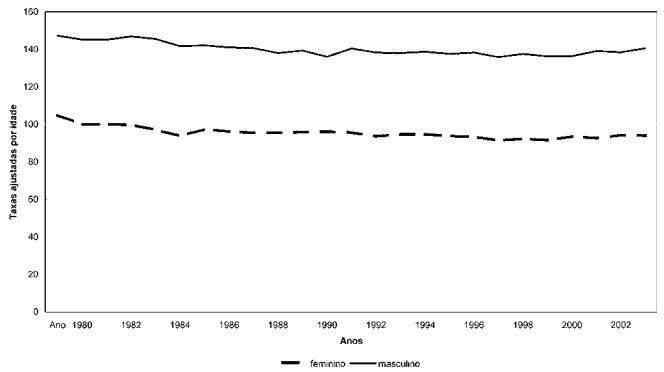
Similarly to what happened with women, stomach cancer presented a statistically significant decrease in rates in the study period, while lung cancer rates had no significant decrease. Prostate and colon/rectal cancers both showed significantly upward trends, particularly the former (Figure 3).

DISCUSSION

The general downward trend in standardized rates of cancer mortality in Brazilian state capitals, verified by the decrease in age-specific rates in the age groups up to 69 years, in both sexes, is in line with similar trends already reported for several developed countries,^{1,2} and confirms, with more accurate data, the conclusions of a previous study, which had already shown a downward trend in cancer-related mortality in Brazil.³

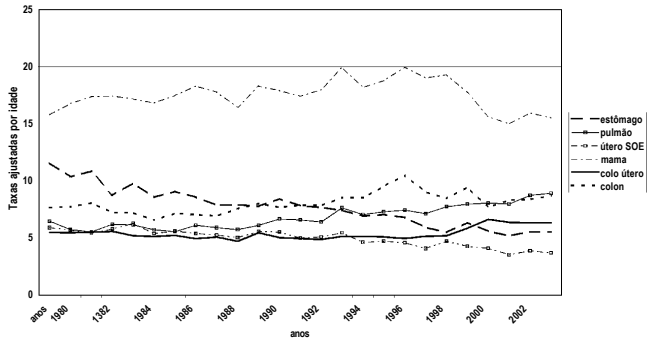
It is not simple to interpret this decrease in mortality in ages lower than 70 years. Cancer is not a single disease, but actually the coexistence of several diseases, each of them with its own

Figure 1 - Cancer mortality in Brazilian state capitals according to sex, 1980-2004 Age-adjusted rates



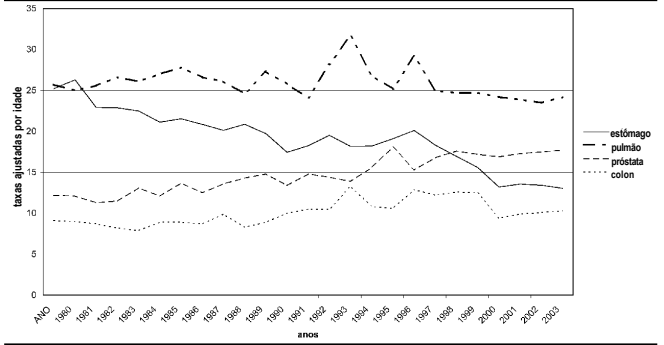
Year Years Female–Male

Figure 2 - Mortality due to the most frequent types of cancer in females, Brazilian state capitals, 1980-2004 Age-adjusted rates



Years Years Stomach Lung NOS uterus Cervix Colon

Figure 3 - Mortality due to the most frequent types of cancer in males, Brazilian state capitals, 1980-2004 Age-adjusted rates



Years Years Stomach Lung Prostate Cervix Colon

biological, clinical, and epidemiological characteristics and, therefore, its own causes and possibilities of prevention and treatment. The trend toward mortality reduction in all cancer types, as observed in this study, is the result of the sum of the trends of several individual cancer types, some of which even presented an increase in mortality in the studied period, e.g. prostate cancer,

while others showed an expressive decrease, e.g. stomach cancer. Moreover, mortality behavior was influenced by at least two variables, incidence and survival. The incidence of a certain cancer type may increase throughout time, whereas in fact it is the significant advances observed in secondary prevention and treatment that result in an increase in survival and an apparent reduction in mortality. A strong example of this situation is the increase in survival among children and adolescents with acute lymphoid leukemia, observed in the last decades.⁸

Most data on cancer incidence available in Brazil derive from Populational Registers recently implemented, preventing the assessment of historical series. Moreover, as Doll had already emphasized years ago, in an instructive and prolonged feud with Bailar, the examination of mortality trends, rather than incidence, is more adequate to evaluate whether progress against cancer is occurring or not, since incidence data are more subject to changes in surveillance and in the very recording practices, whereas mortality statistics are based on systems of vital statistics established a longer time ago.^{9,10} Another issue has also been the subject of a feud between the same authors, namely the fact that, when analyzing mortality trends, stronger emphasis should be placed on the exam of age-specific rates and not on age-adjusted rates, since the latter are disproportionately influenced by more advanced ages, which could conceal possible decreases of rates in younger ages.^{11,12} In this regard, it is important to consider the fact that cancer mortality increased in Brazilian capitals for the age group of 70 years or more, contrarily to what happened among younger people. This fact may have contributed to lessen the decline observed in age-adjusted rates, whose calculation is affected by the high proportional weight of elderly people mortality. Another conclusion that could be drawn from the behavior of age-specific rates is that, throughout the study period, some of the cancer-related deaths were occurring progressively later, at more advanced ages, signaling progress against the disease.

Incidence and mortality trends associated with individual cancer types were influenced by the behavior of their respective risk factors. For instance, the stability, with a declining bias, of lung cancer rates among men may be a reflection of the reduced prevalence of smoking habits in Brazil, which has decreased from 34.8% in 1989 to 22.4% in 2003.^{13,14} This fact suggests that even higher decreases in lung cancer mortality may occur in future decades.

Cervical cancer mortality remained stable until 1999, when a small increase in the rates started to be observed; on the other hand, the rates of not otherwise specified uterine cancer presented a decrease, especially in the last nine years of the study period. This may point to a higher diagnostic accuracy, leading to an apparent increase in mortality due to a more clear diagnosis of cervical cancer. One previous study that corroborates this hypothesis was conducted in the city of São Paulo and demonstrated that the decrease in mortality due to not otherwise specified uterine cancer was higher than that observed for cervical cancer in the same period. If applicable to other capitals, this finding may explain the behavior of mortality rates observed in this study in association with the two diagnoses above.¹⁵ It is also important to remember that

the population of São Paulo alone corresponds to around one fourth of the total population of the capitals included in this study (10.7 millions of inhabitants of a total of 42.7 millions in 2004).

The most noticeable decline in mortality, among the main cancer types, was associated with stomach cancer, in both sexes, a fact that has been observed in several countries, including some in Latin America. This finding seems to be a result of improvements in basic sanitation and the progressively wider use of refrigeration to preserve foods, avoiding the use of salt and smoke for that purpose.¹⁶

Breast cancer rates presented a general trend toward stability in the study period. An increase in the incidence of the disease could be expected, given the population ageing and perhaps a higher prevalence of associated risk factors; therefore, the stability of rates observed in the present study can be considered as a successful outcome. It should also be noted that a structured breast cancer tracking program is not available in Brazil.

Colon/rectal cancer mortality rates showed an increasing trend during the whole study period for both sexes, however with a less intense increase towards the end of the study. As in the case of breast cancer, no structured tracking program for colon cancer is available in Brazil.

Prostate cancer mortality has been increasing in Brazil, similarly to several other countries, such as Argentina, Chile, Mexico, Japan, China, and Russia, and contrarily to what has been observed in the United States, Germany, France, and Canada.¹⁷

CONCLUSION

Similarly to what had been reported previously for the country as a whole, mortality rates for some frequent cancer types have remained stable or decreased. This study extends the time period previously assessed, up to 2004, and draws upon more precise and reliable data, once it analyzes solely information pertinent to state capitals, where vital statistics have a better quality and a broader coverage, thus yielding more relevant findings.

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