

Social inequalities in the incidence, mortality, and survival of neoplasms in women from a municipality in Southeastern Brazil

Desigualdades sociais na incidência, mortalidade e sobrevida de câncer em mulheres em um município do Sudeste do Brasil

Inequidades sociales en la incidencia, mortalidad, y supervivencia relacionada con neoplasmas en mujeres de una municipalidad en el sudeste de Brasil

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Abstract

This study aims to analyze inequalities in the incidence, mortality, and survival of the main types of cancer in women according to the Social Vulnerability Index (SVI). The study was conducted in Campinas, São Paulo State, Brazil, from 2010 to 2014, and used data from the Population-based Cancer Registry and the Mortality Information System. Incidence and mortality rates standardized by age and 5-year survival estimates were calculated according to the social vulnerability strata (SVS), based on the São Paulo Social Vulnerability Index. Three SVS were delimited, with SVS1 being the lowest level of vulnerability and SVS3 being the highest. Rate ratios and the concentration index were calculated. The significance level was 5%. Women in SVS1 had a higher risk of breast cancer (0.46; 95%CI: 0.41; 0.51), colorectal cancer (0.56; 95%CI: 0.47; 0.68), and thyroid cancer (0.32; 95%CI: 0.26; 0.40), whereas women from SVS3 had a higher risk of cervical cancer (2.32; 95%CI: 1.63; 3.29). Women from SVS1 had higher mortality rates for breast (0.69; 95%CI: 0.53; 0.88) and colorectal cancer (0.69; 95%CI: 0.59; 0.80) and women from SVS3 had higher rates for cervical (2.35; 95%CI: 1.57; 3.52) and stomach cancer (1.43; 95%CI: 1.06; 1.91). Women of highest social vulnerability had lower survival rates for all types of cancer. The observed inequalities differed according to the location of the cancer and the analyzed indicator. Inequalities between incidence, mortality, and survival tend to revert and the latter is always unfavorable to the segment of highest vulnerability, indicating the existence of inequality in access to early diagnosis and timely treatment.

Social Inequalities; Incidence; Mortality; Survival; Cancer

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Introduction

Social inequalities in the epidemiological profile of neoplasms differ depending on the primary location of the cancer and the analyzed indicator, whether incidence, mortality, or survival ^{1,2}. Studies indicate a higher incidence of breast and thyroid cancers in women from higher socioeconomic strata ^{3,4,5,6}, whereas women from lower strata are at higher risk of cervical and stomach cancers ^{7,8}.

In some European countries, colorectal cancer was prevalent in higher socioeconomic levels until the 1980s ⁹, but became even ¹⁰ or higher in the highest social vulnerability strata after the 2000s ¹¹. In the United States and Canada, in the 2000s, those of lower socioeconomic levels also had a higher incidence of cancer ³.

Lung cancer incidence and mortality tend to follow the previous social distribution of smoking prevalence ². Low- and middle-income countries currently have higher rates of lung cancer ^{3,9} than those with high-income ^{9,12}.

Women of poorer socioeconomic conditions have higher incidence and mortality rates of cervical and stomach cancer ^{3,12,13}. However, countries show a different inequality pattern in death rates from breast cancer: some have higher rates in the highest socioeconomic levels ^{14,15}, and others have no differences between social strata ^{16,17}.

Recently, incidence and mortality rates of colorectal cancer which were prevalent in higher social strata became even ¹⁸ or higher in lower social strata ^{19,20}.

Regarding survival, research on different types of cancer indicates that people in the lower-income social strata have a shorter survival time for most cancers ^{7,21,22,23,24}.

The International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) recognizes that producing evidence on the extent of social inequalities in cancer is essential to provide information on measures for reducing social inequities in access to health care and the diagnosis and treatment of the disease ²⁵.

In Brazil, studies on social inequalities in cancer incidence and mortality are scarce ^{13,15,26,27}. Research is essential to expand knowledge of the pattern of social disparities in cancer in Brazil, which differ according to the location of neoplasms and changes in magnitude and direction over time. Our objective was to analyze the inequalities in incidence, mortality, and survival of the main types of cancer in women dwelling in Campinas, São Paulo State, from 2010 to 2014, according to the Social Vulnerability Index (SVI).

Methods

This is an ecological study on incidence, mortality, and survival of the most frequent neoplasms among women residing in the city of Campinas from 2010 to 2014, according to the area of residence stratified by the level of social vulnerability.

Campinas is a large city located 99km Northwest of São Paulo, capital of the state of São Paulo, with an estimated 1,213,792 inhabitants in 2020 and the 14th most populous city in the country, with an urbanization rate of 98.3%. In 2010, its Human Development Index (HDI) was 0.805, which is considered very high ²⁸.

Information on cancer cases and deaths were obtained from the Population-Based Cancer Registry (RCBP) and from the Mortality Information System (SIM) of the Municipal Health Department of Campinas, codified by the International Classification of Diseases, 10th Revision (ICD-10). The studied types of cancer were: breast cancer (C50), colorectal cancer (C18_20), lung and bronchial cancer (C33_34), stomach cancer (C16), and cervical cancer (C53), which are the most prevalent among women in Brazil, and thyroid cancer (C73), which is the third most common type of cancer in Campinas.

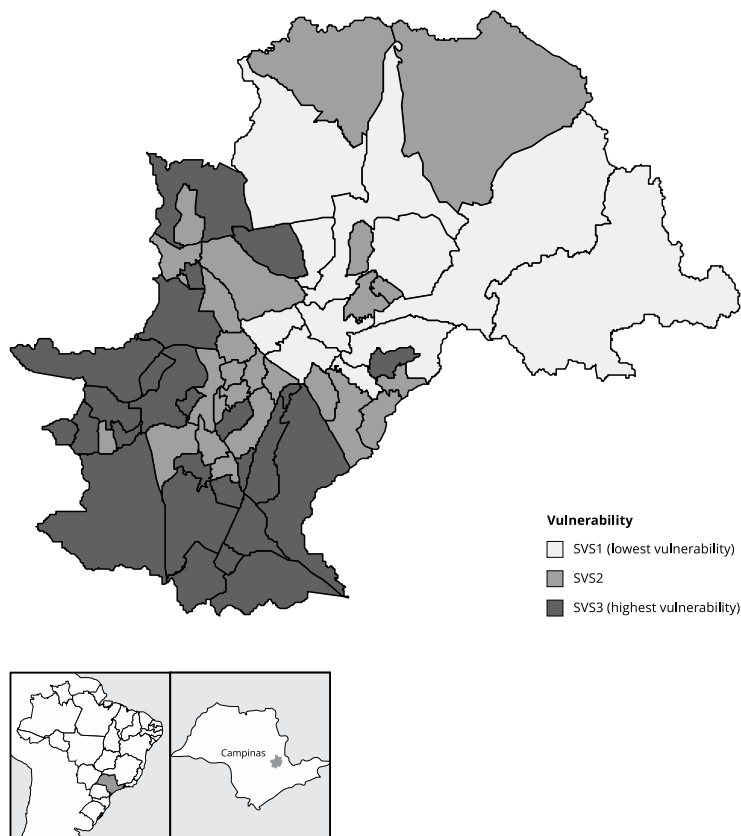
Data on mortality from cervical cancer were corrected by proportional reallocation of deaths from cancer of the “uterus, part unspecified – NOS [not otherwise specified]” (coded as C55) for the categories of the cervix (C53) and the body of the uterus (C54) ²⁹, considering the age group and area of residence of the cases.

The São Paulo Social Vulnerability Index 2010 (IPVS-2010), developed by the SEADE Foundation ³⁰, was used to stratify areas of residence according to social vulnerability. IPVS combines demographic and socioeconomic variables. The demographic variables are: % of households headed by individuals aged 10 to 29 years, % of households headed by women aged 10 to 29 years, mean age of the head of household, and % of households with children aged 0 to 5 years. The socioeconomic variables are: disposable household and per capita income, mean income of women heads of household, % of households with per capita income up to ½ a minimum wage, % of households with per capita income up to ¼ a minimum wage, and % of literate people who are the head of the household. The IPVS is calculated for each census tract and categorized into seven groups, from IPVS 1 to IPVS 7, in which 1 is very low social vulnerability and 6-7 is very high social vulnerability, 6 for urban areas and 7 for rural areas.

The social vulnerability strata in Campinas were based on the areas covered by the primary healthcare units (UBS), with available information on deaths and cancer cases in the municipality. To each UBS area was assigned a vulnerability score considering the proportion of census sectors classified at each level of the IPVS. The areas were ordered from the lowest to the highest score and grouped into three social vulnerability stratum (SVS), with SVS1 and SVS3 being the lowest and highest social vulnerability stratum, respectively. Each SVS corresponds to approximately one third of the population of the municipality. Figure 1 shows areas covered by the UBS, grouped according to social vulnerability strata.

Figure 1

Map of Campinas, São Paulo State, Brazil, and areas of primary healthcare units according to social vulnerability strata (SVS).



The SVS population data from 2010 to 2014 were obtained from the population estimates of the areas covered by UBS, conducted by the Municipal Health Department of Campinas using data from the 2010 demographic census of the Brazilian Institute of Geography and Statistics (IBGE) ³¹.

The mean values of incidence and mortality rates per 100,000 women by type of cancer were calculated for each SVS from 2010 to 2014. Incidence and mortality rates were standardized by age using the direct method, considering as standard the world population of 1960, modified by Doll et al. in 1966 ³².

The incidence rate ratios (RR) and their respective 95% confidence intervals (95%CI) were estimated using Equation 1:

$$CI = \left(\frac{SR_1}{SR_2} \right) 1 \pm \left(\frac{1.96}{X} \right) \quad (\text{Equation 1})$$

Where:

$$X = \frac{(SR_1 - SR_2)}{\sqrt{SE(SR_1)^2 + SE(SR_2)^2}} \quad (\text{Equation 2})$$

Where: *CI* is the confidence interval, *SR* is the standardized rate, and *SE* is the standard error of the standardized rate ³³.

To assess inequalities in cancer incidence and mortality in SVS, the concentration index was calculated using the covariance method, based on the standardized rates of incidence and mortality for each type of cancer analyzed and according to Equation 3, to compute the covariance between the health variable *y* and the fractional rank *R*:

$$C = \frac{2}{\mu} cov(y, R) \quad (\text{Equation 3})$$

Where: μ is the mean of *y* and *R* is the fractional rank of the *i*th person in the income distribution.

The concentration index is a synthetic measurement of socioeconomic inequalities which could be applied to analysis in several dimensions, inspired by the Gini index and the Lorenz curve, and adapted to a measurement of inequalities in health by O'Donnell et al. ³⁴ and Schneider et al. ³⁵. In this study, the concentration index offers a synthetic measurement of inequalities in cancer incidence and mortality, according to the social vulnerability strata of the area of residence of patients.

The concentration index ranges from -1 to +1, in which negative values indicate a greater cumulative risk of cancer incidence or mortality in groups of highest vulnerability and positive values indicate higher risk in groups of lowest social vulnerability. Values close to zero represent a low level of socioeconomic inequality, and values close to +1 or -1 indicate a higher level of inequality ³⁵. A significance level of 5% was considered in the analyses performed.

The survival estimate of each type of cancer for each SVS was calculated by the complement of the mortality incidence RR, which has been used and validated as a 5-year survival rate proxy ³⁶, according to Equation 4:

$$1 - \left(\frac{SRM}{SRI} \right) \quad (\text{Equation 4})$$

Where: *SRM* is the standardized mortality rate and *SRI* is the standardized incidence rate.

Statistical analyses were performed using the softwares Microsoft Excel 2016 (<https://products.office.com/>) and Stata 15.0 (<https://www.stata.com>). The map was built using the TabWin version 4.1.5 (<http://siab.datasus.gov.br/DATASUS/index.php?area=060805&item=3>).

The research was approved by the Research Ethics Committee of the School of Medical Sciences, State University in Campinas (opinion n. 09217719.9.0000.5404).

Results

Among the studied neoplasms, breast and colorectal cancer were the most prevalent in the three SVS. Thyroid cancer was the third most prevalent for women who live in areas of lowest and intermediate vulnerability whereas lung and cervical cancer were the third and fourth for women who live in areas of highest social vulnerability, with similar incidences (Table 1).

A comparison between the three strata shows that women of higher social vulnerability have higher mortality rates for cervical, stomach, and lung cancer and lower mortality rates for breast and colorectal cancer than women of lower vulnerability (Table 2).

The 5-year survival estimate was lower in SVS3 (highest vulnerability) than in SVS1 (lowest vulnerability) for all types of cancer analyzed, with the greatest difference observed for stomach cancer and the smallest difference for cervical cancer (Table 3).

The incidence RR between SVS3 and SVS1 show that women living in areas of highest social vulnerability have a lower risk of breast cancer (RR = 0.46), colorectal cancer (RR = 0.56), and thyroid cancer (RR = 0.32) and higher risk of cervical cancer (RR = 2.32). Lung and stomach cancers showed no significant differences (Table 4).

Table 1

Number of cases and incidence rates (IR) * of malignant neoplasms in women according to social vulnerability strata (SVS). Campinas, São Paulo State, Brazil, 2010-2014.

Primary tumor location	SVS1 (lowest vulnerability)		n	SVS2		n	SVS3 (highest vulnerability)	
	n	IR (95%CI)		IR (95%CI)	n		IR (95%CI)	
Breast	1,301	92.05 (86.93; 97.18)	884	65.95 (61.55; 70.35)	352	42.22 (37.64; 46.80)		
Colorectal	493	30.25 (27.39; 33.12)	386	27.75 (24.93; 30.58)	128	17.08 (14.02; 20.13)		
Thyroid	344	28.13 (25.07; 31.20)	228	17.87 (15.53; 20.21)	86	9.02 (7.05; 10.99)		
Cervix	69	4.85 (3.65; 6.04)	90	6.72 (5.31; 8.12)	95	11.24 (8.86; 13.61)		
Lung	170	10.53 (8.84; 12.21)	141	10.00 (8.32; 11.68)	79	11.63 (9.00; 14.26)		
Stomach	138	7.78 (6.37; 9.18)	104	7.23 (5.81; 8.65)	55	7.30 (5.30; 9.29)		

95%CI: 95% confidence interval.

* Incidence rates per 100,000 women standardized by age using the 1960 world population as standard ³².

Table 2

Number of deaths from malignant neoplasms and mortality rates (MR) * in women according to social vulnerability strata (SVS). Campinas, São Paulo State, Brazil, 2010-2014.

Primary tumor location	SVS1 (lowest vulnerability)		n	SVS2		n	SVS3 (highest vulnerability)	
	n	MR (95%CI)		MR (95%CI)	n		MR (95%CI)	
Breast	234	15.07 (13.08; 17.06)	212	14.92 (12.87; 16.97)	76	10.32 (7.92; 12.71)		
Colorectal	161	10.12 (8.50; 11.73)	138	9.51 (7.89; 11.14)	51	7.00 (5.04; 8.97)		
Thyroid	6	0.32 (0.06; 0.58)	2	0.12 (-0.05; 0.30)	4	0.58 (-0.01; 1.18)		
Cervix	33	2.06 (1.74; 2.38)	43	2.95 (2.63; 3.27)	34	4.85 (4.31; 5.39)		
Lung	127	8.08 (6.62; 9.53)	108	7.60 (6.14; 9.07)	62	9.41 (7.02; 11.79)		
Stomach	67	3.74 (2.79; 4.70)	62	4.14 (3.52; 4.76)	38	5.33 (4.43; 6.24)		

95%CI: 95% confidence interval.

* Mortality rates per 100,000 women standardized by age using the 1960 world population as standard ³².

Table 3

Estimated 5-year survival rate among women according to type of neoplasia and social vulnerability stratum (SVS). Campinas, São Paulo State, Brazil, 2010-2014.

Primary tumor location	Survival estimates * (%)		
	SVS1 (lowest vulnerability)	SVS2	SVS3 (highest vulnerability)
Breast	83.63	77.38	75.56
Colorectal	66.55	65.93	59.02
Thyroid	98.86	99.33	93.57
Cervix	57.53	56.10	56.85
Lung	23.27	24.00	19.09
Stomach	51.93	42.74	26.99

* Survival estimates = 1 - (mortality rate/incidence rate).

Table 4

Inequalities in the incidence, mortality, and survival of women's neoplasms. Campinas, São Paulo State, Brazil, 2010-2014.

Primary tumor location	Incidence		Mortality		Survival estimate Difference (%) SVS1-SVS3
	RR (95%CI) SVS3/SVS1	Concentration index (95%CI)	RR (95%CI) SVS3/SVS1	Concentration index (95%CI)	
Breast	0.46 (0.41; 0.51)	0.162 (0.156; 0.168)	0.69 (0.53; 0.88)	0.076 (0.012; 0.139)	8.07
Colorectal	0.56 (0.47; 0.68)	0.121 (0.064; 0.177)	0.69 (0.59; 0.81)	0.076 (0.034; 0.117)	7.52
Thyroid	0.32 (0.26; 0.40)	0.226 (0.211; 0.240)	1.81 (0.42; 7.85)	-0.167 (-0.570; 0.237)	5.29
Cervix	2.32 (1.63; 3.29)	-0.184 (-0.258; -0.110)	2.35 (1.57; 3.53)	-0.186 (-0.251; -0.121)	0.68
Lung	1.10 (0.83; 1.46)	-0.022 (-0.060; 0.016)	1.16 (0.85; 1.60)	-0.034 (-0.086; 0.018)	4.18
Stomach	0.94 (0.68; 1.30)	0.014 (-0.001; 0.030)	1.43 (1.06; 1.91)	-0.079 (-0.113; -0.044)	24.94

95%CI: 95% confidence interval; RR: rate ratio; SVS: social vulnerability stratum.

Women of lowest social vulnerability had a higher mortality risk for breast (RR = 0.69) and colorectal cancers (RR = 0.69) whereas women of highest social vulnerability had a higher mortality risk for cervical (RR = 2.35) and stomach cancers (RR = 1.43), with no differences in lung and thyroid neoplasms (Table 4).

The concentration indices for incidence and mortality rates confirm the inequalities verified with the RR between SVS3 and SVS1. The incidence concentration index was positive for breast, colorectal, and thyroid cancers, indicating a higher risk for women of lower social vulnerability strata, and negative for cervical cancer, indicating a higher risk for women of higher social vulnerability (Table 4). Stomach and lung cancers showed no significant inequality (Table 4). The mortality concentration index was positive for breast and colorectal cancers, although lower than the incidence index, and negative for cervical and stomach cancers, with no significant differences regarding thyroid and lung cancers (Table 4).

Discussion

Our results indicate that social disparities greatly differ according to the location of the cancer and the type of indicator analyzed. Overall, the lower SVS has higher incidences of breast, thyroid, and colorectal cancer and higher mortality rates from breast and colorectal cancers. However, inequalities were lower in mortality than in incidence. The high vulnerability stratum had a lower estimated survival for all types of cancer analyzed.

Most research shows that women of higher socioeconomic status have a higher incidence of breast cancer^{3,4}. Mackillop et al.³ found that women in the decile of highest socioeconomic status had a higher risk of breast cancer than those of the lowest socioeconomic level in the United States (RR = 1.35) and in the province of Ontario, Canada (RR = 1.10). A study conducted in Texas (United States) from 2008 to 2011 found a 69% higher incidence of breast cancer in women residing in areas of higher income⁴. Our study identified greater inequalities than the mentioned surveys and found that the incidence of breast cancer in women of lowest social vulnerability was 2.18 times higher than in women of highest vulnerability.

According to our results, women from the highest social vulnerability stratum had a 32% lower risk of dying from breast cancer. Evidence from research carried out in Southern Spain and Costa Rica found that women from the lowest socioeconomic stratum had an 18% and a 35% lower risk of death from breast cancer in Spain¹⁸ and in Costa Rica, respectively³⁷. Other studies found no social inequalities regarding breast cancer mortality rates, including those conducted by Menvielle et al.¹⁷ in France between 1999 and 2007, Gadeyne et al.³⁸ in Belgium from 1991 to 1995, and Power et al.³⁹ in the United Kingdom. In South Korea, inequality went the opposite direction, with higher breast cancer mortality rates among women in the lowest socioeconomic segments⁴⁰.

Our results indicated that women of lower social vulnerability had an 8.7% higher 5-year survival rate. Similarly, in the United States, they had an 8.3% higher rate⁴¹. In Colombia, women with contributory and special health insurance had a 10% higher survival rate than women who had subsidized coverage or no health insurance²². Gorey et al.²³ found that women from the lowest income stratum in California (United States) had lower survival rates (0.89; 95%CI: 0.81; 0.98), but the authors identified no statistically significant difference in survival in Ontario.

Our study found that women from the lowest social vulnerability stratum have higher mortality and incidence rates of breast cancer because of a greater exposure to risk factors, including reproductive factors and hormone replacement therapy^{16,38,39}. The higher incidence could also be caused by a greater access to mammography, which detects small tumors in the early stages of the disease^{42,43}. Mortality rates showed lower inequality than incidence rates and women of higher social vulnerability had a lower 5-year survival rate, which could indicate that the socially-disadvantaged segment has difficulty in accessing diagnosis and treatment in the early stages of cancer^{2,15,21}.

Our findings show a higher incidence and mortality from colorectal cancer in women residing in areas of lower social vulnerability. On the other hand, a study carried out in Canada and in the United States found that women in poorer socioeconomic conditions had a higher incidence of this type of cancer³. Other studies carried out in Finland¹⁰ and California⁴⁴ found no association between colorectal cancer incidence and socioeconomic status.

Regarding mortality, a survey carried out in California found that women of the lower socioeconomic level had higher rates of deaths from colorectal cancer⁴⁴, whereas other studies conducted in Spain and Colombia found no differences between socioeconomic strata^{12,18}. Nevertheless, results of a research conducted in Costa Rica were similar to those of Campinas, in which the higher socioeconomic level had higher mortality rates³⁷.

Studies carried out in Finland, Denmark, and the United States show that rates of incidence and mortality from colorectal cancer were highest in the higher socioeconomic level until the 1980s and, from 2000 onward, in the higher social vulnerability level^{10,11,19}. Incidence and mortality from colorectal cancer increased partly because the countries' economic growth affected the population's dietary pattern, increased obesity, and physical inactivity^{11,45}. The increased exposure to risk factors initially affects the entire population before the socioeconomic strata differ regarding risk identification and cancer prevention and control measures⁴⁶. In the United States, mortality from colorectal cancer decreased 53% from 1975 to 2007 because of changes in risk factors, mainly diet and physical

inactivity, increased screening coverage, and improved treatment. However, individuals with higher socioeconomic status had an even greater mortality decrease¹⁹.

Women in the lower vulnerability stratum had a 6.42% higher rate of survival from colorectal cancer. Research carried out in Northern Portugal and in South Korea found no differences in survival according to schooling, income level, and occupation^{47,48}. Women in the higher vulnerability stratum possibly have lower survival rates because of a late diagnosis, when tumors are in more advanced stages.

Similarly to studies of other countries^{39,49,50}, our study found that women with lower social vulnerability have higher incidence rates of thyroid cancer. On the other hand, mortality rates from thyroid cancer were equal between SVS. Deaths from thyroid cancer are rare and we found no studies which analyzed inequalities in this cancer's mortality. Our results showed that women from the lowest SVS had a higher 5-year survival rate, corroborating with studies conducted in the United States and in South Korea^{6,40}. We found that the highest social level has a three times higher cancer incidence than the lowest level, which suggests a cancer overdiagnosis in this part of the population^{2,49,51}.

Women with higher social vulnerability had a higher incidence of cervical cancer, corroborating with the usual literature^{3,7,8,50}. In Germany, from 2010 to 2013, women from the lowest socioeconomic stratum had a 12% higher risk of having cervical cancer than women from the highest socioeconomic stratum⁵⁰. In Canada and the United States, women of higher socioeconomic status also had a lower incidence of cervical cancer³. The same relation is observed for mortality. In our study, women of higher social vulnerability had 2.35 times higher mortality rates. A study carried out in Colombia between 1998 and 2007 found that women with lower schooling levels had over five times higher rates of mortality from cervical cancer than women with higher schooling levels (RR = 5.75)¹². In South Korea, women of lowest socioeconomic status had over two times higher mortality rates than women of highest socioeconomic status⁴⁰.

Unlike other studies^{24,48}, we found that women of lower and higher social vulnerability had less than 1% difference in survival from cervical cancer. Women from the highest and the lowest socioeconomic strata had a 7% difference in survival in the United States between 1988 and 1994²⁴. In South Korea, women of the working class with minimum qualifications had a 42% lower survival rate than more qualified workers⁴⁸. The small difference in survival between women of higher and lower social vulnerability contrasts with the results of incidence and mortality, which are unfavorable for women of higher social vulnerability.

We found no evidence of inequality in the incidence of stomach cancer among women from the different analyzed strata. Mackillop et al.³ also found no difference among Canadian women. Studies in the United States and Germany, however, found that women from the lower socioeconomic segment had a higher incidence of stomach cancer^{3,50}. Regarding mortality, we found that women in the highest SVS in Campinas had a 43% higher risk of dying from stomach cancer than those of lowest vulnerability, corroborating with studies conducted in Spain and Colombia^{12,18}. Mortality was 26% higher in women from the lowest socioeconomic status in Spain¹⁸ and 98% higher in women who only attended elementary school than in those with higher education in Colombia¹². According to a study conducted in Colombia²², the survival of women with subsidized coverage was 30% lower than of those who had better-coverage health insurance. This supports our findings that women with stomach cancer in the highest vulnerable stratum have lower survival rates. However, authors of a study conducted in South Korea found no difference in the survival of women with stomach cancer according to occupational groups⁴⁸.

Women of highest social vulnerability have higher mortality and lower survival rates from stomach cancer, which could indicate difficulties in accessing diagnosis and timely treatment.

Although we found no inequalities in the incidence and mortality from lung cancer, other authors found higher cancer rates in the lower socioeconomic levels in Canada and the United States³, Spain¹⁸, and Colombia¹². On the other hand, a study carried out in Costa Rica found no differences in lung cancer mortality between socioeconomic strata³⁷. Differences observed between countries are possibly caused by temporal changes in the distribution of smoking, a practice which used to be common in segments of higher socioeconomic status and is now prevalent in the poorer segments of the population⁹.

This study found that women of highest social vulnerability had the lowest rate of survival from lung cancer. Similarly, in South Korea, workers with minimum qualifications had a 41% lower rate of survival from lung cancer than those most qualified⁴⁸. On the other hand, a study carried out in Colombia found no difference in the survival of women with lung cancer according to schooling²².

Lung cancer is quite aggressive and leads to low survival rates in most countries²¹ because of its late diagnosis, considering that the disease is usually silent and causes no symptoms in the early stages⁵². Women living in areas of lower social vulnerability have higher 5-year survival rates, which could indicate access to better treatment⁴⁰.

Determinants of social inequalities in the occurrence and evolution of cancer cases influence the degree of exposure to risk factors related to socioeconomic conditions and lifestyle, environmental and occupational factors, access to screening and early-diagnosis programs, access to and quality of treatment, and even palliative care^{9,46}.

The incidence of most types of cancer analyzed is associated with lifestyle and exposure to risk factors that can be modified, particularly smoking, alcohol abuse, obesity, physical inactivity, inadequate diet, among others^{53,54}. Temporal changes have affected the distribution of such factors among the socioeconomic segments of the Brazilian population⁵⁵.

Women from the highest social vulnerability stratum had higher mortality from cervical and stomach cancers, lower inequality in the mortality than in the incidence of breast and colorectal cancer, and lower 5-year survival rates for the six types of cancer analyzed. This could indicate that these women have smaller access to screening, early diagnosis, and treatment programs, resulting in shorter survival time from delay in treatment^{21,56}.

Considering that those of highest social vulnerability have lower survival rates, the Brazilian Ministry of Health created a law that establishes a maximum of 60 days between cancer diagnosis and the beginning of treatment, seeking to reduce delays⁵⁷. Since the Brazilian Unified National Health System (SUS) was implemented in Brazil in 1998, oncology policies have become more organized, including health promotion actions, screening programs for breast and cervical cancer, and access to early diagnosis and treatment⁵⁸; however, achieving an equal provision of cancer care in Brazil remains a challenge¹⁵.

One of the limitations of our study is the use of survival estimates calculated from the complement of the ratio between mortality and incidence rates and not from the follow-up cohort of patients with cancer. However, we emphasize that this method is recommended as a proxy for 5-year survival rates, as long as the mortality information is of high quality and the incidence and survival rates are stable, and that it has been used in other articles^{35,59,60}. Another limitation is that the social vulnerability indicator is ecologically and not individually based, defined according to the area of residence. On the other hand, we used good-quality information to analyze cancer mortality and incidence, seeking to fill a gap in the literature about social inequalities in the incidence, mortality, and survival of different types of cancer in Brazil.

Conclusions

Our results indicate large differences in social inequalities between incidence, mortality, and survival for each type of cancer studied. Women of higher social vulnerability possibly have the smallest differences between mortality and incidence for breast and colorectal cancers, the highest mortality from cervical and stomach cancers, and lower survival rates for all types of cancer because of barriers in accessing early diagnosis and timely treatment. The results also indicate that analyzing social inequalities in the incidence and mortality of neoplasms is essential to implement priority actions which promote health equality.

Contributors

M. C. Ferreira and M. B. A. Barros contributed to the study design, analysis, and writing. F. M. Sarti contributed to the analysis and writing. All authors approved the final version of the manuscript.

Additional informations

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Resumo

O estudo teve como objetivo analisar desigualdades na incidência, mortalidade e sobrevida de câncer em mulheres de acordo com o Índice de Vulnerabilidade Social (IVS). O estudo foi realizado em Campinas, Estado de São Paulo, Brasil, no período de 2010 a 2014 e usou dados do Registro de Câncer de Base Populacional (RCBP) e do Sistema de Informação de Mortalidade (SIM). Foram calculadas as taxas de incidência e mortalidade padronizadas por idade e estimativas de sobrevida em cinco anos de acordo com estratos de vulnerabilidade social. Foram demarcados três estratos com base no IVS de São Paulo, onde o estrato 1 representava o nível de menor vulnerabilidade e o estrato 3 o de maior vulnerabilidade. Foram calculadas razões de taxas e índice de concentração, com nível de significância de 5%. Foram encontrados riscos mais elevados de câncer de mama (0,46; IC95%: 0,41; 0,51), colorretal (0,56; IC95%: 0,47; 0,68) e tireoide (0,32; IC95%: 0,26; 0,40) em mulheres do estrato 1 e de colo uterino em mulheres do estrato 3 (2,32; IC95%: 1,63; 3,29). Mulheres do estrato 1 tiveram taxas mais elevadas de câncer de mama (0,69; IC95%: 0,53; 0,88) e colorretal (0,69; IC95%: 0,59; 0,80), e mulheres do estrato 3 tiveram taxas mais elevadas de câncer do colo uterino (2,35; IC95%: 1,57; 3,52) e estômago (1,43; IC95%: 1,06; 1,91). Para todos os tipos de câncer, a sobrevida era mais baixa em mulheres do estrato de maior vulnerabilidade social. As desigualdades observadas mostraram diferenças de acordo com a localização do tumor e o indicador utilizado. Além disso, há uma tendência de inverter as desigualdades entre incidência, mortalidade e sobrevida, onde a sobrevida sempre é desfavorável para o estrato de maior vulnerabilidade, indicando a existência de desigualdades em acesso ao diagnóstico precoce e tratamento precoce.

Desigualdades Sociais; Incidência; Mortalidade; Sobrevida; Câncer

Resumen

El objetivo fue analizar las inequidades en la incidencia, mortalidad y supervivencia de los principales tipos de cáncer en mujeres, según el Índice de Vulnerabilidad Social (IVS). El estudio se llevó a cabo en Campinas, estado de São Paulo, Brasil, durante el período 2010-2014, y se usaron datos del Registro de Câncer de Base Poblacional (RCBP) y el Sistema de Información de Mortalidad (SIM). Las tasas de incidencia y mortalidad estandarizadas por edad, así como las estimaciones de supervivencia durante cinco años, se calcularon según los estratos de vulnerabilidad social (SVS). Se delimitaron tres SVS, basados en el IVS de São Paulo, con SVS1 siendo el nivel más bajo de vulnerabilidad y SVS3 siendo el nivel más alto de vulnerabilidad. Se calcularon los cocientes de tasas y el índice de concentración. El nivel de significancia fue 5%. Se encontró un riesgo más alto de cáncer de la mama (0,46; IC95%: 0,41; 0,51), colorrectal (0,56; IC95%: 0,47; 0,68), y tiroides (0,32; IC95%: 0,26; 0,40) en mujeres de SVS1, y cáncer cervical en mujeres de SVS3 (2,32; IC95%: 1,63; 3,29). Respecto a la mortalidad, las mujeres de SVS1 tuvieron tasas más altas en cáncer de la mama (0,69; IC95%: 0,53; 0,88) y colorrectal (0,69; IC95%: 0,59; 0,80) y las mujeres de SVS3 tuvieron tasas más altas en cáncer cervical (2,35; IC95%: 1,57; 3,52) y estómago (1,43; IC95%: 1,06; 1,91). Para todos los tipos de cáncer, las tasas de supervivencia fueron más bajas en mujeres del estrato social con más alta vulnerabilidad social. Las inequidades sociales observadas difirieron según la localización del cáncer y el indicador analizado, y no hubo una tendencia para revertir las inequidades entre incidencia, mortalidad y supervivencia, las últimas siempre fueron desfavorables para el segmento de más alta vulnerabilidad, indicando la existencia de desigualdad en el acceso a un diagnóstico temprano y un tratamiento oportuno.

Desigualdades Sociales; Incidencia; Mortalidad; Sobrevida; Câncer

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