Canadian Cancer Statistics 1993

Developed by:
Statistics Canada, Health and Welfare Canada
Provincial Cancer Registries, National Cancer Institute of Canada

Canadian Cancer Statistics 1993

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INTRODUCTION

This monograph is published by the National Cancer Institute of Canada in collaboration with the Canadian Centre for Health Information (within Statistics Canada), Health and Welfare Canada and provincial cancer registries. It is part of an annual series which began publication in 1987.

The main purpose of the publication is to provide health professionals, and others who have an interest in cancer, with an overview of the current incidence of, and mortality from, the more common types of cancer at the provincial and national levels. This constitutes the regular "core" of the monograph. In addition, and usually in response to requests from readers, special topics are included. This year's special topic is breast cancer in women, with incidence and mortality rates being presented in detail to demonstrate the patterns in regions of Canada and in other countries.

The statistics contained herein refer to all types of cancer, defined according to a standardized classification method that is used worldwide. As is customary in reports from cancer registries, the statistics exclude skin cancers other than melanoma, benign tumours and carcinoma in-situ. Details of how cancer sites were classified and definitions of technical terms are provided in a **Glossary**.

Information on cancer incidence and mortality comes from the provincial cancer registries and offices of vital statistics, which send their data to Statistics Canada for compilation at the national level. The processes of collecting complete information about cancer cases in each province and then compiling this information at the national level result in a considerable delay before reliable information for a particular year is available for all of Canada. This report contains actual rates and frequencies up to the most recent year for which complete data are available (1988 for incidence; 1990 for mortality), but in addition, estimated values for 1993 are presented. The estimates for 1993 are made in the following way: first, time trends in the known rates are examined; second, these trends are projected to the present time to obtain current rate estimates; and third, these rate estimates for the current year are applied to current population estimates. Details of the statistical methods used to produce the projections are described in the Methodological Appendix. **It is important to emphasize that the figures provided for 1993 are estimates, rather than actual data**.

The development of this publication over the years has benefitted considerably from the comments and suggestions of readers. The Steering Committee appreciates and welcomes such comments, including ideas on how the report can be improved (an evaluation form is included on the final page of the report).

HIGHLIGHTS

Current Incidence and Mortality

- An estimated 116,200 new cases of cancer and 59,700 deaths from cancer will occur in Canada in 1993.

- These estimates indicate that in 1993, prostate cancer will overtake lung cancer as the most frequently diagnosed cancer for men.

- Lung cancer remains the leading cause of cancer death, and is responsible for one third of cancer deaths in males. For females, breast cancer deaths will still exceed lung cancer deaths but the gap continues to narrow.

Geographic Patterns of Cancer Incidence

- Incidence rates for some types of cancer are consistent with regional patterns of risk factors. Examples are: higher rates of lung cancer with higher rates of tobacco use in Quebec; higher rates of stomach cancer with greater use of salted foods in Newfoundland; and higher rates of melanoma of the skin in Ontario and British Columbia and lower rates in Newfoundland and Quebec may possibly be related to variations in sun exposure.

Age and Sex Distribution of Cancer

- In 1993, it is estimated that over 80% of both cancer deaths and new cases will occur in Canadians aged 55 and older; less than 1% of deaths and less than 2% of new cases will occur prior to age 25.

The Probability of Developing Cancer

- More than one in three Canadians will develop some form of cancer (other than non-melanoma skin cancers) during their lifetime (based on 1988 data). This probability has increased from one in four since 1971.

- The probability of developing cancer strongly depends on one's age. For example, a man aged 50 has a one in a hundred chance of developing colorectal cancer before reaching his 60th birthday. However, this probability increases to one in fifty in the next decade of his life.

Potential Years of Life Lost due to Cancer

- Cancer is the leading cause of potential years of life lost with diseases of the heart a close second (based on 1990 data). Breast cancer is the leader among women, accounting for 22% of all potential years of life lost. Among men, lung cancer accounts for 33% of all potential years of life lost due to cancer, in contrast with prostate cancer which accounts for just 7%.

Relative Cancer Survival

- Modest improvement in the relative 5-year survival in men and women in the periods between 1970-74 and 1980-84 have occurred based on pooled data from the British Columbia Cancer Agency, the Saskatchewan Cancer Foundation and the Ontario Cancer Treatment and Research Foundation.

- For men, survival rates improved significantly for testicular cancer, melanoma, and leukemia while for women, significant improvements occurred for melanoma, leukemia, lymphoma, colorectal cancer, breast cancer, and bladder cancer.

Trends in Cancer Incidence and Mortality

- Since the mid 1980s, incidence and mortality rates for lung cancer in men have levelled off, likely reflecting the fall in tobacco consumption among men which began in the mid-1960s.

- The incidence and mortality rates for cancers of the cervix, uterine body and ovary in females, Hodgkin's Disease in males, and stomach cancer in both sexes have been falling steadily.

- In the 1980s, mortality rates for testicular cancer in males, Hodgkin's Disease and melanoma in females, and colorectal cancer in both sexes declined despite a stable or increased incidence rate. This reflects improved survival rates.

- The incidence rate of all cancers combined increased by an average annual rate of 0.8% in males and 0.5% in females from 1981 to 1988. Mortality rates increased less rapidly, with an average annual increase of 0.5% in males and 0.4% in females. During the 1980s, the incidence and mortality rates for lung cancer in females, prostate cancer and melanoma in males and kidney cancer in both sexes showed steady increases.

Cancer in Children Aged 0-14

- Mortality rates for childhood cancer have fallen steadily by 50% over the past 20 years, despite a gradual increase in incidence over that period. Improved treatment of leukemia and lymphoma in children accounts for much of this decline in mortality.

Female Breast Cancer

- Excluding skin cancer, breast cancer is the leading type of cancer in Canadian women with 16,300 new cases expected to be diagnosed in 1993. During 1993, it is estimated that there will be 5,400 deaths from this cancer in women.

- Breast cancer incidence begins to rise after age 30. Although the majority of cases (67%) in 1993 will occur after age 55, 14% will be diagnosed in women aged 25-44.

- Currently, one in nine Canadian women can expect to develop breast cancer during her lifetime and one in 23 will die of the disease. Over the next ten years, one in 250 Canadian women aged 30-39 can expect to develop breast cancer. This ratio rises to one in 71 women aged 40-49, one in 48 women aged 50-59, one in 34 women aged 60-69 and one in 30 women aged 70-79.

- Since 1981, incidence rates for breast cancer have increased at an average annual rate of 1.5%. However, the increase in incidence rates is restricted to women aged 50 and over, as rates for women under 50 have not changed over the past two decades. Mortality rates have risen less rapidly, at 0.5% per year since 1981.

- Survival rates for breast cancer are higher than for most other cancers. The relative five-year survival rate for breast cancer is 74% based on cases diagnosed between 1980 and 1984.

- The incidence rate for breast cancer in Canada is among the highest in the world exceeded only by that in the United States. Breast cancer is very much a disease of "Western" countries with very low rates being reported for most Asia and African populations. Incidence rates vary within Canada from high rates reported in British Columbia and Manitoba to low rates found in the Territories and Newfoundland.

- Breast cancer screening programs which particularly focus on women aged 50 to 69 have been initiated in British Columbia, Ontario, Alberta, Saskatchewan and Nova Scotia. Most programs are still under active development with mammography being the screening detection method common to all programs.

CURRENT INCIDENCE AND MORTALITY

Table 1 shows three measures of the current importance of the different types of cancer in Canada. The first is **incidence**, expressed as the number of new cases of a given type of cancer diagnosed per year. The second is **mortality**, expressed as the number of deaths attributed to the particular type of cancer during the year. The third is the **ratio** of the number of deaths to the number of new cases, which is a crude indicator of disease severity, with a value of 1.0 being an indication of very poor prognosis. As mentioned previously, the frequencies listed in Tables 1 to 7 are **estimates** based on extrapolations from previous years, and are rounded to the nearest 5, 10 or 100. It is also important to mention some of the problems and refinements inherent in statistics of this kind.

The incidence figures are collected by provincial cancer registries. Every effort is made to count all newly diagnosed cases of cancer among people who reside in a given province at the time of diagnosis, and to ascertain for each case the site and histological type of cancer from pathology and other records. Cancer sites are defined using the Ninth Revision of the International Classification of Diseases (ICD-9), according to the site groupings listed in the **Glossary**. Although the provincial cancer registries strive, through the Canadian Council of Cancer Registries, to achieve uniformity in defining and classifying new cases, the procedures do differ across the country. This is especially true for cancer of the skin (other than melanoma) which occurs frequently but is difficult to register completely because it is usually treated successfully without requiring hospitalization or the review of a pathologic specimen. For this reason, **all tables in this monograph exclude the estimated 50,200 cases of non-melanoma skin cancer for Canada in 1993.** The number of new cases of non-melanoma skin cancer is estimated on the basis of incidence rates from the cancer registry in one province, British Columbia, which is considered to have the most complete data.

The provincial cancer incidence data are brought together by Statistics Canada to form the National Cancer Incidence Reporting System. These data are also included in the series entitled, **Cancer Incidence in Five Continents**, which is produced by the International Agency for Research on Cancer.[8]

Mortality statistics are derived from the death records maintained by the provincial registrars of vital statistics for persons resident in that province at the time of death. The deaths counted in these tables are those that are attributed to some form of cancer as the underlying cause of death by the certifying physician. Although these procedures have been standardized, both nationally and internationally, some lack of uniformity is inevitable. The description of the type of cancer provided on the death certificate is usually less precise than that obtained by the cancer registries from hospital and pathology records. It is important to note that cancer deaths occurring in a given year may be the result of cancers diagnosed in previous years.

With these reservations in mind, estimates in Table 1 indicate that 116,100 new cases of cancer will be diagnosed in Canada this year, and that 59,700 deaths will be attributed to cancer. Males outnumber females in terms of both new cases and deaths, as shown by sex ratios (male/female) of 1.1 for incidence and 1.2 for deaths. Three types of cancer account for 55% of the new cases in each sex: lung, prostate and colorectal cancers in males, and breast, colorectal and lung cancers in females. A third of the cancer deaths in males is due to lung cancer. For female cancer deaths, breast cancer still exceeds lung cancer, but the gap continues to narrow (Figures 1.1 and 1.2).

The ratio of deaths to new cases is 51% overall, being slightly greater in males than females. Based on these ratios, the cancer sites listed in Table 1 can be classified into three groups: those with a very good prognosis (a ratio of 33% or less - breast, prostate, bladder, melanoma, body of the uterus, cervix); those with a fair prognosis (a ratio greater than 33% but less than 66% - colorectal, lymphoma, kidney, leukemia, oral, ovary, larynx); and those with a poor prognosis (ratio greater than 66% - lung, stomach, pancreas, brain). These ratios are generally quite similar for males and females within sites. The overall ratio of deaths to new cases of 51% would be considerably lower if non-melanotic skin cancer cases were included, because most people with this disease are readily cured.

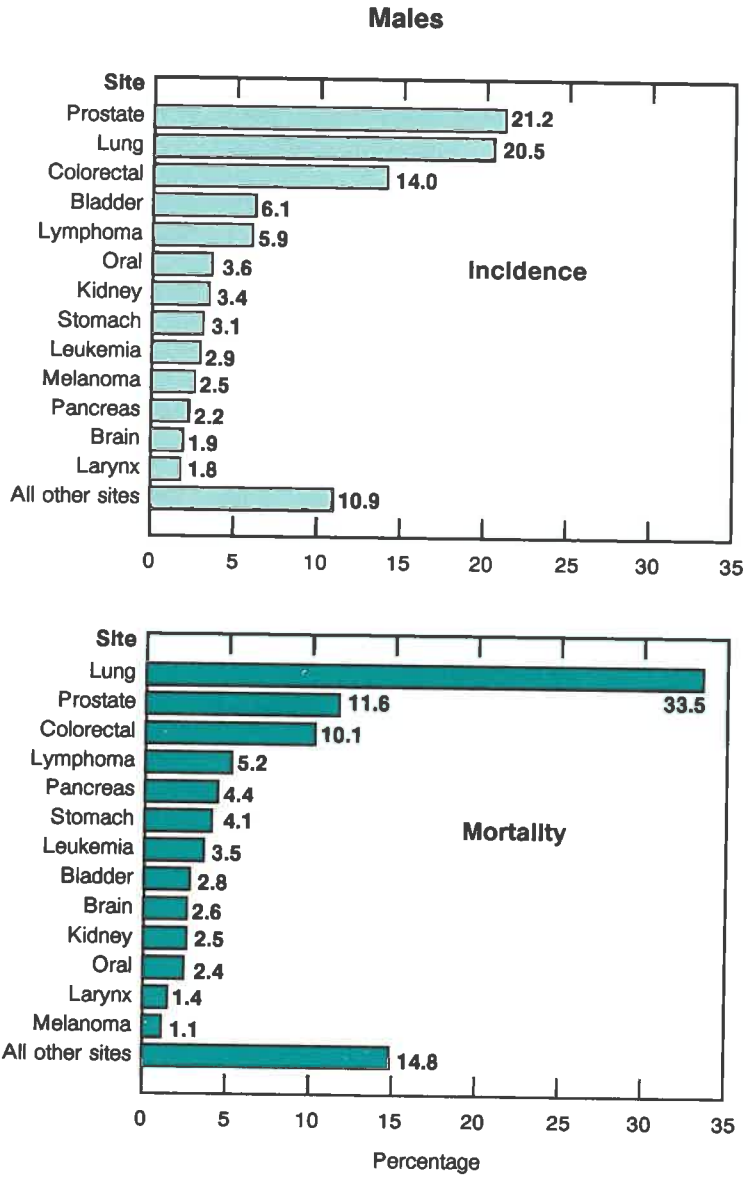
Table 1
Estimated New Cases and Deaths for Major Cancer Sites by Sex, Canada, 1993

Site	New Cases 1993 Estimate			Deaths 1993 Estimate			Deaths/Cases ratio 1993 Estimate		
	Total	M	F	Total	M	F	Total	M	F
All Cancers	**116,200**	**60,900**	**55,300**	**59,700**	**32,800**	**26,900**	**0.51**	**0.54**	**0.49**
Lung	19,100	12,500	6,600	16,300	11,000	5,300	0.85	0.88	0.80
Female Breast	16,300	...	16,300	5,400	...	5,400	0.33	...	0.33
Colorectal	16,000	8,500	7,500	6,300	3,300	3,000	0.39	0.39	0.40
Prostate	12,900	12,900	...	3,800	3,800	...	0.29	0.29	...
Lymphoma	6,600	3,600	3,000	3,200	1,700	1,500	0.48	0.47	0.50
Bladder	4,900	3,700	1,200	1,310	910	400	0.27	0.25	0.33
Kidney	3,550	2,100	1,450	1,360	820	540	0.38	0.39	0.37
Leukemia	3,150	1,750	1,400	2,060	1,150	910	0.65	0.66	0.65
Oral	3,120	2,200	920	1,100	790	310	0.35	0.36	0.34
Stomach	3,000	1,900	1,100	2,140	1,350	790	0.71	0.71	0.72
Melanoma	2,950	1,500	1,450	560	350	210	0.19	0.23	0.14
Body of Uterus	2,900	...	2,900	630	...	630	0.22	...	0.22
Pancreas	2,750	1,350	1,400	2,900	1,450	1,450	1.05	1.07	1.04
Ovary	2,100	...	2,100	1,350	...	1,350	0.64	...	0.64
Brain	2,030	1,150	880	1,480	840	640	0.73	0.73	0.73
Larynx	1,370	1,100	270	565	470	95	0.41	0.43	0.35
Cervix	1,300	...	1,300	400	...	400	0.31	...	0.31
All other sites	12,080	6,650	5,430	8,845	4,870	3,975	0.73	0.73	0.73

Note: *Figures exclude non-melanoma skin cancer (ICD-9 173).*
...not applicable.
Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 1.1

Percent Distribution of Estimated New Cases and Deaths for Major Cancer Sites, Canada, 1993

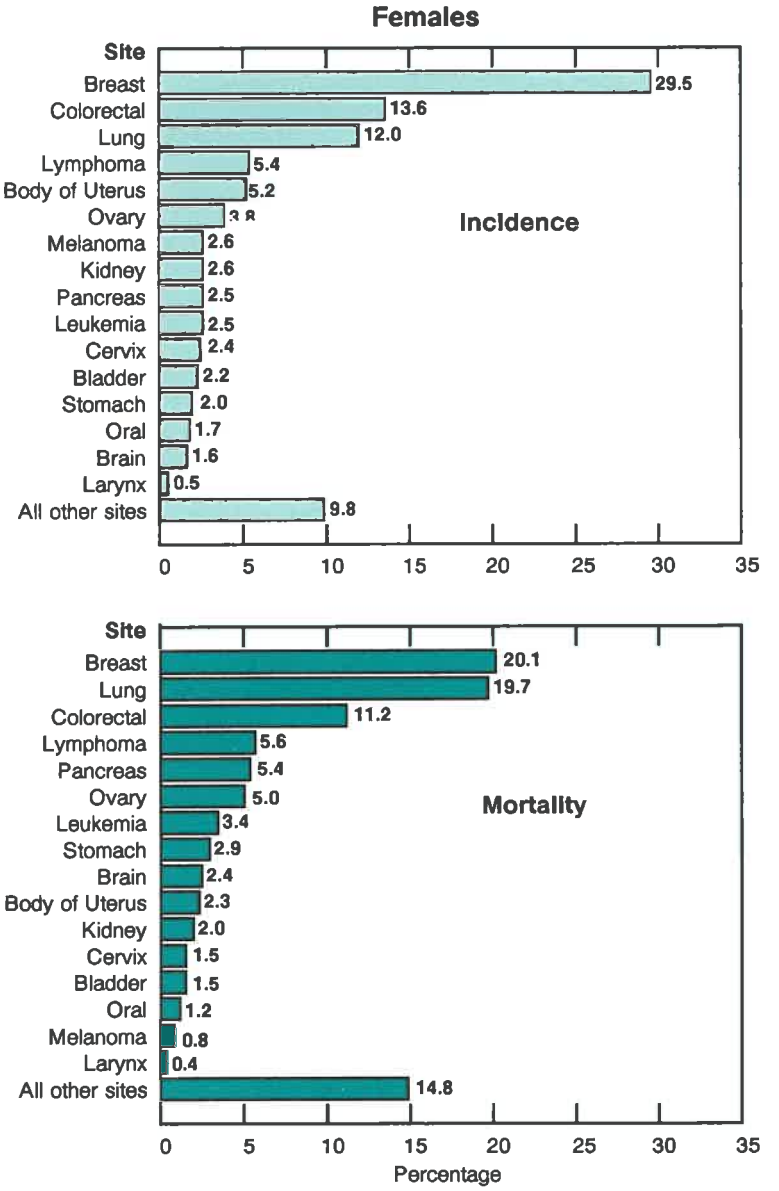


Note: *Excludes 50,200 cases of non-melanoma skin cancer (ICD-9 173). "All other sites" includes all those not mentioned.*

Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 1.2

Percent Distribution of Estimated New Cases and Deaths for Major Cancer Sites, Canada, 1993



Note: *Excludes 50,200 cases of non-melanoma skin cancer (ICD-9 173).*
Source: *Canadian Centre for Health Information, Statistics Canada.*

GEOGRAPHIC PATTERNS OF CANCER OCCURRENCE

Table 2 presents estimates for 1993 of populations, new cases and deaths for all sites of cancer combined, by sex and by province or territory. Readers have previously asked whether the observed inter-provincial differences in the rates for a particular type of cancer can be explained by the variation in the prevalence of known risk factors for that cancer site. Three potential problems should be considered prior to examining such associations. First, due to the rarity of some forms of cancer, the number of cases occurring in some provinces during a one year period may be so small that the resultant rate estimates may be unreliable. To avoid this problem, geographic patterns shown in Table 3 were identified on the basis of data for a five year period (1984-88), as available from the National Cancer Incidence Reporting System. Second, correlations between the incidence of disease and the prevalence of risk factors in geographical areas can be misleading. To prove a causal association between a factor and a disease, it is necessary to perform more detailed studies of individual subjects. Third, for many cancers there is a long interval between exposure to a risk factor and the occurrence of disease, and information on the prevalence of risk factors in previous decades is often lacking.

Table 3 identifies cancer sites where the rate reported by a province for either women or men differs by 25 per cent or more from the Canadian average. The pattern of higher rates in Quebec for cancer of the lung is consistent with higher levels of tobacco use in that province. The relatively high rates of stomach cancer in Newfoundland are consistent with the greater use of salted and smoked foods. The relatively high rates of melanoma of the skin in Ontario and British Columbia, and the lower rates in Newfoundland and Quebec may result from variations in sunlight exposure. Low rates of breast cancer and high rates of cervical cancer in Newfoundland may be related to reproductive patterns and socio-economic factors in that region. Low rates were reported for a number of cancer sites including lymphoma, leukemia, prostate, brain and bladder for one or both sexes. For these sites, differences in diagnostic procedures available in the region, or reporting procedures used in the registry, may affect rates.

For each province and for each specific type of cancer, the number of new cases estimated for 1993 is shown in Table 4. Estimates of the age-standardized incidence rates presented in Table 5 adjust for differences between the size and age distribution of each province's population, thereby facilitating interprovincial comparisons. The standard population used to standardize the rates is included in the **Glossary**. Tables 6 and 7 present data in a similar way for the number of deaths and for age-standardized mortality rates, respectively.

Table 2
Estimated Population, New Cases and Deaths for All Cancers By Sex, Canada and Provinces, 1993

Province	Population (thousands) 1993 Estimate[1]	New Cases 1993 Estimate[2]			Deaths 1993 Estimate[2]		
	Total	Total	Male	Female	Total	Male	Female
Canada[3]	**27,730.2**	**116,200**	**60,900**	**55,300**	**59,700**	**32,800**	**26,900**
Newfoundland	575.9	1,880	1,000	880	1,070	610	460
Prince Edward Island	133.1	500	280	270	320	190	130
Nova Scotia	910.8	4,700	2,400	2,300	2,300	1,250	1,050
New Brunswick	732.1	3,400	1,900	1,500	1,630	910	720
Quebec	6,970.8	27,800	14,900	12,900	16,300	9,200	7,100
Ontario	10,270.3	45,700	23,500	22,200	22,000	11,900	10,100
Manitoba	1,112.9	5,100	2,700	2,400	2,550	1,400	1,150
Saskatchewan	1,008.4	4,250	2,300	1,950	2,120	1,200	920
Alberta	2,613.0	8,100	4,100	4,000	4,250	2,300	1,950
British Columbia	3,319.0	14,800	7,800	7,000	7,200	3,800	3,400
Yukon[4]	27.5	40	20	20	25	15	10
Northwest Territories[4]	56.4	70	40	30	50	30	20

1 *1993 population projections have been provided by the Census and Demographic Statistics Branch, Statistics Canada.*
2 *Figures exclude non-melanoma skin cancer (ICD-9 173).*
3 *Totals may not add due to rounding.*
4 *Data for Yukon and Northwest Territories are based on averages of the most recent 5 years for which data are available.*
Source: *Canadian Centre for Health Information, Statistics Canada.*

Table 3
Province to Canada Ratios of Age-standardized Incidence Rates by Sex and Selected Sites, 1984-1988

Site	Rate Ratio (≤.75)			Rate Ratio (≥1.25)		
	Province	Male	Female	Province	Male	Female
Lung	Alberta	0.74		Quebec	1.27	
	Nova Scotia		0.50			
	Prince Edward Island		0.72			
Prostate	Newfoundland	0.65		British Columbia	1.28	
Female Breast	Newfoundland		0.75			
Cervix	Prince Edward Island		0.71	Newfoundland		1.82
Stomach	Prince Edward Island		0.65	Newfoundland	1.79	1.73
Melanoma	Newfoundland	0.44	0.55	Ontario	1.32	
	Quebec	0.45		British Columbia	1.44	1.56
Lymphoma	Newfoundland	0.58	0.66			
	Prince Edward Island	0.67				
Leukemia	Newfoundland	0.62	0.48			
	Prince Edward Island	0.75				
	Nova Scotia	0.68				
	New Brunswick	0.69				
Oral	New Brunswick		0.71			
	Prince Edward Island		0.50			
	Nova Scotia		0.69			
Brain	Newfoundland	0.74				
	Prince Edward Island	0.74	0.53			
Bladder	British Columbia	0.64	0.65			
	Prince Edward Island		0.65			

Source: *Canadian Centre for Health Information, Statistics Canada.*

Table 4
Estimated New Cases for Major Cancer Sites by Sex, Canada and Provinces, 1993

	New Cases										
	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Males											
All Cancers	**60,900**	**1,000**	**280**	**2,400**	**1,900**	**14,900**	**23,500**	**2,700**	**2,300**	**4,100**	**7,800**
Prostate	12,900	170	65	450	420	2,500	4,400	730	570	960	2,600
Lung	12,500	210	65	500	420	3,800	4,400	480	410	750	1,400
Colorectal	8,500	160	60	370	280	2,000	3,400	370	310	570	950
Bladder	3,700	75	15	160	130	1,000	1,450	160	160	280	260
Lymphoma	3,600	50	10	110	120	940	1,500	160	140	240	300
Oral	2,200	80	5	90	50	430	890	110	90	150	270
Kidney	2,100	35	10	110	65	540	790	80	90	180	230
Stomach	1,900	70	10	90	45	510	710	80	70	120	210
Leukemia	1,750	20	5	60	35	420	740	80	90	110	180
Melanoma	1,500	10	10	65	45	170	770	45	60	130	230
Pancreas	1,350	10	5	70	25	360	510	60	45	120	160
Brain	1,150	10	10	40	40	300	420	45	35	100	120
Females											
All Cancers	**55,300**	**880**	**270**	**2,300**	**1,500**	**12,900**	**22,200**	**2,400**	**1,950**	**4,000**	**7,000**
Breast	16,300	250	80	620	410	3,900	6,200	690	610	1,200	2,300
Colorectal	7,500	140	40	350	240	1,850	3,000	330	280	440	830
Lung	6,600	60	40	260	160	1,600	2,600	290	200	430	960
Lymphoma	3,000	40	10	110	100	780	1,250	140	120	180	250
Body of Uterus	2,900	55	15	100	95	700	1,100	140	95	260	390
Ovary	2,100	40	10	70	60	380	970	65	75	150	280
Melanoma	1,450	20	5	75	50	150	680	55	45	130	240
Kidney	1,450	30	5	65	50	390	540	55	55	110	140
Pancreas	1,400	10	10	65	40	360	530	60	60	120	180
Leukemia	1,400	15	5	45	40	370	620	50	55	85	130
Cervix	1,300	35	5	70	30	200	570	60	55	140	140
Bladder	1,200	25	10	50	30	290	490	55	50	95	90
Stomach	1,100	20	5	60	35	320	360	50	35	70	120
Oral	920	15	–	35	10	190	400	45	30	80	120
Brain	880	10	5	25	30	230	370	30	20	60	95

Note: *Canada totals may not add due to rounding. The Canada and provincial totals for all cancers exclude non-melanoma skin cancer (ICD-9 173). Due to changes and improvements in source data and methodology, the 1993 estimates are not directly comparable to estimates published in previous years. Please refer to methodological appendix for further details. These estimates may vary from actual figures by about 5 to 15 percent. Provincial cancer registries may be contacted for the most current actual data.*

– Less than 5 cases.

Source: *Canadian Centre for Health Information, Statistics Canada.*

Table 5

Estimated Age-standardized Incidence Rates for Major Cancer Sites by Sex, Canada and Provinces, 1993

	Rate per 100,000										
	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Males											
All Cancers	**340**	**288**	**295**	**383**	**376**	**341**	**345**	**335**	**302**	**271**	**315**
Lung	72	59	69	78	84	87	65	60	54	51	56
Prostate	64	44	51	63	73	55	60	80	64	61	97
Colorectal	48	45	52	58	56	45	50	45	38	38	37
Bladder	21	21	22	24	26	23	20	19	21	18	10
Lymphoma	21	16	19	18	24	22	23	22	20	17	21
Oral	13	23	12	15	10	10	14	15	13	10	12
Leukemia	11	6	8	10	8	11	12	12	13	7	9
Stomach	10	19	11	13	8	11	10	10	8	8	8
Kidney	12	11	11	18	15	13	12	10	12	12	10
Pancreas	8	6	10	12	5	8	7	7	6	8	6
Melanoma	10	2	6	11	10	4	12	6	9	9	11
Brain	8	3	6	7	10	8	7	8	6	7	6
Females											
All Cancers	**264**	**240**	**248**	**302**	**266**	**234**	**280**	**261**	**249**	**237**	**259**
Breast	81	68	71	87	77	74	84	81	84	76	90
Lung	33	17	22	37	39	29	32	33	26	26	35
Colorectal	32	35	27	39	24	30	33	32	28	23	26
Body of Uterus	15	16	14	15	16	13	14	16	12	17	15
Lymphoma	14	12	12	16	19	14	16	15	14	11	14
Ovary	10	11	9	10	11	8	13	8	11	10	11
Melanoma	9	6	7	11	10	3	10	8	6	9	10
Leukemia	7	4	8	6	8	7	8	6	7	5	6
Pancreas	6	4	7	6	6	6	5	5	5	6	5
Bladder	6	7	4	5	4	5	5	5	5	5	3
Kidney	8	9	4	8	8	7	7	6	6	6	5
Cervix	6	9	6	10	6	4	8	6	8	9	6
Brain	5	3	3	4	7	5	6	4	3	4	4
Stomach	4	5	4	6	5	5	4	4	3	4	4
Oral	4	5	1	5	1	3	5	5	3	5	5

Note: *Rates exclude non-melanoma skin cancer (ICD-9 173) and are adjusted to the age distribution of the World Standard Population. Due to changes and improvements in source data and methodology, the 1993 estimates are not directly comparable to estimates published in previous years. Please refer to methodological appendix for further details. These estimates may vary from actual figures. Provincial cancer registries may be contacted for their most current actual data.*

Source: *Canadian Centre for Health Information, Statistics Canada.*

Table 6
Estimated Deaths for Major Cancer Sites by Sex, Canada and Provinces, 1993

	Deaths										
	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Males											
All Cancers	**32,800**	**610**	**190**	**1,250**	**910**	**9,200**	**11,900**	**1,400**	**1,200**	**2,300**	**3,800**
Lung	11,000	190	60	410	330	3,600	3,800	400	360	670	1,200
Prostate	3,800	75	25	150	90	880	1,400	210	190	300	520
Colorectal	3,300	60	10	95	75	1,000	1,300	140	120	220	320
Lymphoma	1,700	20	5	55	50	450	630	85	75	140	200
Pancreas	1,450	20	10	60	35	390	510	60	40	130	180
Stomach	1,350	40	5	55	35	390	480	60	55	95	140
Leukemia	1,150	20	5	35	20	330	440	50	45	75	110
Bladder	910	20	5	35	30	230	340	40	35	55	120
Brain	840	15	5	20	20	210	320	25	30	70	110
Oral	790	10	5	20	15	250	310	35	25	45	85
Kidney	820	20	5	35	20	230	270	25	40	60	110
Melanoma	350	–	5	15	10	75	150	5	10	25	50
Females											
All Cancers	**26,900**	**460**	**130**	**1,050**	**720**	**7,100**	**10,100**	**1,150**	**920**	**1,950**	**3,400**
Breast	5,400	85	20	200	140	1,450	2,100	210	180	430	600
Lung	5,300	55	30	220	130	1,350	1,950	230	160	360	800
Colorectal	3,000	60	10	95	50	980	1,100	110	110	200	310
Lymphoma	1,500	20	5	55	45	400	580	80	55	95	170
Pancreas	1,450	20	10	50	35	380	520	50	65	110	200
Ovary	1,350	15	5	50	35	320	530	55	50	90	190
Leukemia	910	10	5	30	25	250	370	35	25	65	95
Stomach	790	25	10	25	20	220	270	40	30	55	100
Brain	640	15	5	25	15	170	250	20	20	45	80
Body of Uterus	630	10	–	10	25	210	210	20	25	45	65
Kidney	540	15	5	25	20	140	180	30	15	50	60
Cervix	400	5	–	25	10	75	180	20	20	30	40
Bladder	400	10	–	10	10	130	140	15	15	20	55
Oral	310	5	–	10	5	65	130	15	10	20	45
Melanoma	210	–	–	10	5	40	80	15	10	15	35

Note: *Canada totals may not add due to rounding. The Canada and provincial totals for all cancers exclude non-melanoma skin cancer (ICD-9 173). Due to changes and improvements in source data and methodology, the 1993 estimates are not directly comparable to estimates published in previous years. Please refer to methodological appendix for further details. These estimates may vary from actual figures by about 5 to 15 percent.*

– Less than 5 cases.

Source: *Canadian Centre for Health Information, Statistics Canada.*

Table 7
Estimated Age-standardized Mortality Rates for Major Cancer Sites by Sex, Canada and Provinces, 1993

	Rate per 100,000										
	Canada	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Males											
All Cancers	**174**	**170**	**196**	**188**	**175**	**206**	**170**	**167**	**148**	**149**	**148**
Lung	59	54	67	63	64	80	54	49	46	45	46
Prostate	18	20	21	21	14	19	18	21	18	18	18
Colorectal	17	16	10	15	15	22	18	17	14	15	12
Lymphoma	9	6	5	8	9	10	9	10	9	9	8
Pancreas	8	6	12	9	6	9	7	7	4	9	7
Stomach	7	12	3	8	8	8	7	7	6	6	5
Leukemia	6	6	3	5	4	8	6	6	6	5	5
Bladder	5	5	3	4	5	5	5	5	4	3	4
Oral	5	3	3	3	3	6	5	5	4	3	4
Brain	5	5	8	4	5	5	5	4	5	5	5
Kidney	4	6	6	5	4	5	4	3	5	4	4
Melanoma	2	–	2	2	2	2	2	1	1	2	2
Females											
All Cancers	**113**	**113**	**100**	**132**	**112**	**115**	**113**	**110**	**101**	**107**	**111**
Breast	25	21	19	27	23	25	25	22	22	26	22
Lung	24	15	24	30	24	24	23	24	20	21	28
Colorectal	11	13	4	9	6	14	11	10	10	10	9
Lymphoma	6	4	4	6	7	6	6	7	6	5	5
Ovary	6	5	3	6	5	6	6	6	6	5	7
Pancreas	5	4	3	5	5	6	5	4	6	5	6
Leukemia	4	2	3	4	3	4	4	3	3	3	3
Stomach	3	6	3	2	3	3	3	3	3	3	3
Brain	3	4	5	3	3	3	3	2	2	3	3
Body of Uterus	2	3	1	1	3	3	2	1	2	2	2
Cervix	2	2	–	3	1	1	2	2	2	2	1
Kidney	2	3	1	3	3	2	2	3	1	3	2
Melanoma	1	–	–	1	1	1	1	–	1	1	1
Bladder	1	1	1	–	1	2	1	1	1	1	2
Oral	1	2	–	1	1	1	1	1	1	1	1

Note: *Rates exclude non-melanoma skin cancer (ICD-9 173) and are calculated by extrapolating trends in cancer mortality as reported by provincial agencies. Due to changes and improvements in source data and methodology, the 1993 estimates are not directly comparable to estimates published in previous years. Please refer to methodological appendix for further details.*

– Estimated age-standardized mortality rate less than 0.5 per 100,000.

Source: *Canadian Centre for Health Information, Statistics Canada.*

AGE AND SEX DISTRIBUTION OF CANCER

Tables in this section present estimated data for 1993, as well as actual data for incidence for 1988 and mortality for 1990. The age groupings used include varying age ranges and represent different components of the population, with one age group for young people (0-24 years), two for middle-aged adults (25-44, 45-54), and three for older adults (55-64, 65-74, 75+). Table 8 shows that more than three-quarters of cancer deaths in 1990 and new cases in 1988 occurred in older Canadians (55 years and older). On the other hand, less than 1% of deaths and less than 2% of new cases occurred prior to age 25.

For four of the most common types of cancer, Table 9 lists the estimated number of new cases and deaths in each age category. The age-specific patterns of new cases indicate that lung, colorectal and prostate cancers occur primarily among older Canadians (age 55+). This is especially true for prostate cancer, which is recognized as a disease of elderly men, with 83% of the cases occurring among men 65 years or older. Although breast cancer is more frequent at earlier ages, with 32% of new cases occurring in middle-aged women (ages 25-54), the majority of cases arise in older women (67% in ages 55+).

Figure 2 presents actual age-specific rates of cancer incidence for 1988 and mortality rates for 1990. The cancer incidence rate rises steeply with age in both sexes. As previously noted, incidence is slightly higher in females than in males up to age 55, after which it becomes more frequent in males. This is due to the high incidence of cancers of the breast and reproductive organs in younger women, and the higher incidence of most types of cancer in older men. Similar patterns are apparent with regard to mortality, as age-specific rates rise sharply after age 55, especially in males.

Specific cancer sites for each sex are presented in greater detail in Table 10, with the actual number of new cases in 1988, and in Table 11, with the actual number of deaths in 1990. In contrast to previous tables, Tables 10 and 11 list cancers according to their International Classification of Diseases codes, and provide frequencies for several of the rarer types of cancer.

Table 8

Percent Distribution of New Cases of Cancer (1988 Actuals, 1993 Estimates) and Cancer Deaths (1990 Actuals, 1993 Estimates) by Age Group and Sex, Canada

Age Group	Actual New Cases (1988)						Estimated New Cases (1993)					
	Total		Males		Females		Total		Males		Females	
	#	%	#	%	#	%	#	%	#	%	#	%
0-24*	1,780	1.8	937	1.8	843	1.8	1,950	1.7	1,050	1.7	900	1.6
25-44*	8,465	8.5	3,109	6.0	5,356	11.2	9,200	7.9	3,500	5.8	5,700	10.3
45-54	10,304	10.4	4,348	8.4	5,956	12.5	12,600	10.9	5,300	8.7	7,300	13.2
55-64	21,737	21.9	11,673	22.6	10,064	21.1	23,100	19.9	12,800	21.0	10,300	18.7
65-74	29,764	29.9	17,022	32.9	12,742	26.7	35,000	30.2	20,300	33.3	14,700	26.6
75 +	27,321	27.5	14,607	28.2	12,714	26.7	34,400	26.6	18,100	29.7	16,300	29.5
All ages	**99,456**	**100.0**	**51,740**	**100.0**	**47,716**	**100.0**	**116,200**	**100.0**	**60,900**	**100.0**	**55,300**	**100.0**

Age Group	Actual Deaths (1990)						Estimated Deaths (1993)					
	Total		Males		Females		Total		Males		Females	
	#	%	#	%	#	%	#	%	#	%	#	%
0-24*	376	0.7	227	0.8	149	0.6	370	0.6	230	0.7	140	0.5
25-44*	2,202	4.2	942	3.3	1,260	5.4	2,280	3.8	980	3.0	1,300	4.8
45-54	4,267	8.2	2,164	7.5	2,103	8.9	5,000	8.4	2,500	7.6	2,500	9.3
55-64	10,315	19.8	5,975	20.8	4,339	18.5	11,100	18.6	6,500	19.8	4,600	17.1
65-74	16,143	30.9	9,441	32.8	6,702	28.5	18,300	30.7	10,800	32.9	7,500	27.9
75 +	18,988	36.4	10,024	34.8	8,964	38.1	22,700	38.0	11,900	36.3	10,800	40.2
All ages	**52,291**	**100.0**	**28,774**	**100.0**	**23,517**	**100.0**	**59,700**	**100.0**	**32,800**	**100.0**	**26,900**	**100.0**

* *Age groupings are for a variable number of years (e.g., 0-24 represents a 25 year span, 25-44 a 20 year span and 45-54 is a ten year span).*

Note: Figures exclude non-melanoma skin cancer (ICD-9 173). Actual totals include 85 new cases (44 in males and 41 in females) with age not stated, and 1 death in men of age not stated. Estimated total may not add up due to rounding. Please refer to methodological appendix for further details. Percentages have been calculated using the total number of new cases and deaths due to cancer, and may not add due to rounding.

... not applicable.

Source: Canadian Centre for Health Information, Statistics Canada.

Table 9
Estimated New Cases and Deaths for Selected Cancer Sites by Age Group and Sex, Canada, 1993

Age Group	Lung			Breast	Colorectal			Prostate
	Total	Male	Female	Female	Total	Male	Female	Male
New Cases (1993 Estimate)								
0-24*	5	5	–	10	20	5	15	5
25-44*	440	200	240	2,300	500	270	230	5
45-54	1,950	1,100	850	3,000	1,470	830	640	200
55-64	4,800	3,200	1,600	3,300	3,150	1,900	1,250	1,950
65-74	6,900	4,700	2,200	4,000	5,200	3,000	2,200	5,100
75 +	4,950	3,300	1,650	3,600	5,600	2,400	3,200	5,600
All Ages	**19,100**	**12,500**	**6,600**	**16,300**	**16,000**	**8,500**	**7,500**	**12,900**
Deaths (1993 Estimate)								
0-24*	5	5	–	–	–	–	–	–
25-44*	310	150	160	490	135	75	60	5
45-54	1,440	860	580	720	450	260	190	35
55-64	3,650	2,500	1,150	1,150	1,060	640	420	330
65-74	5,950	4,100	1,850	1,350	1,880	1,100	780	1,150
75 +	4,850	3,300	1,550	1,700	2,800	1,250	1,550	2,300
All Ages	**16,300**	**11,000**	**5,300**	**5,400**	**6,300**	**3,300**	**3,000**	**3,800**

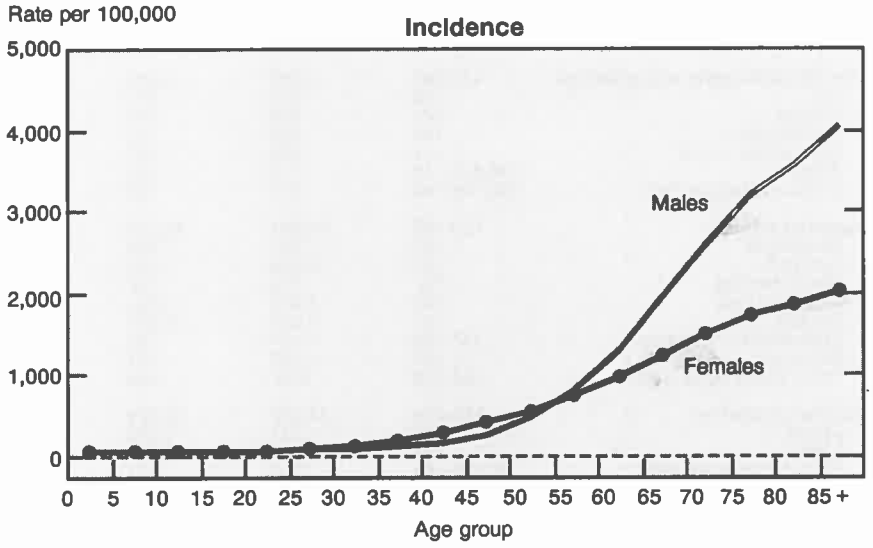
* *Age groupings are for a variable number of years (e.g., 0-24 represents a 25 year span, 25-44 a 20 year span and 45-54 a ten year span).*

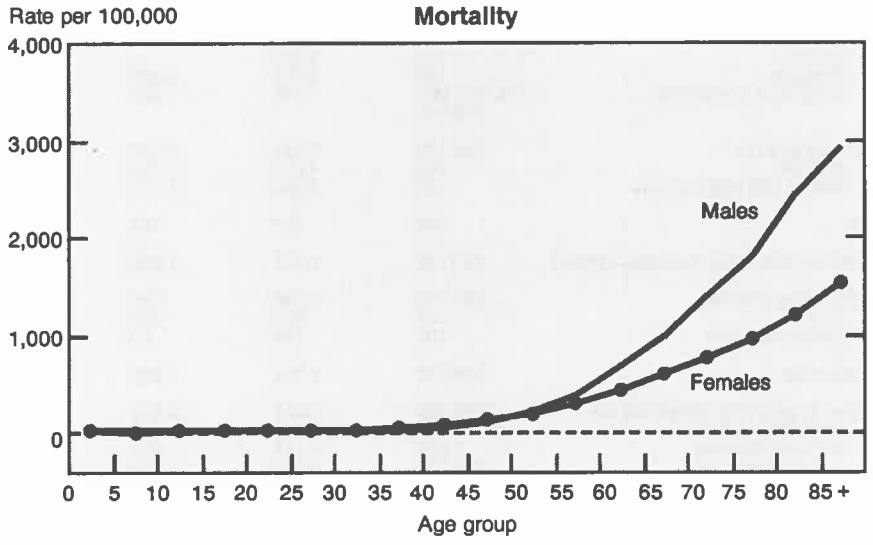
Note: *Figures exclude non-melanoma skin cancer (ICD-9 173). Estimated total may not add due to rounding. Please refer to methodological appendix for further details. Percentages have been calculated using the total number of new cases and deaths due to cancer, and may not add due to rounding.*
– less than 5.

Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 2

Age-Specific Incidence (1988) and Mortality (1990) Rates for All Cancers by Sex, Canada





Note: *Excludes non-melanoma skin cancer (ICD-9 173).*
Source: *Canadian Centre for Health Information, Statistics Canada.*

Table 10
New Cases of Cancer by Site and Sex, Canada, 1988

Site	ICD-9	Total	Males	Females
All cancer sites	**140-208**	**99,456**	**51,740**	**47,716**
Oral (Buccal cavity and pharynx)	**140-149**	**2,857**	**2,096**	**761**
Lip	140	669	571	98
Tongue	141	464	320	144
Salivary gland	142	209	123	86
Floor of the mouth	144	229	167	62
Pharynx	146,147,148	739	550	189
Other and unspecified	143,145,149	547	365	182
Digestive organs	**150-159**	**22,621**	**12,235**	**10,386**
Esophagus	150	927	664	263
Stomach	151	2,928	1,867	1,061
Small intestine	152	273	126	147
Large intestine	153	9,299	4,604	4,695
Rectum	154	4,564	2,602	1,962
Liver and biliary passages	155,156	1,520	783	737
Pancreas	157	2,582	1,331	1,251
Other and unspecified	158,159	528	258	270
Respiratory system	**160-165**	**17,582**	**12,278**	**5,304**
Larynx	161	1,243	1,035	208
Lung	162	15,817	10,892	4,925
Other and unspecified	160,163-165	522	351	171
Bone tissue and skin	**170-172**	**3,358**	**1,707**	**1,651**
Bone	170	299	157	142
Connective Tissue	171	575	300	275
Skin (melanoma)	172	2,484	1,250	1,234
Breast	**174,175**	**13,656**	**108**	**13,548**
Genital organs	**179-187**	**16,875**	**10,287**	**6,588**
Cervix	180	1,399	...	1,399
Body of uterus	182	2,696	...	2,696
Ovary	183	1,985	...	1,985
Prostate	185	9,605	9,605	...
Other and unspecified	179,181,184, 186,187	1,190	682	508
Urinary organs	**188-189**	**7,381**	**5,120**	**2,261**
Bladder	188	4,612	3,406	1,206
Kidney and other urinary	189	2,769	1,714	1,055
Eye	**190**	**267**	**144**	**123**
Brain and central nervous system	**191-192**	**1,877**	**1,058**	**819**
Endocrine glands	**193-194**	**1,098**	**340**	**758**
Thyroid	193	954	261	693
Other endocrine	194	144	79	65
Leukemia	**204-208**	**2,864**	**1,600**	**1,264**
Other blood and lymph tissues	**200-203**	**5,650**	**3,089**	**2,561**
Hodgkin's disease	201	783	462	321
Multiple myeloma	203	1,215	645	570
Other lymphomas	200,202	3,652	1,982	1,670
All other and unspecified sites	**195-199**	**3,370**	**1,678**	**1,692**

Note: *ICD-9 refers to the ninth revision of the International Classification of Diseases. Figures include data from Yukon and Northwest Territories and exclude non-melanoma skin cancer (ICD-9 173). Further information on cancer incidence can be obtained annually from the source listed below.*
... not applicable.

Source: *Cancer in Canada, Health Reports Catalogue 82-003S8, Canadian Centre for Health Information, Statistics Canada.*

Table 11
Cancer Deaths by Site and Sex, Canada, 1990

Site	ICD-9	Total	Males	Females
All cancer sites	**140-208**	**52,291**	**28,774**	**23,517**
Oral (Buccal cavity and pharynx)	**140-149**	**960**	**687**	**273**
Lip	140	16	14	2
Tongue	141	199	133	66
Salivary gland	142	64	39	25
Floor of the mouth	144	66	44	22
Pharynx	146,147,148	271	207	64
Other and unspecified	143,145,149	344	250	94
Digestive organs	**150-159**	**14,380**	**7,816**	**6,564**
Esophagus	150	1,009	736	273
Stomach	151	2,100	1,305	795
Small intestine	152	96	57	39
Large intestine	153	4,431	2,216	2,215
Rectum	154	1,354	777	577
Liver and biliary passages	155,156	1,351	697	654
Pancreas	157	2,611	1,329	1,282
Other and unspecified	158,159	1,428	699	729
Respiratory system	**160-165**	**14,422**	**10,115**	**4,307**
Larynx	161	513	434	79
Lung	162	13,704	9,536	4,168
Other and unspecified	160,163-165	205	145	60
Bone tissue and skin	**170-172**	**864**	**523**	**341**
Bone	170	117	73	44
Connective Tissue	171	250	132	118
Skin (melanoma)	172	497	318	179
Breast	**174,175**	**4,753**	**41**	**4,712**
Genital organs	**179-187**	**5,662**	**3,289**	**2,373**
Cervix	180	443	...	443
Body of uterus	182	341	...	341
Ovary	183	1,222	...	1,222
Prostate	185	3,212	3,212	...
Other and unspecified	179,181,184, 186,187	444	77	367
Urinary organs	**188-189**	**2,362**	**1,532**	**830**
Bladder	188	1,187	821	366
Kidney and other urinary	189	1,175	711	464
Eye	**190**	**45**	**22**	**23**
Brain and central nervous system	**191-192**	**1,348**	**765**	**583**
Endocrine glands	**193-194**	**199**	**81**	**118**
Thyroid	193	113	41	72
Other endocrine	194	86	40	46
Leukemia	**204-208**	**1,817**	**1,005**	**812**
Other blood and lymph tissues	**200-203**	**2,872**	**1,537**	**1,335**
Hodgkin's disease	201	162	98	64
Multiple myeloma	203	924	499	425
Other lymphomas	200,202	1,786	940	846
All other and unspecified sites	**195-199**	**2,607**	**1,361**	**1,246**

Note: *ICD-9 refers to the ninth revision of the International Classification of Diseases. Figures include data from Yukon and Northwest Territories, and exclude non-melanoma skin cancer (ICD-9 173). Further information on cancer mortality can be obtained annually from the source listed below.*
... not applicable.

Source: *Causes of Death, Health Reports Catalogue 82-003S11, Canadian Centre for Health Information, Statistics Canada.*

THE PROBABILITY OF DEVELOPING CANCER

Table 12 shows the probability, expressed in percent, of developing the major types of cancer at specific ages during the next 10 year period, and during the whole lifetime for men and women. Figures for lifetime probability of dying from cancer are also presented. These probabilities assume that current incidence and mortality patterns will be maintained during the next 10 year period or during the lifetime, respectively. For example, a woman who is 50 years old has a 0.7% chance of developing lung cancer before reaching her 60th birthday; this increases to a 1.4% chance for the next decade of life.

Figures 3.1 and 3.2 compare the life time probabilities of developing cancer for men and women in 1971 and 1988. For men, the ranking of the probabilities from the largest to the smallest did not change appreciably between the two periods. The largest relative increase in the probabilities was for melanoma. In 1971, the probability was about 1 in 400 that a person would develop melanoma; in 1988 this increased to about 1 in 100. The probabilities of the two most common cancers, lung and prostate, almost doubled during this period. The lifetime chances of developing either lung or prostate cancer have increased from about 1 in 20 to almost 1 in 10. For two cancers, stomach and oral cavity, the probabilities declined somewhat from 1971 to 1988. For both men and women, the lifetime chances of developing any kind of cancer (excluding non-melanoma skin cancer) have increased from about 1 in 4 in 1971 to about 1 in 3 in 1988.

For women, lung cancer ranked as the eighth most common type of cancer in 1971 (Figure 3.2). About 1 in 100 could expect to develop it in their lifetime. However, by 1988 its ranking had increased to third place where about 1 in 25 women could expect to develop lung cancer. The tragic and dramatic increase (400%) in the lifetime probability of developing lung cancer is almost entirely due to increases in the number of women who started smoking in the decades after the Second World War. The lifetime probabilities for the two most common types of cancer, breast and colorectal, increased by 37% and 29%, respectively. The probability of developing stomach cancer for women decreased, but the decrease is proportionately greater than that for men. The lifetime probability of developing cervical cancer has also decreased and proportionately more so than that for stomach cancer. In 1971, about 1 in 60 women could expect to develop this type of cancer; the chances had decreased to about 1 in 100 in 1988. The chances of developing any kind of cancer in 1971 were somewhat lower for men than for women. By 1988 the chances had reversed to being somewhat higher for men than for women.

Table 12
Probability of Developing Cancer by Age Group, and Lifetime Probability of Developing and Dying from Cancer, Canada

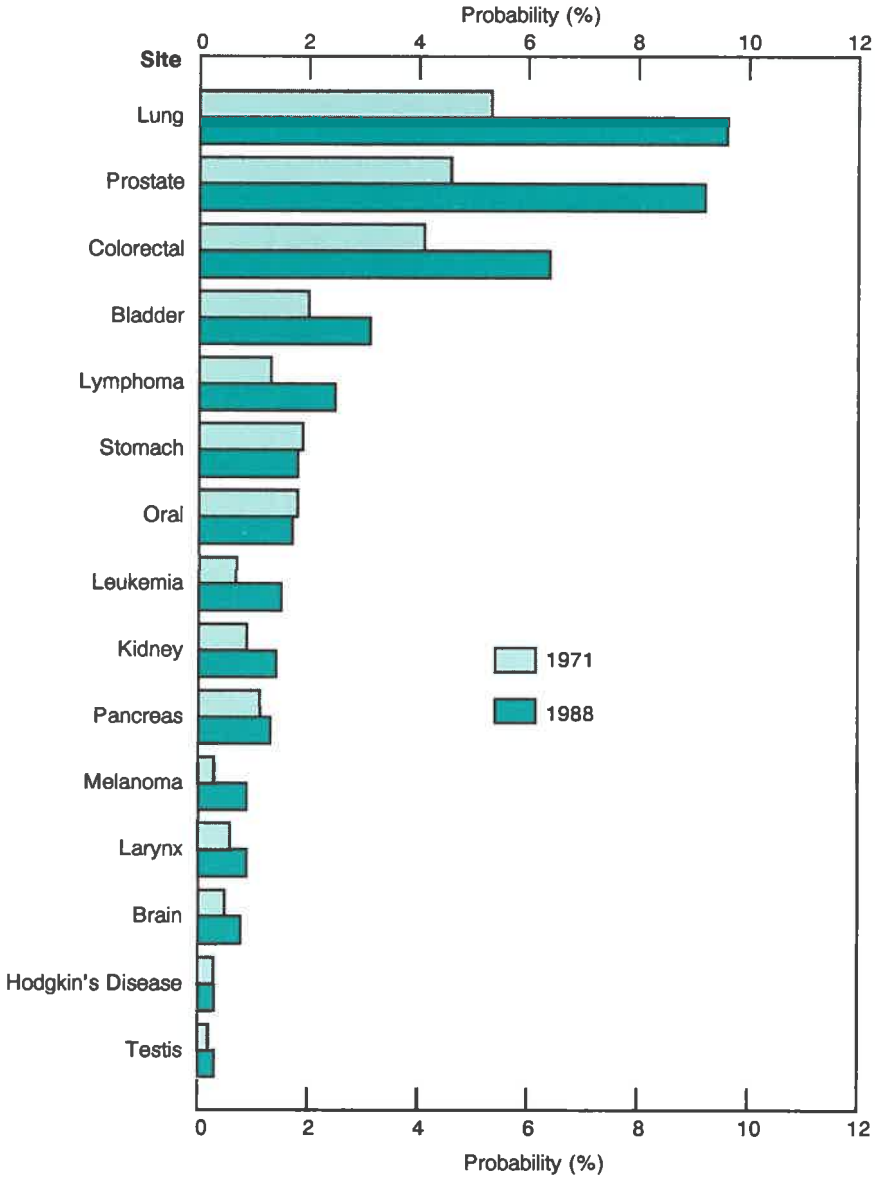
	Risk of developing cancer in next 10 years by age group					Lifetime probability of developing and dying from cancer, all ages	
	30-39	40-49	50-59	60-69	70-79	Developing	Dying
			(%)			(%)	
Males							
All cancers	**0.7**	**1.8**	**5.8**	**13.9**	**21.2**	**39.8**	**26.8**
Lung	--	0.3	1.5	3.7	4.8	9.6	8.6
Prostate	--	--	0.5	2.6	5.6	9.2	3.5
Colorectal	0.1	0.2	0.9	2.1	3.3	6.4	2.8
Bladder	--	0.1	0.4	1.0	1.6	3.1	0.9
Lymphoma	0.1	0.2	0.4	0.7	1.0	2.5	1.4
Stomach	--	0.1	0.2	0.5	0.8	1.8	1.2
Oral	--	0.1	0.4	0.6	0.6	1.7	0.6
Kidney	--	0.1	0.3	0.5	0.6	1.5	0.7
Leukemia	--	0.1	0.1	0.3	0.6	1.4	0.9
Pancreas	--	0.1	0.2	0.4	0.6	1.3	1.2
Melanoma	0.1	0.1	0.2	0.3	0.3	0.9	0.3
Larynx	--	--	0.2	0.4	0.3	0.9	0.4
Brain	--	0.1	0.1	0.2	0.2	0.8	0.6
Hodgkin's Disease	--	--	--	0.1	0.1	0.3	0.1
Testis	0.1	0.1	--	--	--	0.3	0.0
Females							
All cancers	**1.2**	**3.1**	**6.0**	**10.0**	**13.4**	**36.8**	**22.4**
Breast	0.4	1.4	2.1	2.9	3.3	10.9	4.2
Colorectal	--	0.2	0.7	1.4	2.5	6.4	2.9
Lung	--	0.2	0.7	1.4	1.6	4.3	3.7
Body of Uterus	--	0.1	0.5	0.8	0.8	2.4	0.6
Lymphoma	0.1	0.1	0.3	0.5	0.8	2.2	1.3
Ovary	0.1	0.1	0.3	0.4	0.5	1.6	1.1
Pancreas	--	--	0.1	0.3	0.5	1.3	1.3
Leukemia	--	0.1	0.1	0.2	0.4	1.2	0.8
Bladder	--	--	0.1	0.3	0.5	1.2	0.4
Stomach	--	--	0.1	0.2	0.4	1.1	0.8
Cervix	0.2	0.2	0.1	0.2	0.2	1.0	0.4
Kidney	--	--	0.1	0.3	0.3	1.0	0.5
Melanoma	0.1	0.2	0.2	0.2	0.2	0.9	0.2
Oral	--	--	0.1	0.2	0.2	0.7	0.3
Brain	--	0.1	0.1	0.2	0.2	0.6	0.5
Hodgkin's Disease	--	--	--	--	--	0.2	0.1
Larynx	--	--	--	0.1	--	0.2	0.1

Note: *Risk of developing cancer is based on 1988 data and calculated by selected age groups; the probability of dying from cancer is based on 1990 data. The probability for all ages is calculated from birth to end of life. Non-melanoma skin cancer (ICD-9 173) is excluded from the calculations. See Methodological Appendix for details.*

Source: *Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Figure 3.1

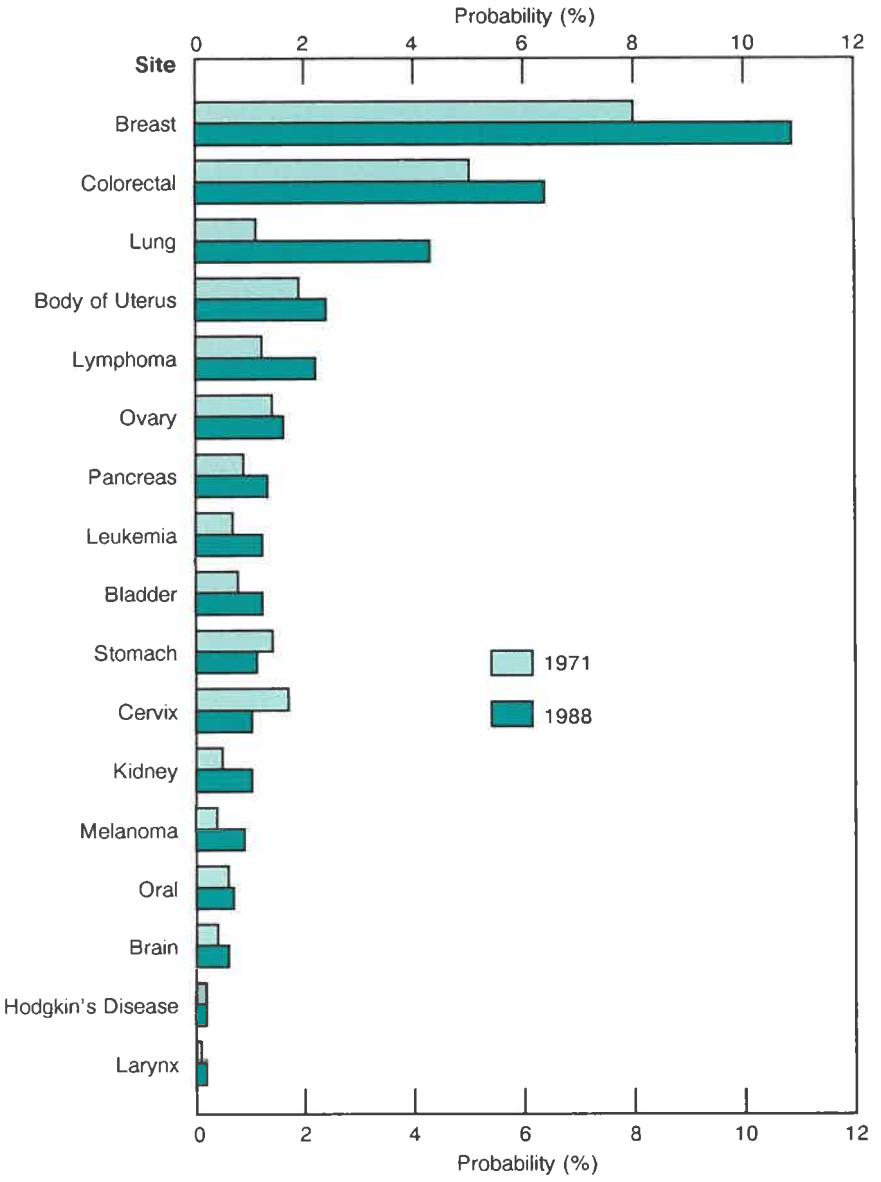
Lifetime Probability of Developing Cancer, Males, Canada, 1971 and 1988



Note: *Life probabilities are calculated from birth to end of life, and calculated based on cancer incidence rates for 1971 and 1988.*

Source: *Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Figure 3.2
Lifetime Probability of Developing Cancer, Females, Canada, 1971 and 1988



Note: *Life probabilities are calculated from birth to end of life, and calculated based on cancer incidence rates for 1971 and 1988.*

Source: *Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

POTENTIAL YEARS OF LIFE LOST DUE TO CANCER

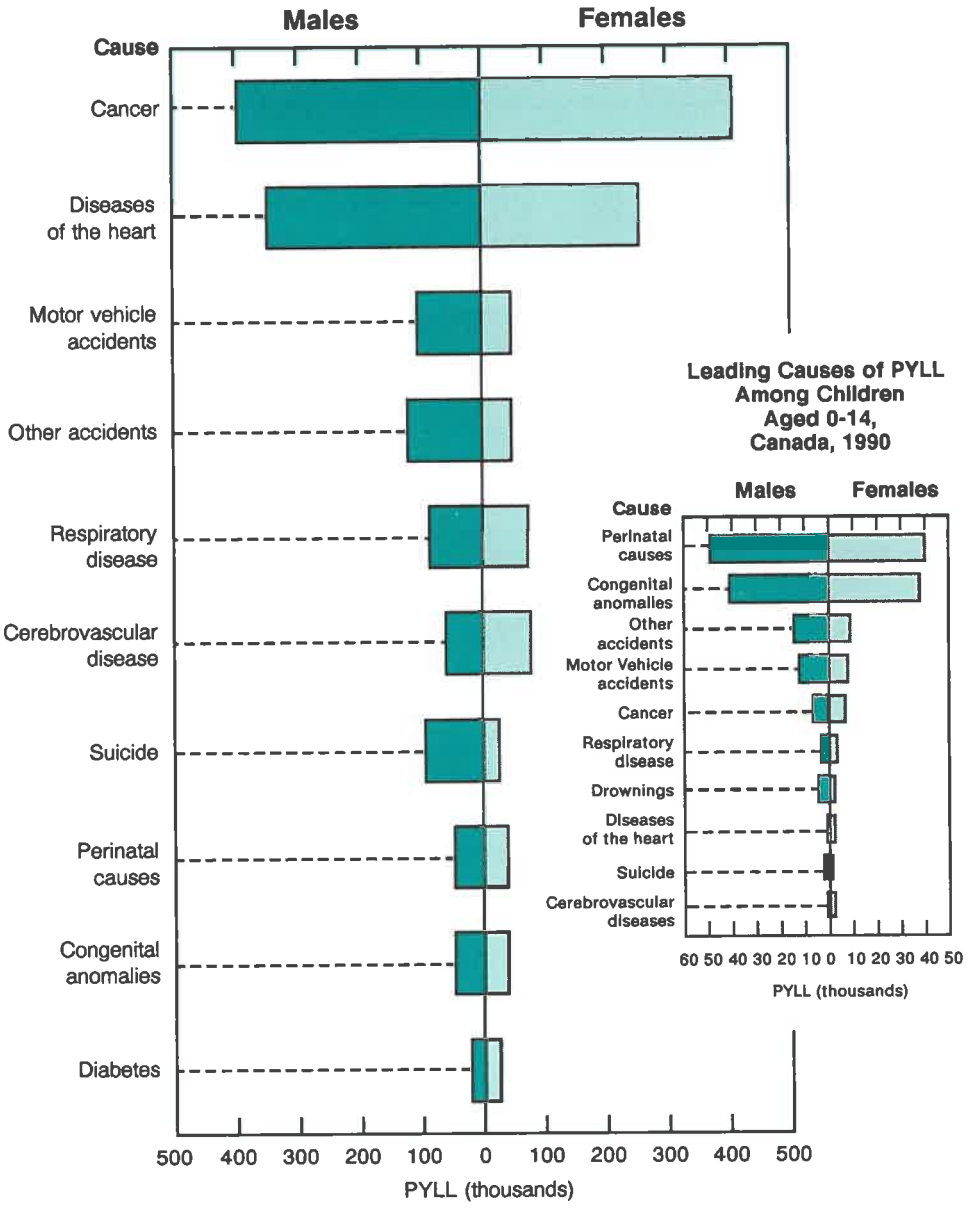
Figure 4 shows that in 1990, for both men and women combined, cancer caused the loss of 806,000 potential years of life. Diseases of the heart, the second leading cause of potential years of life lost, accounted for 605,000 years. In children, cancer ranked fifth as a cause of potential years of life lost, following perinatal causes, congenital anomalies, other accidents and motor vehicle accidents.

Table 13 presents potential years of life lost due to the various types of cancer. For men, the leading cause was lung cancer which accounted for 130,000 potential years of life lost or almost 33 percent of the total 396,000 years lost due to all cancer. Prostate cancer accounts for just 7.4% of the total potential years of life lost due to cancer, although the incidence of prostate cancer has increased such that among men, more new cases of prostate than lung cancer are expected in 1993. For women, the leading cause was breast cancer which accounted for 94,000 life years or almost 23 percent of the total 410,000 years lost due to all cancer. In men, lung, colorectal, and prostate cancers account for slightly more than 50 percent of the life years lost while in women breast, lung and colorectal cancers account for about 50 percent. The annual toll – over four fifths of a million potential years of life lost due to cancer – is enormous.

Although more men than women die from cancer every year, women generally live longer than men and many of the cancer deaths among women occur at younger ages, for example, those due to cancers of the breast and reproductive organs. This results in a slightly higher loss of potential years of life for women than for men.

Figure 4

Leading Causes of Potential Years of Life Lost (PYLL), Canada, 1990



Note: *In descending rank order of the 10 leading causes (both sexes combined).*
Source: *Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Table 13
Potential Years of Life Lost Due to Cancer, Canada, 1990

Site	Potential years of life lost (PYLL)					
	Total		Males		Females	
	Years	%	Years	%	Years	%
All cancers	**806,000**	**100.0**	**396,000**	**100.0**	**410,000**	**100.0**
Lung	206,000	25.6	130,000	32.9	76,000	18.5
Female Breast	94,000	11.6	...	...	94,000	22.8
Colorectal	80,000	10.0	40,000	10.0	41,000	9.9
Lymphoma	46,000	5.7	24,000	6.0	22,000	5.4
Pancreas	36,000	4.5	18,000	4.4	19,000	4.6
Leukemia	34,000	4.2	18,000	4.5	16,000	4.0
Brain	32,000	3.9	17,000	4.4	14,000	3.4
Prostate	29,000	3.6	29,000	7.4	...	...
Stomach	28,000	3.5	17,000	4.3	11,000	2.7
Ovary	23,000	2.8	...	...	23,000	5.5
Kidney	18,000	2.2	10,000	2.6	8,000	1.8
Oral	16,000	2.0	11,000	2.8	5,000	1.2
Bladder	13,000	1.5	9,000	2.2	4,000	1.0
Cervix	11,000	1.3	...	...	11,000	2.6
Melanoma	10,000	1.3	6,000	1.6	4,000	1.0
Body of Uterus	9,000	1.1	...	...	9,000	2.2
Larynx	8,000	1.0	6,000	1.6	1,000	0.4
Hodgkin's Disease	4,000	0.5	2,000	0.5	2,000	0.4
Testis	1,000	0.2	1,000	0.3	...	...

Note: *Ranked in order of total PYLL for both sexes combined and based on life expectancy. Figures may not add due to rounding and exclude non-melanoma skin cancer (ICD-9 173).*
... not applicable.

Source: *Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

RELATIVE CANCER SURVIVAL

Survival rates provide the most direct indication of the severity of cancer and the impact of cancer treatment. Population-based survival rates such as are presented here can be considered to be representative of the total cancer experience in specified geographic areas. Changes in survival reflect a variety of factors, including improvements in treatment, changes in diagnostic technology which have led to earlier detection, and declining proportions of patients lost to follow-up in recent years. Differences in overall survival among different populations reflect differences in incidence rates, health care systems, patient characteristics, and cancer registry reporting methods. It is therefore difficult to compare rates from different populations.

The relative five year survival rates shown in Table 14 and Figures 5 and 6 are based on pooled data from the British Columbia Cancer Agency, Saskatchewan Cancer Foundation and Ontario Cancer Treatment and Research Foundation. The individual records from the three provinces are grouped by two periods, 1970-74 and 1980-84. About 50% of the Canadian population reside in these three provinces according to both the 1971 and 1981 Census. In previous years, relative survival data for British Columbia, Alberta, Saskatchewan, and Ontario have been presented separately.

All rates shown are relative survival rates. Relative survival rates are calculated by adjusting the observed survival rates according to the normal life expectancy in the general population. For example, a five-year relative survival rate of 37 percent for women diagnosed with leukemia in the 1980-84 period means that a woman diagnosed with leukemia during that period is about one third as likely to survive five years after her diagnosis as the general population of women in the same age group.

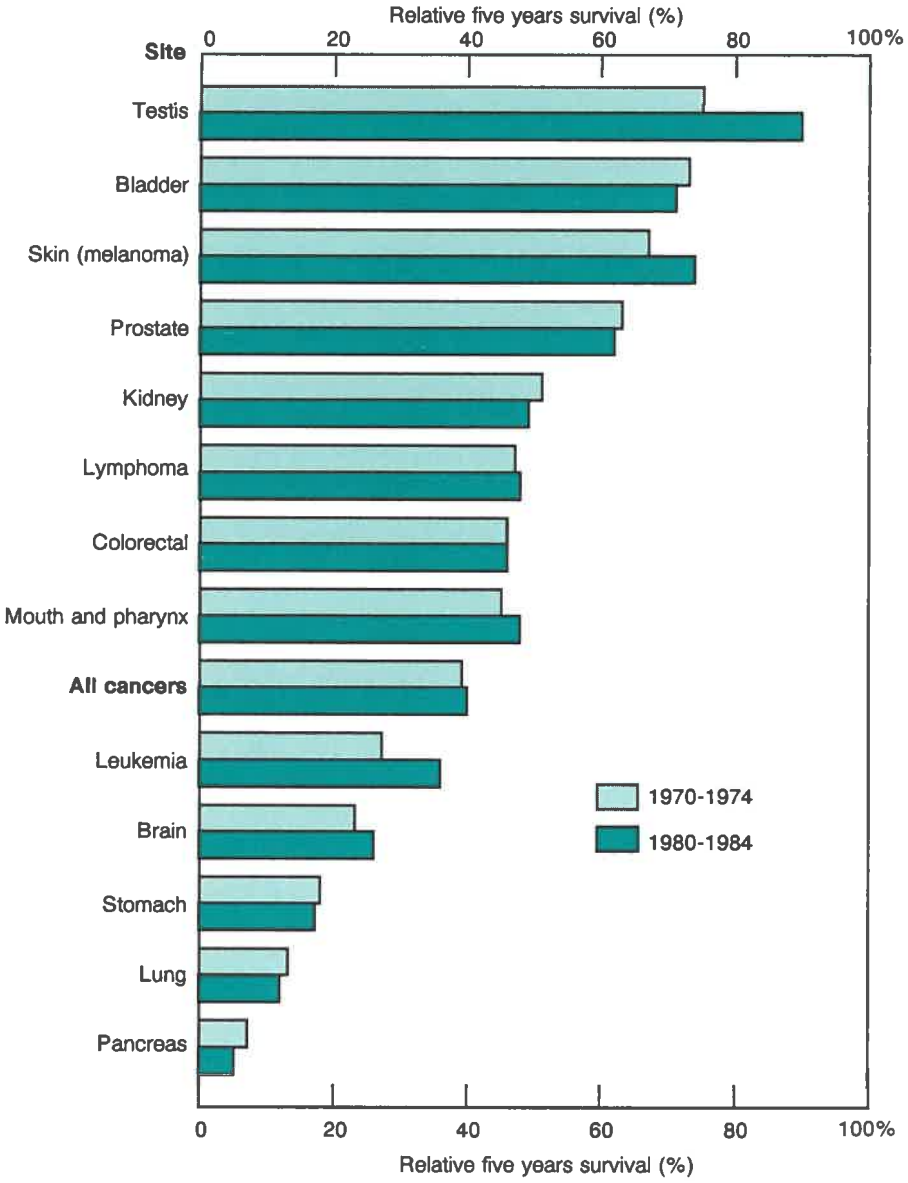
Table 14 demonstrates that although relative survival rates differ markedly among cancer types, the survival rate is generally higher for women than for men. For the 1980-84 period, the relative survival rate for women was 55 percent, unchanged from the 1970-74 period; for men, it was 40 percent, also essentially unchanged from the earlier period. The difference in the survival rates of men and women is primarily due to the greater occurrence of cancers with low survival rates, such as lung cancer, among men. However, this is not a complete explanation since for cancer types that do occur in both sexes, the survival rates are generally higher among women.

Figure 5.1 and 5.2 show that for most cancer types there has been some improvement in the relative survival rates between the two periods, 1970-74 and 1980-84. For men, relative survival rates for testicular cancer, melanoma and leukemia, have increased significantly. For women, there were significant increases in the relative survival of melanoma, leukemia, cancer of the bladder, lymphoma, colorectal cancer and breast cancer. However, there was a significant decrease in relative survival for cancer of the cervix and lung for women, and pancreatic cancer for both men and women.

Figure 6.1 and 6.2 illustrate the relative survival for major cancer sites by sex over a ten year period after inital diagnosis. As evident in the figure, for many types of cancer, a large proportion of excess deaths associated with a cancer diagnosis occurs in the first year after diagnosis, and a much smaller proportion between five and 10 years post diagnosis. Exceptions are breast cancer and prostate cancer, where the relative survival rate continues to decrease for as long as 20 years after diagnosis.

Figure 5.1

Relative Five Year Survival Rates for Major Cancer Sites by Time Period, Three Provinces Combined, Males, 1970-1974 and 1980-1984

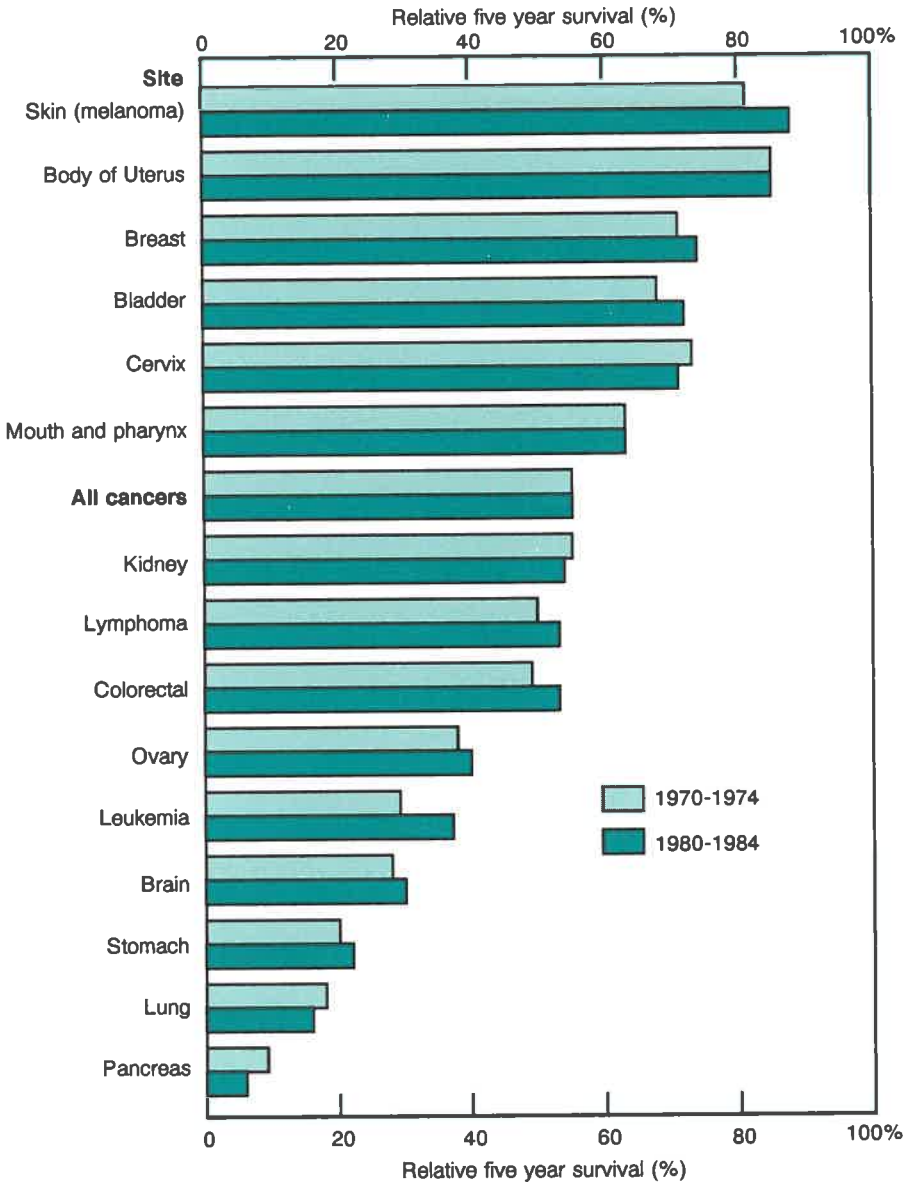


Note: *Excludes non-melanoma skin cancer (ICD-9 173).*

Source: *British Columbia Cancer Agency, Saskatchewan Cancer Foundation, Ontario Cancer Teatment and Research Foundation, and Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Figure 5.2

Relative Five Year Survival Rates for Major Cancer Sites by Time Period, Three Provinces Combined, Females, 1970-1974 and 1980-1984

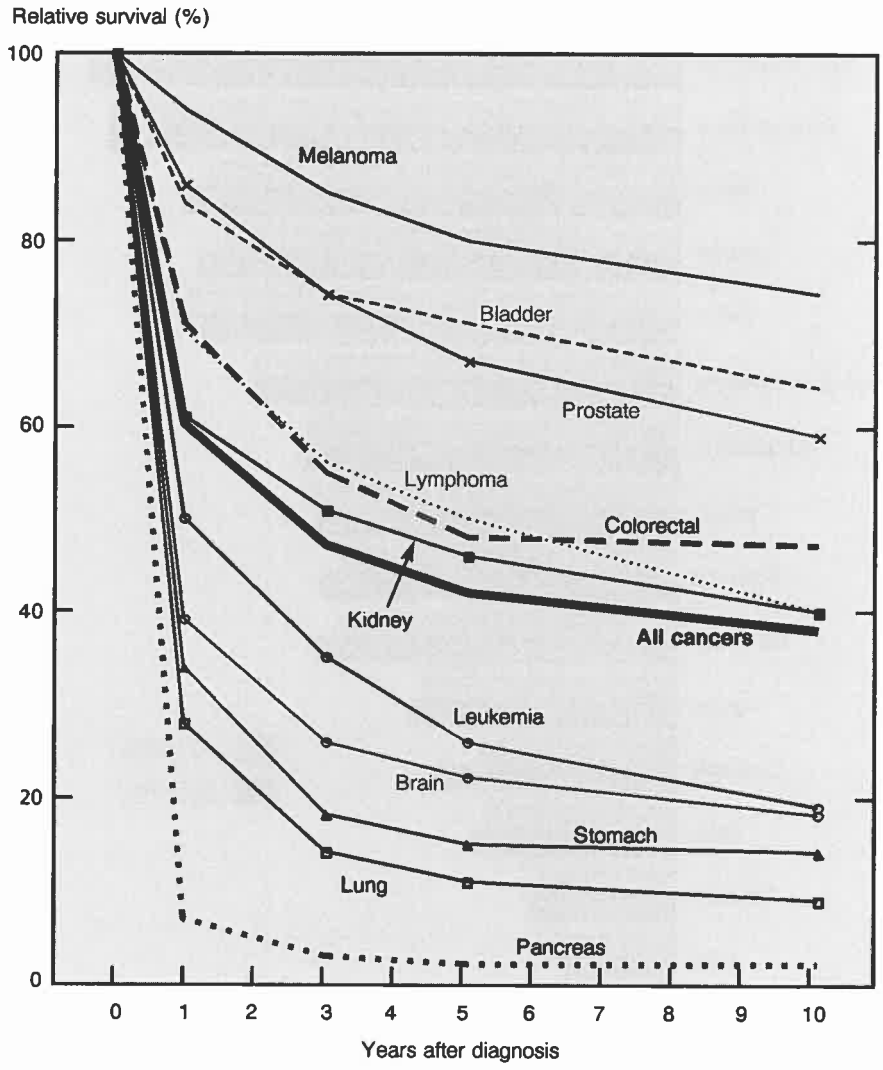


Note: *Excludes non-melanoma skin cancer (ICD-9 173).*

Source: *British Columbia Cancer Agency, Saskatchewan Cancer Foundation, Ontario Cancer Treatment and Research Foundation. and Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Figure 6.1

Relative Survival Rates for Ten Years for Selected Cancer Sites, Males, Three Provinces Combined, from 1970 Onwards

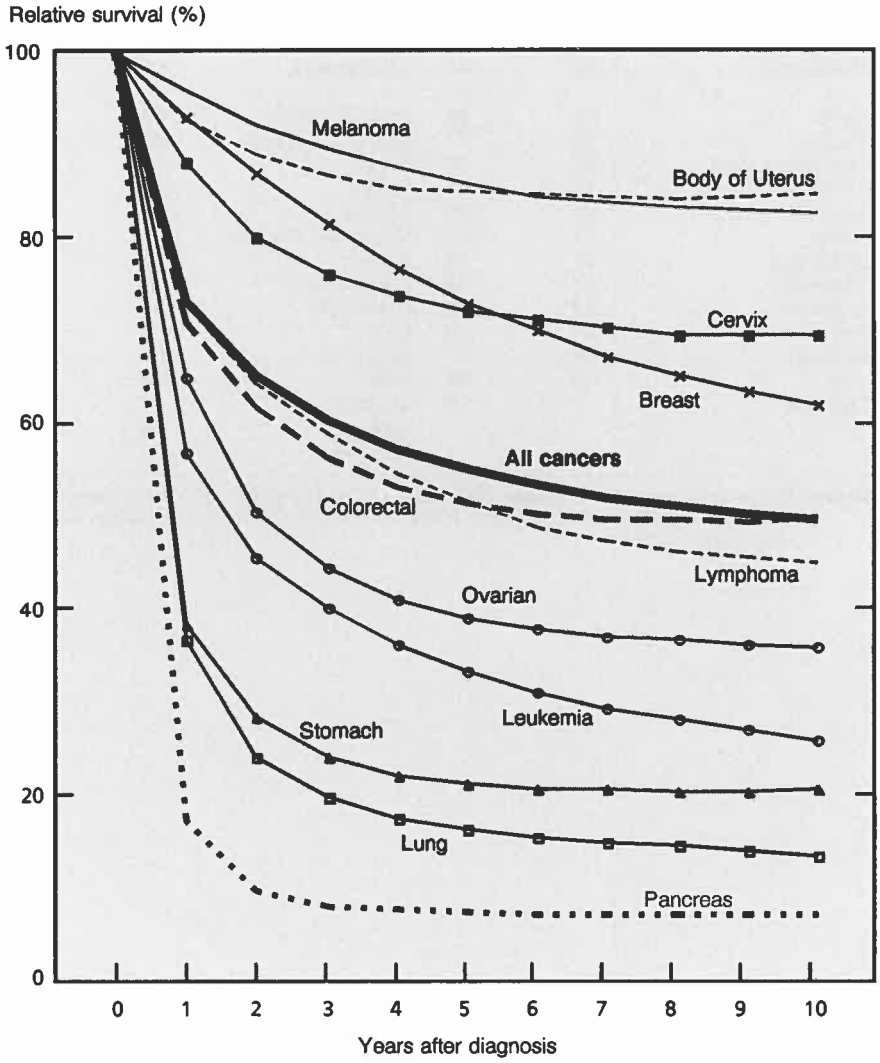


Note: *Excludes non-melanoma skin cancer (ICD-9 173).*

Source: *British Columbia Cancer Agency, Saskatchewan Cancer Foundation, Ontario Cancer Treatment and Research Foundation, and Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Figure 6.2

Relative Survival Rates for Ten Years for Selected Cancer Sites, Females, Three Provinces Combined, from 1970 Onwards



Note: *Excludes non-melanoma skin cancer (ICD-9 173).*

Source: *British Columbia Cancer Agency, Saskatchewan Cancer Foundation, Ontario Cancer Treatment and Research Foundation, and Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Table 14
Relative Five Year Survival Rates for Major Cancer Sites by Type, Time Period, and Sex, Three Provinces Combined, 1970-1974 and 1980-1984

	Relative five year survival (%)				
Males	1970-1974	1980-1984	Females	1970-1974	1980-1984
All Cancers	39	40	**All Cancers**	55	55
Testis	75	90	Body of Uterus	85	85
Bladder	73	71	Skin (Melanoma)	81	88
Skin (Melanoma)	67	74	Cervix	73	71
Mouth and Pharynx	48	45	Breast	71	74
Prostate	63	62	Bladder	68	72
Kidney	51	49	Mouth and Pharynx	63	63
Lymphoma	47	48	Kidney	55	54
Colorectal	46	46	Lymphoma	50	53
Leukemia	27	36	Colorectal	49	53
Brain	23	26	Ovary	38	40
Stomach	18	17	Leukemia	28	37
Lung	13	12	Brain	29	30
Pancreas	7	5	Stomach	20	22
			Lung	18	16
			Pancreas	9	6

Source: *British Columbia Cancer Agency; Saskatchewan Cancer Foundation; Ontario Cancer Treatment and Research Foundation; Bureau of Chronic Disease Epidemiology, Health and Welfare Canada*

TRENDS IN INCIDENCE AND MORTALITY

Recent incidence and mortality trends for major types of cancer are assessed by comparing annual age-standardized rates. The process of age-standardization permits comparisons between calendar years, since it accounts for changes that have occurred over time in the age distribution of the population. The average annual percent change in site-specific incidence and mortality rates over the period beginning in 1981 are listed in Table 14 and plotted in Figure 7. More detailed depictions of the trends in annual rates since 1970 are presented in Figures 8 to 13.

The incidence of all cancers combined increased by an average of 0.8% per year in males and 0.5% per year in females between 1981 and 1988 (Table 15). The corresponding trends in mortality between 1981 and 1990 were similar but less marked, as there was an annual increase of 0.5% in males and 0.4% in females (Table 15). These average annual changes that have occurred since 1981 are shown in Figure 8 to be consistent with cancer trends since 1969.

Figure 9, which plots the annual percentage change in mortality rates for all sites combined and for all sites excluding lung cancer, shows lung cancer to be responsible for the slight trend of increasing mortality rates for all cancer sites combined. Figure 9 also indicates that for all sites other than lung cancer, mortality has been stable in males but decreasing in females.

Time trends in incidence and mortality rates for the major cancer sites are shown for males in Figures 10 and 11, and for females in Figures 12 and 13.

It is possible to infer from the data presented in Table 15 and in Figures 10 to 13 whether the observed trends are due to changes in incidence or survival. In some circumstances it is also possible to speculate about the role of specific risk factors. Specific cancer sites, therefore can be categorized according to these trends in incidence and survival. First, for cancers with stable incidence and mortality rates **over the past decade** (e.g., changing less than 2% per year), such as cancers of the breast and body of the uterus in females, and lung and colorectal* cancers in males, it can be concluded that there has been little change in either incidence or survival. Second, for cancers that have had increases in both incidence and mortality rates (lung cancer in females, prostate cancer and melanoma in males, and kidney cancer in both sexes), it can be concluded that the incidence rate has been increasing. Third, the trend in cancers for which both incidence and mortality rates have been decreasing (cervical cancer in females, Hodgkin's Disease in males, and stomach cancer in both sexes), would be due to a true decline in incidence rates. Fourth, for cancers that have a stable or increasing incidence rate but a decreasing mortality rate (Hodgkin's Disease and melanoma in females, and testicular cancer in males), it can be inferred that survival rates have increased.

Some of these trends can be explained on the basis of known risk factors, such as smoking (lung cancer) or sunbathing (melanoma of the skin), to earlier diagnosis (cancers of the cervix, breast and prostate), or to improved treatment (testicular cancer, Hodgkin's Disease). The different trends in colorectal cancer rates for females and males cannot be fully explained at present.

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* *Correction: In Canadian Cancer Statistics 1992, the incidence rates for colorectal for men were incorrectly repeated for women in Figure 12.*

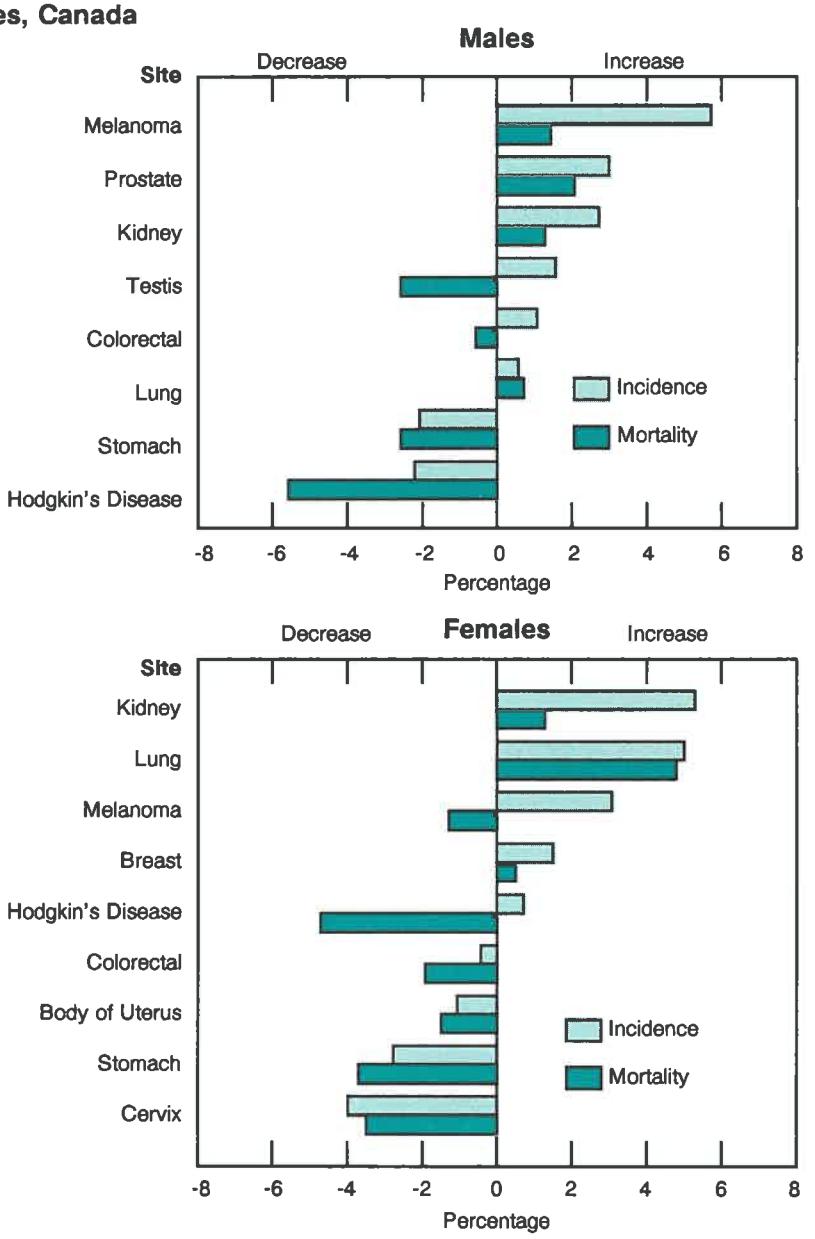
Table 15
Average Annual Percent Change in Age-Standardized Incidence (1981-1988) and Mortality (1981-1990) Rates for Selected Cancer Sites, Canada

Site	Incidence 1981-1988		Mortality 1981-1990	
	Males	Females	Males	Females
All Cancers	**0.8**	**0.5**	**0.5**	**0.4**
Oral	-1.2	-1.0	0.2	-0.7
Stomach	-2.1	-2.8	-2.6	-3.7
Colorectal	1.1	-0.4	-0.6	-1.9
Pancreas	-1.9	0.3	-1.4	-0.3
Larynx	0.3	2.9	0.4	1.5
Lung	0.6	5.0	0.7	4.8
Melanoma	5.7	3.1	1.4	-1.3
Female Breast	...	1.5	...	0.5
Cervix	...	-4.0	...	-3.5
Body of Uterus	...	-1.1	...	-1.5
Ovary	...	-1.4	...	-1.0
Prostate	3.0	...	2.1	...
Testis	1.6	...	-2.6	...
Bladder	-0.3	-0.4	-0.9	-0.9
Kidney	2.7	5.3	1.3	1.3
Brain	0.5	-0.8	0.4	-0.6
Hodgkin's Disease	-2.2	0.7	-5.6	-4.7
Multiple Myeloma	-0.1	0.8	1.4	0.7
Non-Hodgkin's Lymphoma	2.1	...	1.6	1.5
Leukemia	-0.7	-0.6	-0.7	-0.9
All Childhood Cancers	**Both sexes**		**Both sexes**	
Age 0-14	0.8		-4.2	

Note: *Average Annual Percent Change is calculated assuming a log linear model and excludes non-melanoma skin cancer (ICD-9 173).*
... not applicable.
Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 7

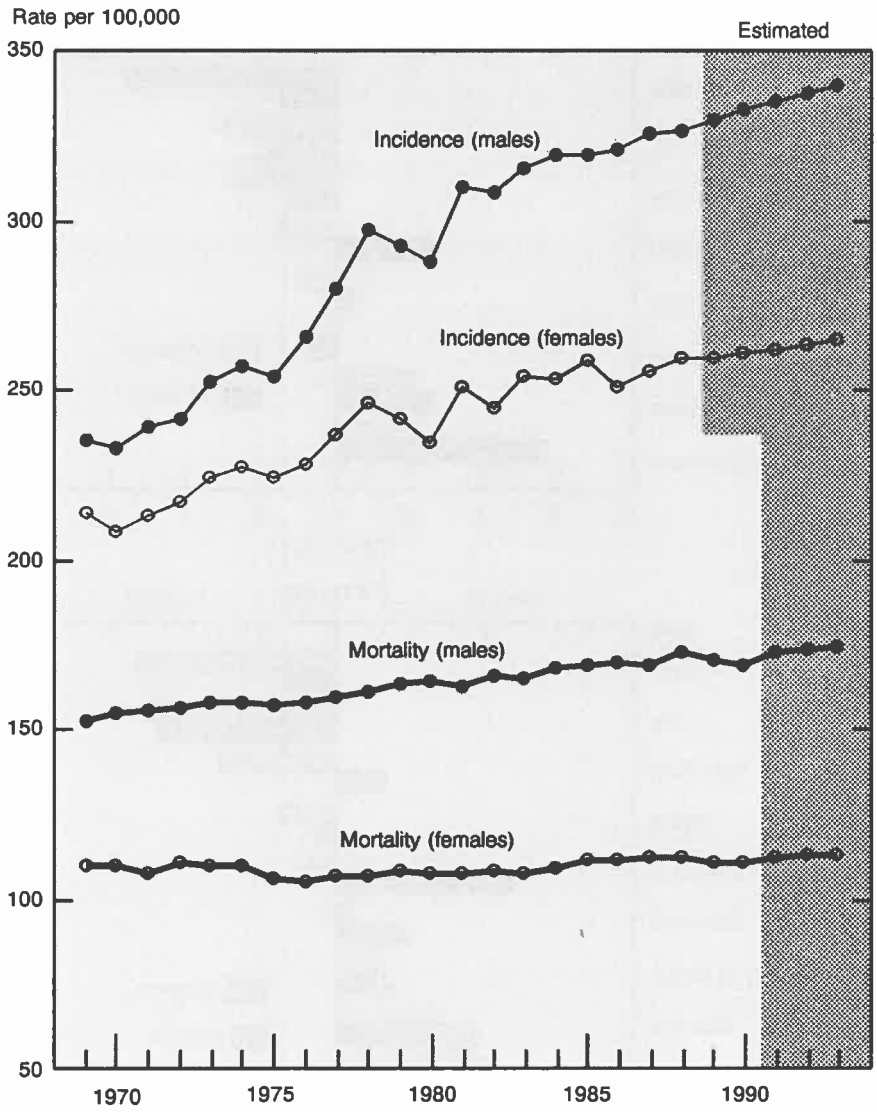
Average Annual Percent Change in Age-Standardized Incidence (1981-1988) and Mortality (1981-1990) Rates for Selected Cancer Sites, Canada



Note: *See Table 15 for percentages for all sites.*
Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 8

Age-Standardized Incidence and Mortality Rates for All Cancers, Canada, 1969-1993

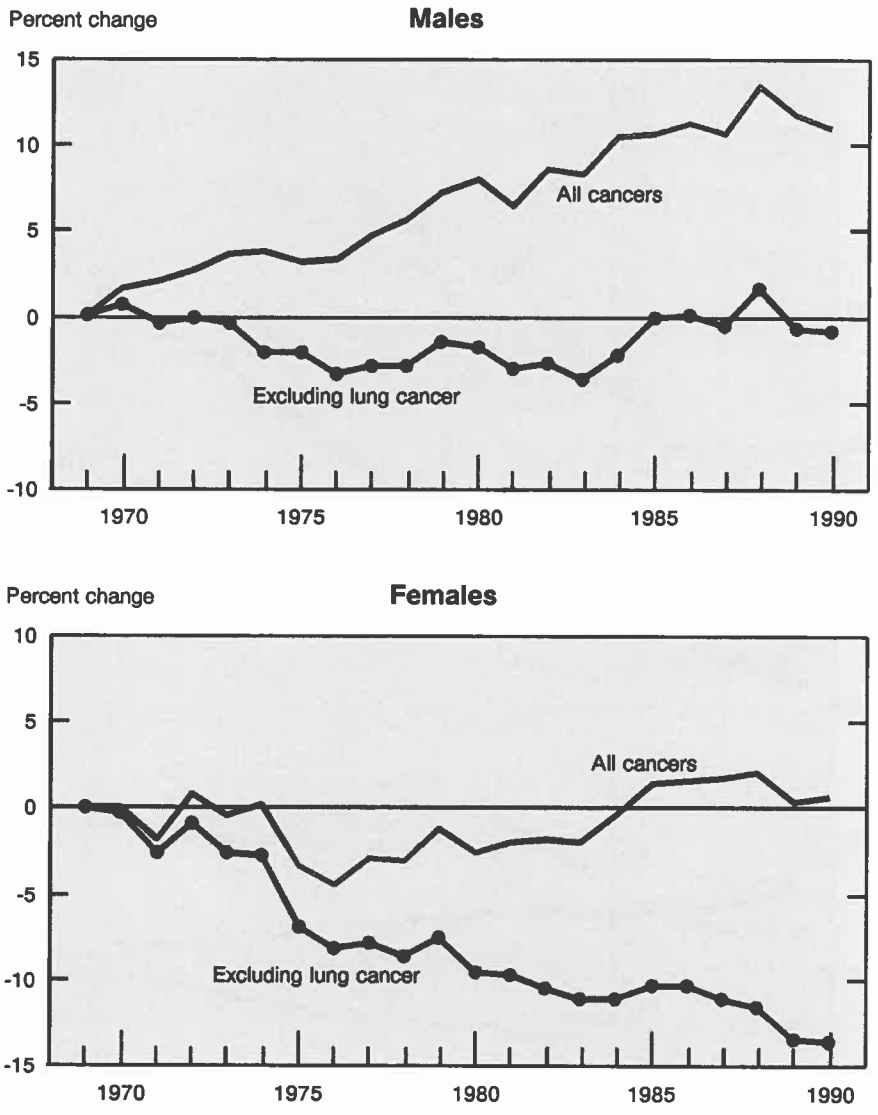


Note: *Rates are adjusted to the age distribution of the World Standard Population; all figures exclude non-melanoma skin cancer (ICD-9 173).*

Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 9

Percent Change[1] in Age-Standardized Mortality Rates[2], Including and Excluding Lung Cancer, Canada, 1969-1990



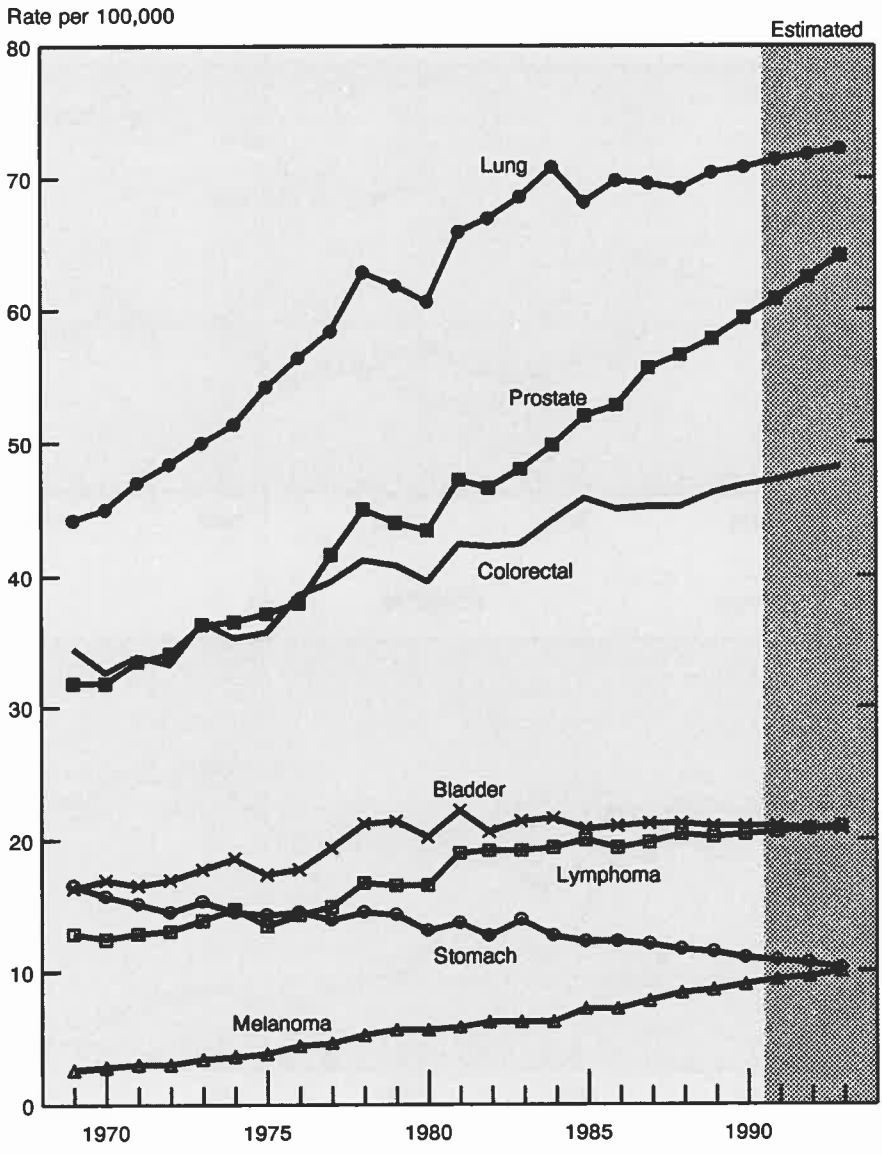
[1] Percent change is the percent difference between the annual and base year (1969) rate.

[2] Rates are adjusted to the age distribution of the World Standard Population; all figures exclude non-melanoma skin cancer (ICD-9 173).

Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 10

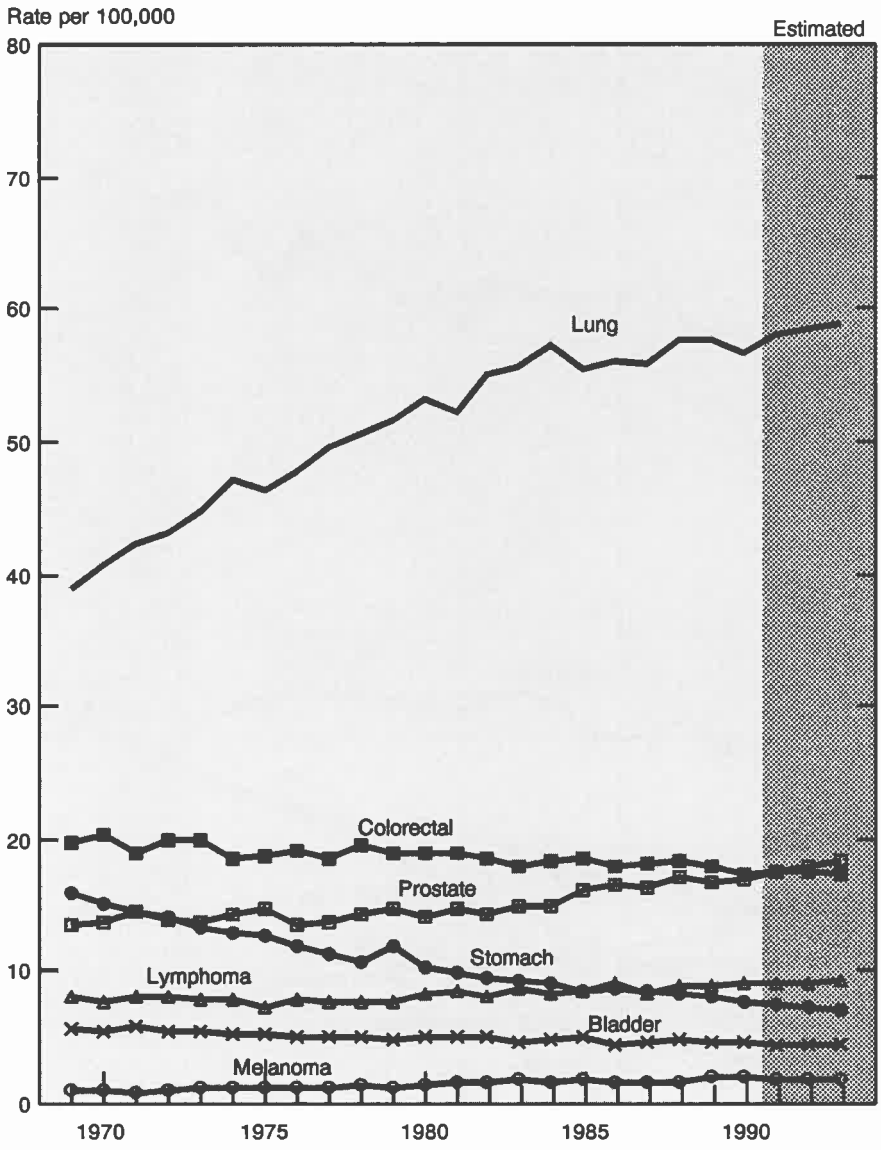
Age-Standardized Incidence Rates for Selected Cancer Sites, Males, Canada, 1969-1993



Note: *Rates are adjusted to the age distribution of the World Standard Population.*
Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 11

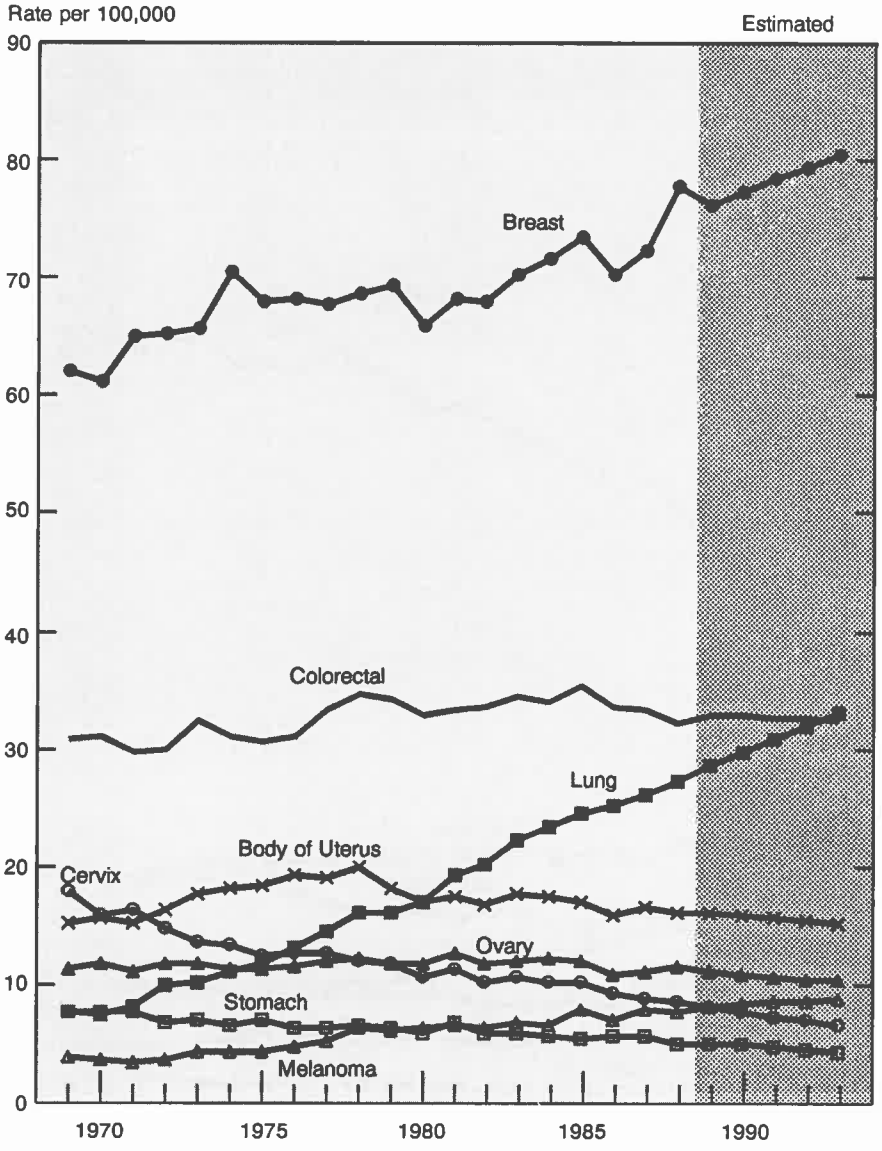
Age-Standardized Mortality Rates for Selected Cancer Sites, Males, Canada, 1969-1993



Note: *Rates are adjusted to the age distribution of the World Standard Population.*
Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 12

Age-Standardized Incidence Rates for Selected Cancer Sites, Females, Canada, 1969-1993

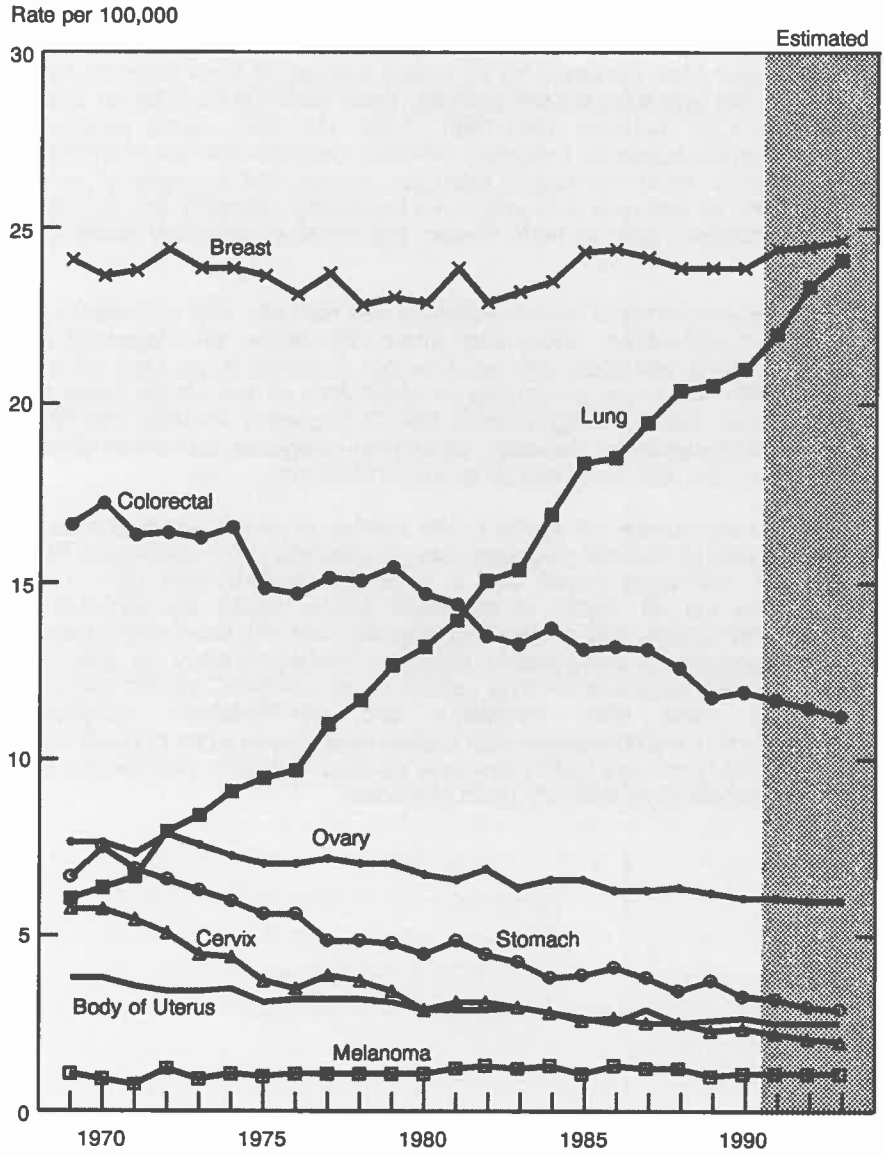


Note: *Figures for colorectal cancer were incorrectly portrayed in Canadian Cancer Statistics 1992. This graph shows the corrected version. Rates are adjusted to the age distribution of the World Standard Population.*

Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 13

Age-Standardized Mortality Rates for Selected Cancer Sites, Females, Canada, 1969-1993



Note: *Rates are adjusted to the age distribution of the World Standard Population.*
Source: *Canadian Centre for Health Information, Statistics Canada.*

CANCER IN CHILDREN AGED 0-14

Figure 14 shows cancer incidence and mortality trends over time for children aged 0-14 years. For all childhood cancers combined, there has been a gradual increase in the incidence rate but this has also been accompanied by a decline in mortality rate. The overall childhood cancer age-standardized incidence rates have increased by an annual average of 0.8% between 1981-1988 while the age-standardized mortality rates have declined by an annual average of 4.2% between 1981-1990 (Table 15). This steady decline in mortality despite increasing incidence indicates improved survival of childhood cancer patients, which has largely been due to improved treatment of certain cancers such as leukemia and lymphoma in children. Mortality due to certain childhood cancers, such as brain cancer, has remained relatively stable (Fig. 14).

Table 16 shows childhood cancer incidence and mortality data in Canada over a recent five year period. Every year, about 920 children are diagnosed with cancer in Canada, and about 220 die of cancer. Leukemia is the most common form of childhood cancer, accounting for about 30% of new cancer cases and 40% of cancer deaths among children. Next in frequency are brain and spinal tumours, and lymphomas. Together, these three categories account for 56% of all new cases and 72% of all cancer deaths in children.

The ratio of the number of deaths to the number of cases, which provides a crude indication of disease prognosis, can be calculated from the data in Table 16. Overall, childhood cancer has a favourable deaths/cases ratio (0.23). However, as not all deaths in childhood cancer cases are included as childhood deaths (e.g., any deaths occurring after age 14), this limits the extent to which comparisons are possible. Among childhood cancers, the ones with relatively poorer prognosis are liver cancer, acute non-lymphocyctic leukemia, lymphomas other than Hodgkin's and non-Hodgkin's lymphoma, neuroblastoma, medulloblastoma and rhabdomyosarcoma while Hodgkin's and non-Hodgkin's lymphoma, retinoblastoma, gonadal and germ cell cancers, and epithelial cancers have relatively good prognosis.

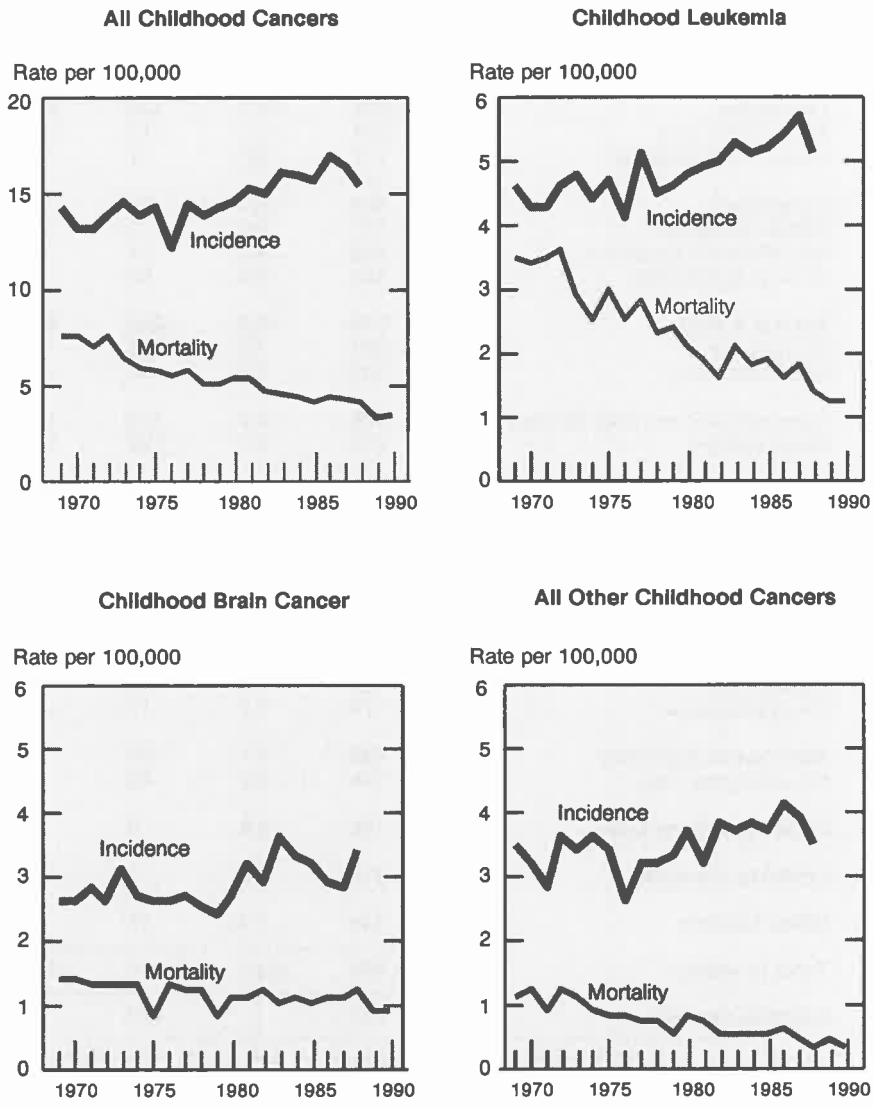
Table 16
New Cases (1984-1988) and Deaths (1985-1989) for Histologic Cell Types of Cancers for Children Aged 0-14, Canada

Diagnostic group[2]	New cases 1984-1988[1]		Deaths 1985-1989[1]	
	Number	Percent	Number	Percent
1. Leukemias	**1,338**	**29.3**	**430**	**39.9**
Acute lymphocytic	1,023	22.3	212	19.7
Acute non-lymphocytic	177	3.9	77	7.0
2. Lymphomas	**475**	**10.4**	**76**	**7.1**
Hodgkin's disease	177	3.9	3	0.3
Non-Hodgkin's lymphoma	145	3.2	11	1.0
All other lymphomas	153	3.3	62	5.8
3. Brain & Spinal	**772**	**16.8**	**269**	**25.1**
Astrocytoma	358	7.8	48	4.5
Medulloblastoma	138	3.0	50	4.6
4. Symphathetic Nervous System	**288**	**6.3**	**109**	**10.1**
Neuroblastoma	276	6.0	109	10.1
5. Retinoblastoma	**89**	**1.9**	**3**	**0.3**
6. Kidney	**265**	**5.8**	**27**	**2.5**
Wilms' tumour	238	5.2	27	2.5
7. Liver	**54**	**1.2**	**28**	**2.6**
8. Bone	**192**	**4.2**	**40**	**3.7**
Osteosarcoma	90	2.0	20	1.9
Ewing's sarcoma	76	1.7	17	1.6
9. Soft Tissue Sarcomas	**280**	**6.1**	**61**	**5.7**
Rhabdomyosarcoma	148	3.2	49	4.6
10. Gonadal & Germ Cell	**176**	**3.8**	**8**	**0.7**
11. Epithelial Cancers	**312**	**6.8**	**8**	**0.7**
12. Other Cancers	**343**	**7.4**	**17**	**1.6**
Total (5 years)	4,584	100.0	1,076	100.0
Average per year	917		215	

[1] *Data are shown for the most recent five year period available and exclude non-melanoma skin cancer (ICD-9 173). Data are grouped according to the International Classification Scheme for Childhood Cancer, World Health Organization.*
[2] *Only major subcategories within each group are included.*
Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 14

Age-Standardized Incidence (1969-1988) and Mortality (1969-1990) Rates for Selected Cancer Sites, Children Aged 0-14, Canada



Note: *Rates are age adjusted to the World Standard Population and exclude non-melanoma skin cancer (ICD-9 173).*

Source: *Canadian Centre for Health Information, Statistics Canada.*

FEMALE BREAST CANCER

Breast cancer is the leading type of cancer in Canadian women (excluding skin cancer), with 16,300 new cases expected to be diagnosed in 1993. This year, it remains the leading cause of cancer death at 5,400 deaths, just ahead of the expected 5,300 lung cancer deaths (Table 1). Breast cancer is thus a very important health problem for women in Canada. It is a disease which often strikes women in the prime of life, at the peak of their work and family responsibilities.

Survival rates for breast cancer are higher than those for most other cancers. The relative five-year survival rate for breast cancer is 74% based on cases diagnosed between 1980-1984 (Table 14).

Breast cancer incidence starts to rise after age 25, although the majority of cases still occurs after age 55 (Figure 15). Rates for breast cancer incidence in women age 35-55 are such that more women than men develop cancer in this age range (Figure 2). Overall, breast cancer is the leading cause of death among women aged 35-55.

Currently one in nine Canadian women can expect to develop breast cancer during her lifetime and one in 23 will die of the disease (Table 12 and Figure 3.2). From the percentages in Table 12, it can be calculated that one in 250 Canadian women aged 30-39 can expect to develop breast cancer over the next 10 years. This ratio rises to one in 71 women aged 40-49, one in 48 women aged 50-59, one in 34 women aged 60-69 and one in 30 women aged 70-79.

Breast cancer incidence rates remained relatively stable during the mid-1970s and early 1980s, but since 1981 incidence rates have increased at an average annual rate of 1.5%. By contrast, mortality rates have increased only slightly, at a rate of 0.5%, since 1981 (Figures 7, 12, 13 and Table 15). The recent increase in incidence rates is restricted to women aged 50 and older (Figure 16), while rates for women under 50 have not changed over the past two decades. By contrast, mortality rates have increased only in women 60 and over, and have declined among women aged 50-59 or younger (Figure 17).

The stable incidence rates for women under age 50 may seem surprising given the commonly held belief that higher rates of breast cancer are occurring in younger women. Data in Table 9 indicate that the number of cases of breast cancer in women under age 45 is expected to increase to 2,300 in 1993 (from 1,950 in 1988),[14] an increase of nearly 20%. This increase, however, is due solely to the movement of the "baby boom" population into the over 40 age group, and not because of any increase in the rate per 100,000 women. These trends have occurred in both Canada and the United States.[4]

Comparison with United States

Until the late 1980s, Canadian trends in breast cancer incidence and mortality rates for breast cancer closely paralleled those of the United States (Figure 18). For example the short-lived increase noted in 1974 occurred in both countries, and may be related to the publicity surrounding the diagnosis of breast cancer among prominent American women. However other factors should not be ruled out.

Canadian incidence rates in 1988 rose to 78 per 100,000, their highest level ever, but have not increased to the levels reported in the United States,[5,6] where age-standardized rates peaked at close to 95 per 100,000 in 1987, followed by two years of declining rates in 1988 and 1989. The dramatic increase in United States rates up to 1987 occurred mainly in tumours diagnosed at an early stage and at a smaller size. This transitory increase probably reflects early detection of prevalent cases of breast cancer from screening mammography, and rates are now expected to return to baseline levels.[5]

International Comparison

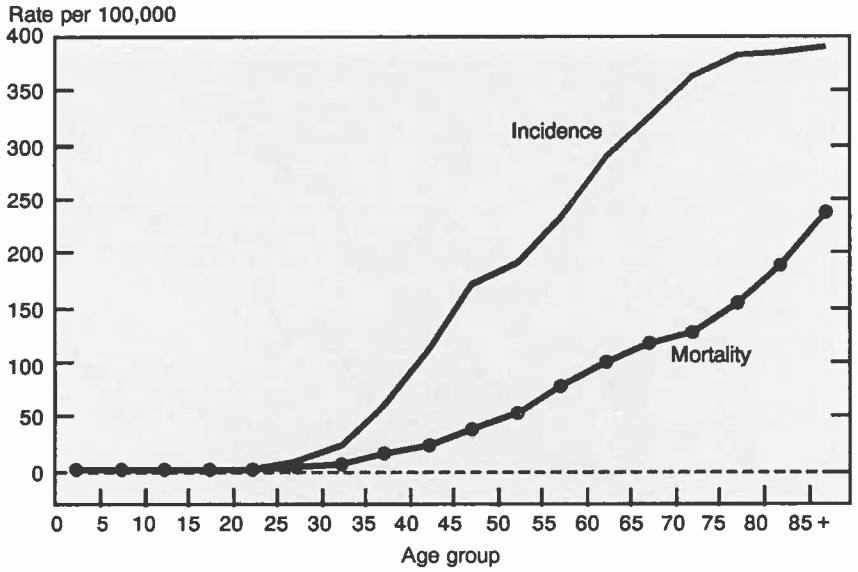
According to the most recently available data from **Cancer Incidence In Five Continents,** rates for breast cancer in Canada are among the highest in the world and are exceeded primarily by those in the United States. Figure 19 graphically shows breast cancer to be very much a disease of western civilization, with rates for Canada being just ahead of those found in Western European countries. Very low rates are reported for most Asian and African populations.

Rates for breast cancer vary within Canada from the high rates reported in British Columbia and Manitoba, to the low rates found in the Territories and Newfoundland. Low rates in the Territories reflect the virtual absence of breast cancer among Inuit women, whereas socio-economic and reproductive factors may contribute to low rates in Newfoundland women.

Cancer mortality rates also vary across Canada as shown in Figure 20 which presents age-standardized mortality rates by census metropolitan areas. Current mortality rates for large cities do not seem to be correlated with incidence rates for the provinces. The reasons are unclear, but one factor may be that current mortality data will include cases first diagnosed 15-20 years earlier.

Figure 15

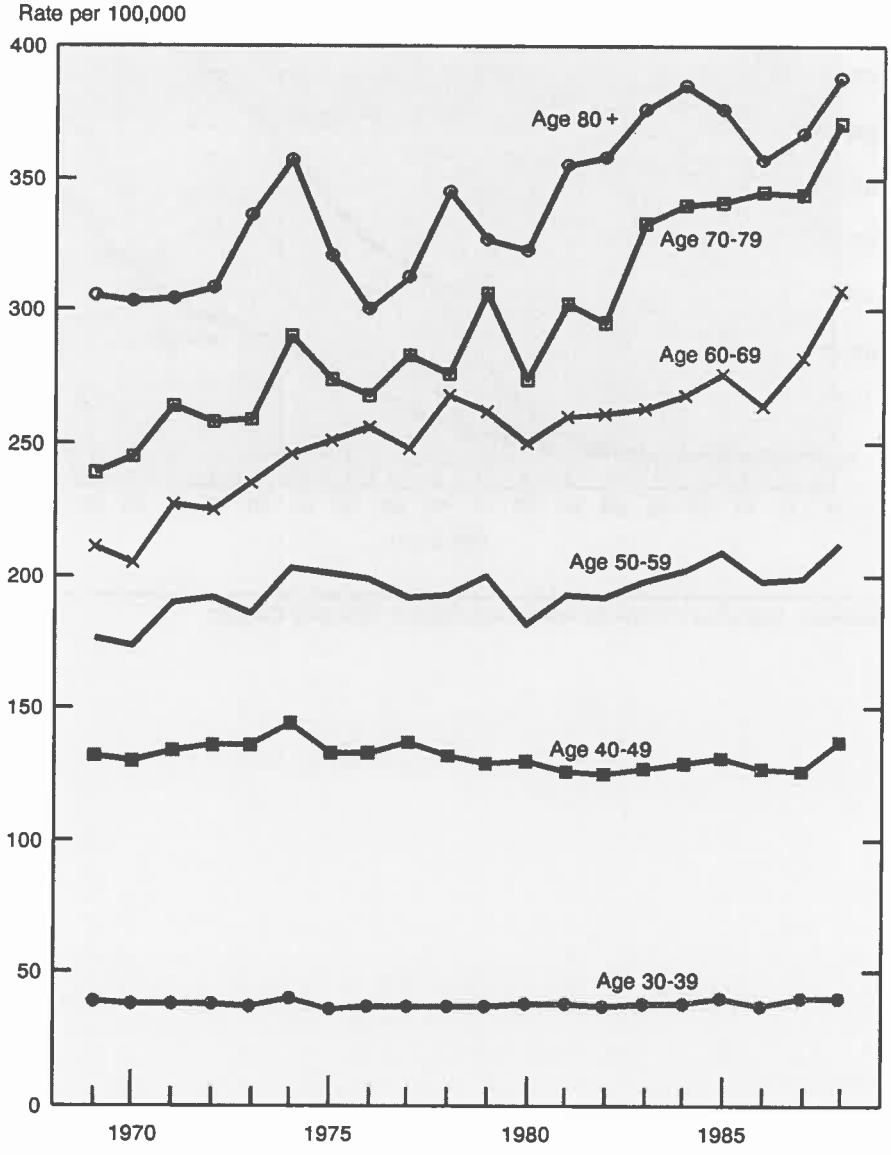
Age-Specific Incidence (1988) and Mortality (1990) Rates for Female Breast Cancer, Canada



***Source**: Canadian Centre for Health Information, Statistics Canada.*

Figure 16

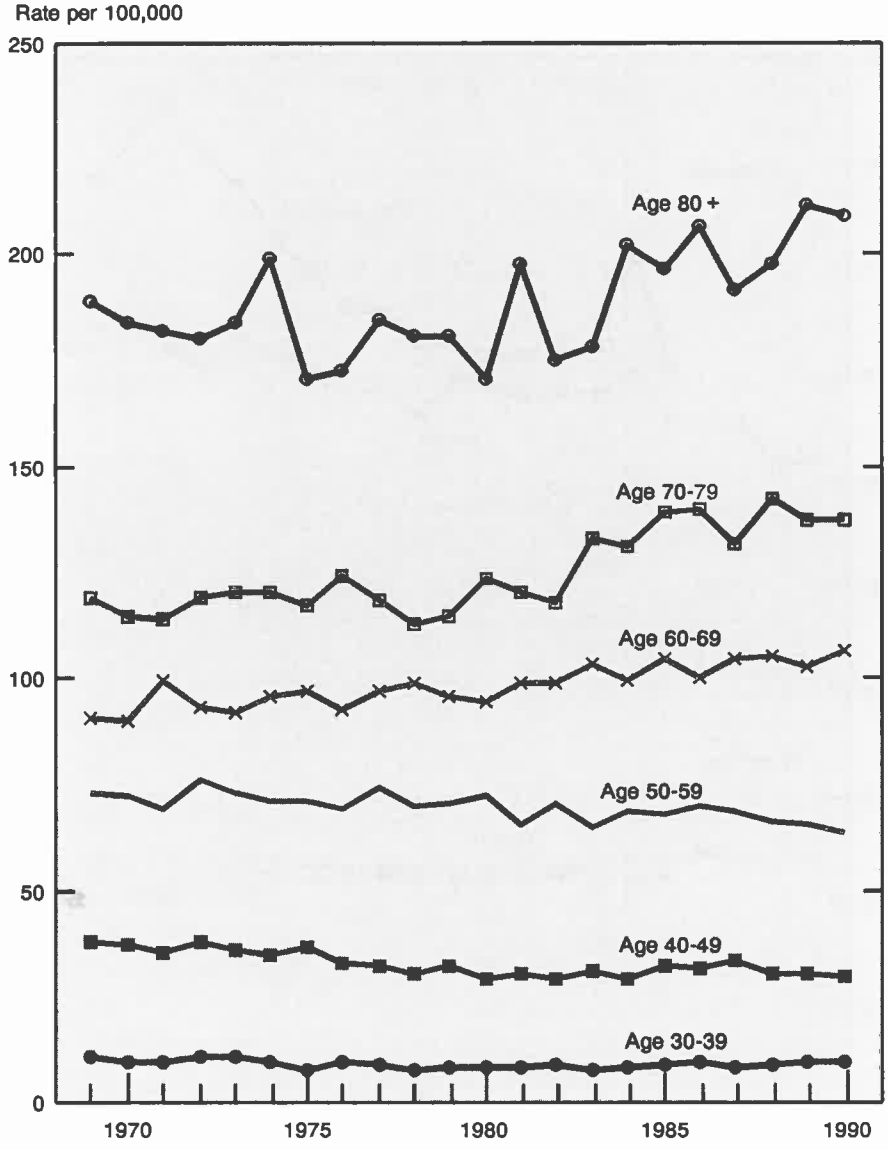
Age-Specific Incidence Rates for Female Breast Cancer, Canada, 1969-1988



Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 17

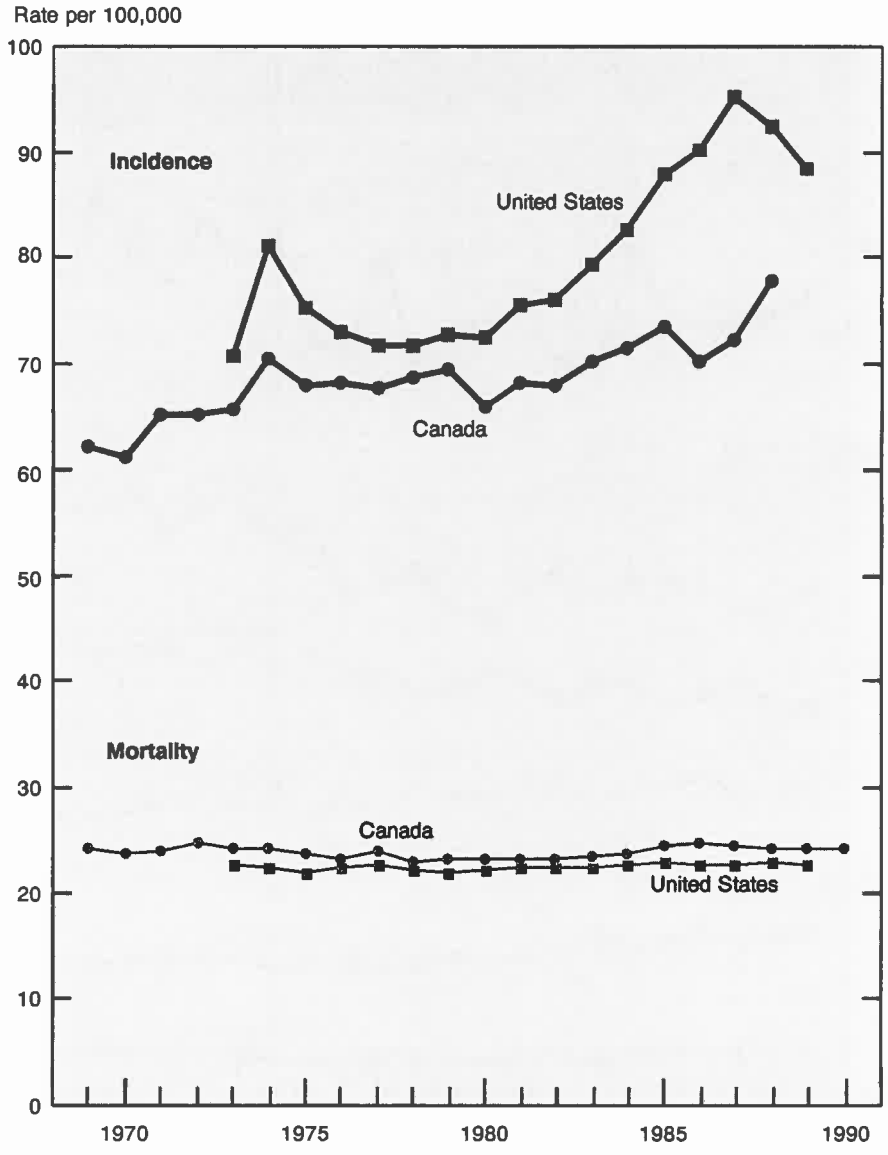
Age-Specific Mortality Rates for Female Breast Cancer, Canada, 1969-1990



Source: *Canadian Centre for Health Information, Statistics Canada.*

Figure 18

Age-Standardized Incidence and Mortality Rates for Female Breast Cancer, Canada and the United States, 1969-1990



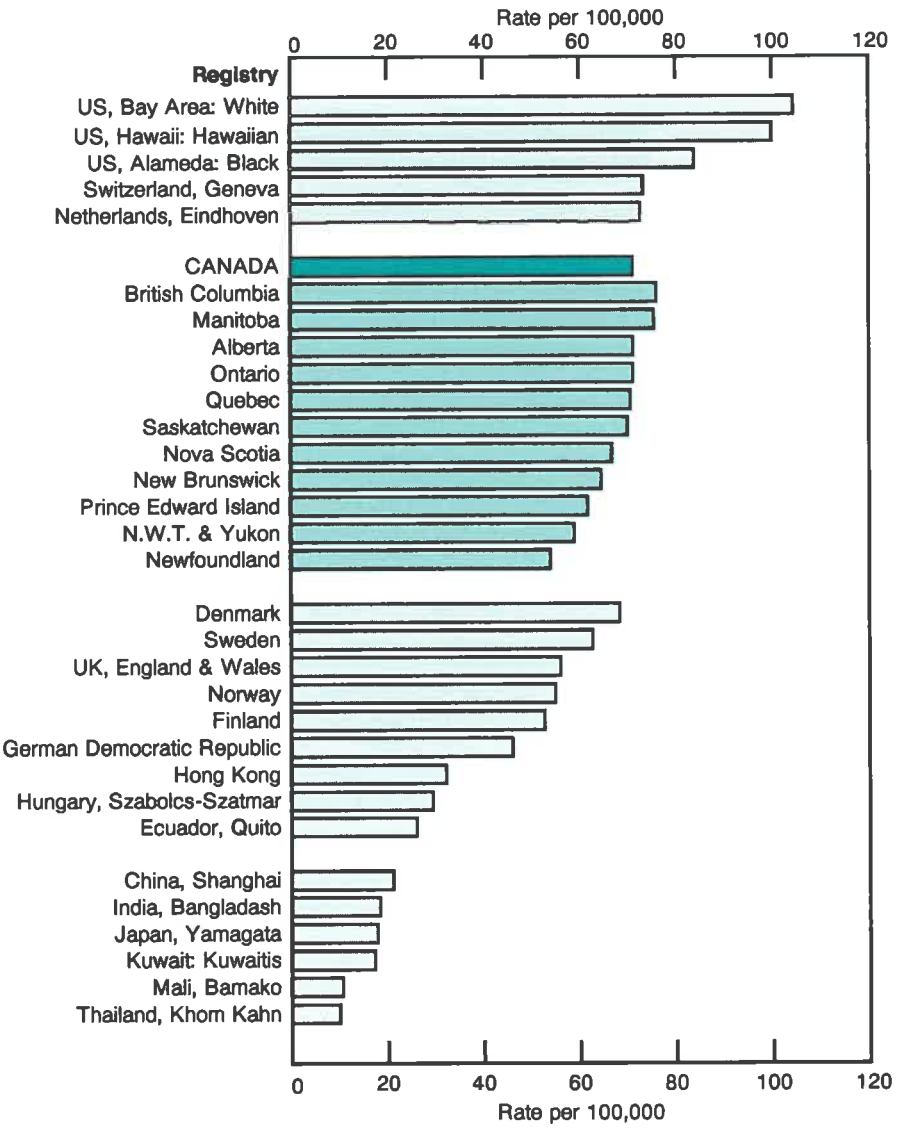
Note: *Rates are age-standardized to the World Standard Population.*

Source (Canada): *Canadian Centre for Health Information, Statistics Canada.*

Source (U.S.): *Data are from the SEER program which covers about 10% of the population.*

Figure 19

Age-Standardized Incidence Rates for Female Breast Cancer, Canada and Selected Cancer Registries, 1983-1987

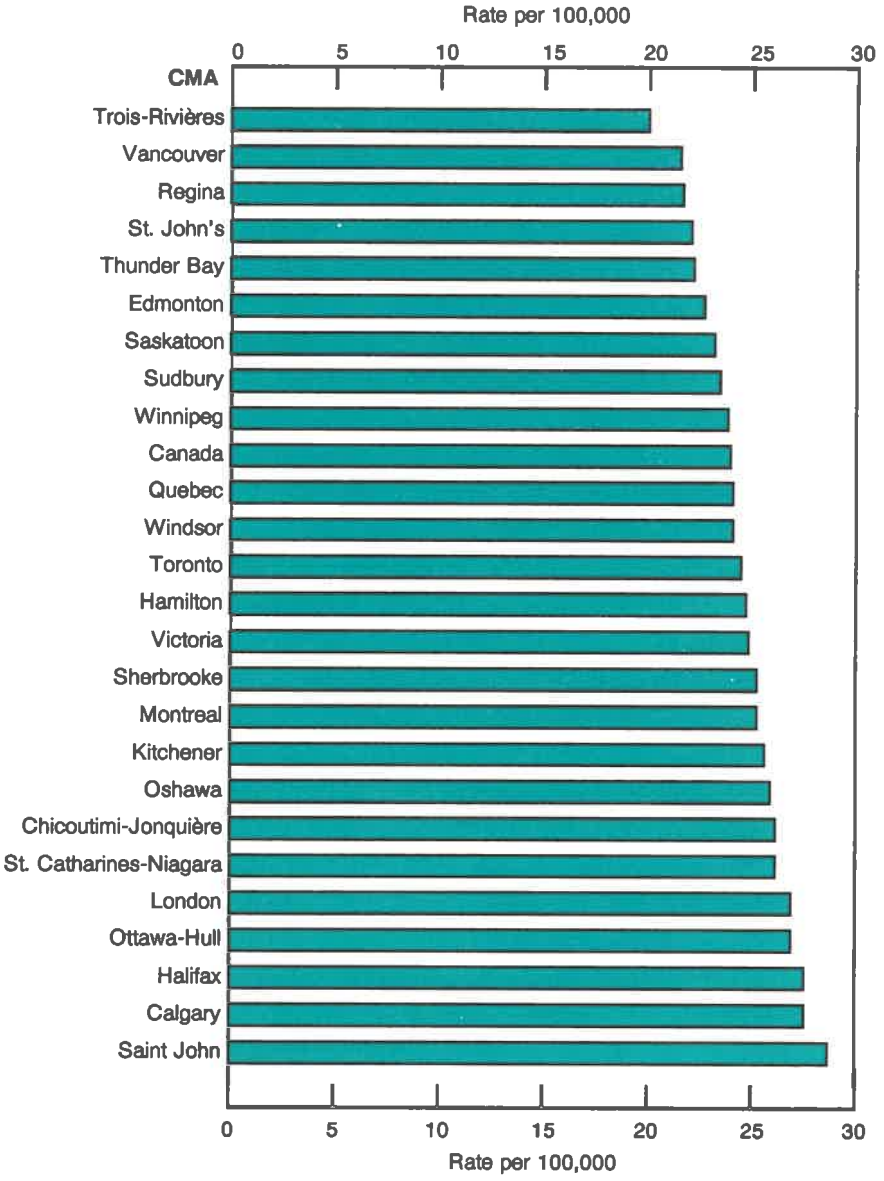


Note: *Rates are age-standardized to the World Standard Population. Includes registries with the five highest and lowest rates, plus six selected registries with intermediate rates.*

Source: *Cancer Incidence in Five Continents, Vol. VI, International Agency for Research in Cancer.*

Figure 20

Age-Standardized Mortality Rates for Female Breast Cancer by Census Metropolitan Area (CMA), 1986-1990



Note: *Rates are age-standardized to the World Standard Population.*

Source: *Bureau of Chronic Disease Epidemiology, Health and Welfare Canada.*

Breast Screening

Of three strategies for cancer control - prevention, screening, and treatment - early detection through screening currently offers the best chance of reducing overall mortality from breast cancer. For the majority of women who develop breast cancer, there is no clear risk factor except advancing age or residence in a country of high incidence. Other identified risk factors, many of which relate to fertility patterns - such as age at first birth, number of children, age at menarche, age at menopause, and artificial menopause - cannot be easily altered, and even if altered might not result in significant reduction of risk. And while there is evidence that treatments such as adjuvant chemotherapy and tamoxifen will lead to increased disease-free as well as overall survival, a longer follow-up is needed to assess the full impact on mortality reduction.

Several studies have shown that early detection of breast cancer through population-based screening of women aged 50-69 every one to three years may reduce breast cancer mortality in screened women by up to 40%.[17] Since the late 1980s, Health and Welfare Canada has sponsored regular meetings with provincial and territorial representatives to facilitate development of breast screening programs. Activities regarding breast screening programs currently operating in Canada are summarized in Table 17.

To date, programs have been established in five provinces starting with a pilot project in British Columbia in 1988, followed by the initiation of programs in Ontario, Alberta and Saskatchewan in 1990, and most recently, Nova Scotia in 1991. Organized screening is also offered in the Yukon and Northwest Territories. All programs offer screening mammography and information on breast self-examination, while Ontario additionally provides a clinical breast examination by a nurse. All programs encourage attendance from women aged 50-69. Programs aim to reach at least 70% of the target group, with a screening frequency of every two years (one province is every year). Most programs are still under active development to add additional centres and mobile units, and are currently reaching, on average, from 10-50% of their target populations. In all but one province, almost half the women presenting for screening are in the 50-59 age group.

The proportion of women referred for follow-up of a suspicious mammogram ranges from 4.5 to 10.5%. In any screening program, rates of referral are highest with the first screening round. The higher referral rates for Ontario are also related to the inclusion of the clinical breast examination as a screening method. Higher rates of cancer detection can be expected in earlier years due to detection of prevalent cancers. Cancer detection rates tend to be 2-3 times higher among women who have not had a mammogram in the past two years, and increase substantially with age, from about 1 to 2 per 1,000 in women under age 50 up to 10 or more 1,000 in women aged 70 and over.

Breast cancer remains the leading cancer among Canadian women. Continued vigilance on all fronts will be needed to control this disease. Through leadership provided by Health and Welfare Canada, a cooperative effort within the cancer control community is underway to address issues related to breast cancer. Major stakeholders at the national and provincial levels are collaborating on the administration of a research fund - The Canadian Breast Cancer Research Fund, the organization of a National Forum on breast cancer and the development of regionally based information services to address all aspects of breast cancer.

It is hoped that these nation-wide initiatives will not only accelerate progress in achieving control of breast cancer but will also serve as a model for future efforts to achieve common cancer control goals for other forms of cancer.

Table 17
Summary of Breast Screening Activities in Canada, 1992

1992	British Columbia	Alberta	Saskatchewan	Ontario	Nova Scotia
Start Date	July 1988	Oct. 1990	April 1990	June 1990	June 1991
Target Population – 1992					
Age Group	40 +	50-69[1]	50-69[1]	50-69[1]	50-69[2]
Number	670,000	183,000	85,560	934,000	77,000
% targeted for attendance	70%	80%	70%	70%	70%
Screening Frequency	annual	biennual	biennual	biennual	biennual
Annual Target Population	470,000	73,200	33,840	467,000	26,950
Annual Capacity – 1992	160,000	21,620	21,440	51,000	10,000
Visits – 1992	89,400	15,441	15,768	40,400	4,373
Age Distribution of Participants	%	%	%	%[3]	%
< 50 years	35	4	–	–	21
50-59 "	28	45	43	50	45
60-69 "	24	46	47	39	33
70 + "	12	6	10	11	1
% referred as abnormal	6-7%	4.5%	10.5%	14.9%[4]	7.0%
Cancer Detection Rate by Age Group (%)	per 1,000 women[5]	per 1,000 women	per 1,000 women	per 1,000 women[7]	per 1,000 women
<50	1.7	1.9[6]	–	–	5.5[6]
50-59	2.8	3.6	3.1	7.2	5.6
60-69	5.4	9.3	8.4	13.0	10.4
70 +	8.6	14.1[6]	6.5[6]	12.1	22.8[6]
Cancer Detection Rate by Interval since last mammography	per 1,000 women	per 1,000 women	per 1,000 women	per 1,000 women	per 1,000 women
In previous 2 yrs?	1.5	3.8	..	8	..
not in previous 2 yrs	5.0	7.2	..	12	..

1 *Accept women above age 69 upon request*
2 *Accept 40-49 and 70-72 years upon request*
3 *Data apply to women seen in 1990 and 1991*
4 *Includes women referred for abnormalities detected by mammography (7.7%), from clinical breast cancer (5%), and both methods (2%)*
5 *12 month period ending September 1992*
6 *Rates highly variable as fewer than 2,000 women were screened in this age group*
7 *From beginning of program to December 1992*
.. *Figures not available, or not applicable*

GLOSSARY

Age: The age of the patient (in completed years) at the time of diagnosis or death.

ICD-9: The Ninth Revision of the International Classification of Diseases.

Incidence: The number of new cases of a given type of cancer diagnosed during the year.

The basic unit of reporting is a new case of cancer rather than an individual patient.

Mortality: The number of deaths attributed to the particular type of cancer that occurred during the year.

Included are deaths of patients diagnosed in earlier years, persons newly diagnosed during the year as well as patients for whom a diagnosis of cancer is made only after death.

Province: For cancer incidence and mortality data, this is the province of the patient's permanent residence at time of diagnosis or death, which may or may not be identical to the province in which the new case of cancer or the cancer death was registered.

Incidence and Mortality Rates:

Crude rate:
The number of new cases of cancer or cancer deaths during the year expressed as a rate per 100,000 persons in the population.

Age-specific rate:
The number of new cases of cancer or cancer deaths during the year expressed as a rate per 100,000 persons in a given age group.

Age-standardized rate:
The number of new cases of cancer or cancer deaths per 100,000 that would have been observed in the World Standard Population if the actual age-specific rates observed in the province had prevailed in the World Standard Population.

Relative survival rate:

The percentage of cases of a given cancer who survive a specified number of years following diagnosis, calculated by adjusting the observed survival rate for normal life expectancy in the population.

Site Definitions: Cancer data presented in this monograph are classified according to the following site groupings, except where otherwise noted.

Site	ICD-9	Site	ICD-9
Oral	140-149	Prostate	185
Stomach	151	Testis	186
Colorectal	153-154	Bladder	188
Pancreas	157	Kidney	189
Larynx	161	Brain	191-192
Lung	162	Lymphoma	200-203
Melanoma	172	Hodgkin's Disease	201
Female Breast	174	Multiple Myeloma	203
Cervix	180	Non-Hodgkin's Lymphoma	200,202
Body of Uterus	179,182	Leukemia	204-208
Ovary	183	All Cancers minus Lung	140-208 minus 173, 162
All Cancers	**140-208 minus 173**	All Other Cancers	All sites between 150-199 not listed above

World Standard Population: The population used to standardize rates has the following age distribution.

Age Group	Population	Age Group	Population	Age Group	Population
0-4	12,000	30-34	6,000	60-64	4,000
5-9	10,000	35-39	6,000	65-69	3,000
10-14	9,000	40-44	6,000	70-74	2,000
15-19	9,000	45-49	6,000	75-79	1,000
20-24	8,000	50-54	5,000	80-84	500
25-29	8,000	55-59	4,000	85 +	500
				TOTAL	**100,000**

METHODOLOGICAL APPENDIX

Data Sources and Processing

The actual cancer incidence (1969-1988) and mortality (1969-1990) data used in this monograph were obtained from two sources maintained by the Health Status Section, Statistics Canada: mortality data files (1969-1990), and the National Cancer Incidence Reporting System (NCIRS) historical file (1969-1991).[14,15] Actual 1991 incidence data were not available at the Canadian level. Data for Newfoundland, Nova Scotia and Alberta were available up to 1990; for Québec and Ontario, up to 1989; and for Prince Edward Island and New Brunswick, up to 1988.[2,14,15]

Using the Ninth Revision of the International Classification of Diseases (ICD-9),[18] records from each province and sex were extracted and then classified into selected cancer sites defined in the Glossary. Canada totals for major sites were then determined as the sum of the ten provinces. For Northwest Territories and Yukon, the 1984-1988 records were also extracted from these data bases to calculate a five year average of cancer incidence and mortality. These averages were used as 1993 estimates for the two territories.

Population figures for Canada and the provinces were taken from censal, intercensal, and post-censal estimates for 1969-1992 and from the revised Series 3 population projections for 1993. The revised Series 3 projections were chosen over the published Series 3 figures,[12] since they are based on more realistic fertility and immigration assumptions which closely reflect actual observations in the 1989-1991 period.

Incidence and mortality estimates for 1993 were obtained from models which were fitted to a subset of the data described above. Specifically, data from 1981 to 1988 (and up to 1991 or the year the data was available from the province) were used to compute incidence estimates, and data from 1981 to 1990 for mortality estimates. Incidence data from 1983 onwards were used for Nova Scotia and from 1984 onwards for Quebec because data were more accurate for these years. In the 1992 and 1993 monographs, simplier models were employed using only the more recent, better quality data with good results.

Actual crude incidence and mortality rates for each province, sex, site and year were computed by dividing the number of cases by the corresponding provincial population figures. These rates were computed for the "under 45" and the "45 and over" age groups separately. For childhood sites (brain, leukemia, cancers other than brain and leukemia, and all cancers), crude rates were computed for both sexes combined for the 0-14 years age group. This year features a study of selected sites (all cancers, breast, colorectal, lung and prostate) by six age groups. For these selected sites, crude rates were computed for age groups 0-24, 25-44, 45-54, 55-64, 65-74, and 75+. Age-standardized incidence and mortality rates for each site were calculated using the World Standard Population.[8,*]

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* *See also Glossary.*

Mortality Estimates (Deaths) for 1993 (Tables 1, 2, 6 & Figures 1.1-1.2)

These were estimated for each site and sex by fitting maximum likelihood models to the provincial and Canadian yearly values. The yearly counts were assumed to follow independent Poisson distributions, with mean values equal to the product of yearly population sizes and yearly death rates. Then, crude mortality rates were modelled separately for the "under 45" and the "45 and over" age groups to obtain corresponding predicted crude rates. Those projected rates were then applied to the 1993 population projection figures to obtain the 1993 projected counts. For all sites, a linear model was used for death rates, with year as the only independent variable. Mortality counts by site for Canada are directly obtained as all provincial estimates are adjusted to sum to the Canadian estimates.

Incidence Estimates (New Cases) for 1993 (Tables 1, 2, 4, & Figures 1.1-1.2)

These were estimated for each site and sex in a similar manner to that used for mortality. For all provinces, a linear model for crude incidence rates, calculated separately for "under 45" and the "45 and over" age groups, was used for all sites, with year as the only independent variable. For estimates of selected sites by age groups, calculations were done separately for each of the six age groups. Since longer data series for some provinces were available, estimates for Canada were computed as the sum of the estimates for each province. For both incidence and mortality, the Canadian estimates for selected sites by six age groups were adjusted to sum to the total estimate over all ages.

Age-Standardized Incidence Rates (ASIRs) and Mortality Rates (ASMRs) for 1993 (Tables 5, 7 & Figures 8-14)

These were generally estimated using weighted least squares regression with some exceptions as noted below. Weights were taken as the inverse of the estimated variances of the actual age-standardized rates. Variances were calculated under the assumption that the age-specific counts used in the computation of the age-standardized rates followed independent Poisson distributions. Regressions were performed for Canada and each province for each site and sex, using year as the independent variable. For mortality estimates, regressions were performed on data from 1981 to 1990.

For incidence estimates, regressions used data from 1981 onward with the following exceptions. First, for Nova Scotia and Quebec, data from 1983 and 1984 onward respectively were used. Second, for lymphoma, data for 1989 and 1990 were excluded from Alberta calculations and for 1990 and 1991 from BC calculations. Third, for PEI, data from 1969 onward were used for colorectal, leukemia, lymphoma, oral, pancreas, melanoma, and bladder for both sexes; for lung, breast, and all cancers for females; and for prostate for males. Fourth, due to large fluctuations in the source data, a five-year average was used in Newfoundland for pancreas (1986-1990) and in Prince Edward Island for brain, stomach, kidney, cervix, and ovary (1984-1988).

Accuracy and Precision

The standard error and coefficient of variation were computed to measure the accuracy of each estimate. These values are available upon request from the Health Status Section of the Canadian Centre for Health Information, Statistics Canada. Note that any estimates are subject to error and the degree of precision depends on the adequacy of the model as well as the number of observed cases and population size for each site, sex, province combination.

Due to changes and improvements in the cancer incidence data provided by the provinces, as well as the changes in the methodology for producing the estimates of cancer incidence and deaths, estimates in the 1993 report may not be directly comparable to those published in previous years. More detailed information on these methods can be found in technical papers available from the Health Status Section of the Canadian Centre for Health Information, Statistics Canada.[1,7]

Average Annual Percent Change (AAPC) in Cancer Incidence and Mortality (Table 15, Figure 7)

The AAPC values were calculated for each site by fitting a model which assumes a constant rate of change in the ASIRs or ASMRs, that is, a linear model for the logarithm of rates. The resulting slope of that model is then transformed back to represent a percentage increase or decrease.

Lifetime Probability of Developing Cancer (Table 12, Figure 3)

Probabilities were calculated based on the age and sex-specific cancer incidence rates for Canada in 1987, using methodology based on Zdeb[19] and Seidman.[13] As noted by Seidman the life table procedures used assume that the rates of cancer incidence for various age groups in a given chronological period will prevail throughout the future life-time of a person as he advances in age. Since these may not be the rates which will prevail at the time a given age is attained, the probabilities should be regarded only as approximations of the actual ones.

Lifetime Probability of Dying from Cancer (Table 12, Figure 3)

This probability represents the proportion of persons dying from cancer in a cohort subjected to the mortality conditions prevailing in the population at large.[11] This indicator, based on 1989 data, was calculated by determining the proportion of deaths attributed to specific types of cancer for each sex and at each age, then multiplying this proportion by the corresponding number of deaths in the life table, summing the life table deaths over all sex and age groups, and finally dividing by the number of survivors at birth to obtain the probability of dying from each cause.

Potential Years of Life Lost Due to Cancer (Table 13, Figure 4)

This indicator, based on 1989 data, was calculated by obtaining deaths for ages 1, 1-4, 5-9, ..., 90 + and life expectancy at birth for ages 1, 5, 10, ..., 80, 85, 90. The PYLL is the equivalent to the total number of years of life lost, obtained by multiplying for each age group the number of actual deaths by the life expectancy of survivors.[11]

Relative Cancer Survival (Table 14, Figures 5 & 6)

Survival data provided by Cancer Registries in British Columbia Cancer, Saskatchewan, and Ontario for new cases diagnosed between 1970-1974 and 1980-1984 were analysed to determine relative survival rates. Relative survival rates for each year up to 10 years after diagnosis, were calculated by adjusting the observed survival rate according to the normal life expectancy in persons from the general population in the same sex and age-group category, and time period of observation.[3] Tests for statistically significant differences between groups were done using a Z-test.[10]

Childhood Cancer (Table 16, Figure 14)

New cases and deaths for childhood cancer in Table 16 are grouped according to a classification scheme which uses both site and histology of cancer, as developed for the World Health Organization.[9] Trends for childhood cancers are based on the site of the cancer for all cancer, leukemia and brain cancer. All other types include ICD9 140-203, except 173, 191 and 192.

Breast Cancer (Table 17, Figures 15-20)

Data used to calculate incidence and mortality rates in Figures 15-17 and 19 were taken from the National Cancer Incidence Reporting System and mortality data files maintained at Statistics Canada. Data in Figure 18 for incidence and mortality of breast cancer in the United States were provided by the SEER program, which covers about 10% of the population for cancer incidence.[6] Mortality data are for the entire U.S. population.

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FOR FURTHER INFORMATION

Detailed Standard Tables are available upon request from Statistics Canada Reference Centres or the Canadian Centre for Health Information, Statistics Canada. Information on cancer indicence and mortality can be obtained annually from Health Reports: Cancer in Canada, Catalogue 82-003S8. Also, hospital statistics on cancer can be obtained from Hospital Morbidity Standard Table 41017. Analytical articles appear regularly in Health Reports, Statistics Canada, Catalogue 82-003, Quarterly.

Please contact the **Statistics Canada Reference Centre** nearest you for further information.

St. John's	(1-800-565-7192)	Winnipeg	(204) 983-4020
Halifax	(902) 426-5331	Regina	(306) 780-5405
Montreal	(514) 283-5725	Edmonton	(403) 495-3027
Ottawa	(613) 951-8116	Calgary	(403) 292-6717
Toronto	(416) 973-6586	Vancouver	(604) 666-3691

Canadian Centre for Health Information
Statistics Canada, Ottawa **(613) 951-1746**

Toll-free is provided in all provinces and territories, **for users who reside outside the local dialing area** of any of the regional reference centres:

Newfoundland, Labrador, Nova Scotia, New Brunswick and Prince Edward Island	1-800-565-7192
Quebec	1-800-361-2831
Ontario	1-800-263-1136
Manitoba, Saskatchewan, Alberta and Northwest Territories	1-800-563-7828
British Columbia and Yukon	1-800-663-1551
Telecommunications Device for the Hearing Impaired	1-800-363-7629

Cancer incidence data are supplied to Statistics Canada by provincial/territorial cancer registries who may be contacted for up to date detailed data for their areas. (See next page)

Information on on-going risk assessment in the epidemilogy of cancer is available from Director, Bureau of Chronic Disease Epidemiology, Laboratory Centre for Disease Control, Health and Welfare Canada, Tunney's Pasture, Ottawa, Ontario, K1A 0L2.
Tel. (613) 957-0327; FAX (613) 941-2057.

PROVINCIAL/TERRITORIAL CANCER REGISTRIES

Newfoundland
Director of Information Services
Newfoundland
Cancer Treatment
and Research Foundation,
25 Kenmount Road,
St. John's, Newfoundland A1B 1W1
Tel. (709) 753-2599
Fax. (709) 753-0927

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Director
Oncology Clinic and P.E.I. Cancer Registry
Queen Elizabeth Hospital
Riverside Drive
Charlottetown, Prince Edward Island C1A 8T5
Tel. (902) 566-6027 (Registry) 566-6167
Fax. (902) 566-6384

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Executive Director
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Cancer Treatment and Research Foundation
of Nova Scotia,
5820 University Avenue,
Halifax, Nova Scotia
B3H 1V7
Tel. (902) 428-4255
Fax. (902) 428-4277

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Director, Health Promotion and Disease
Prevention
Dept. of Health & Community Services,
P.O. Box 5001,
Fredericton, New Brunswick E3B 5G8
Tel. (506) 453-3092
Fax. (506) 453-2726

Quebec
Chef du service des études
opérationelles,
Ministère de la santé et des services sociaux,
1075, chemin Ste-Foy,
3ième étage,
Québec, (Québec) G1S 2M1
Tel. (418) 643-9936
Fax. (418) 643-1956

Ontario
Director, Ontario Cancer Registry,
Epidemiology and Statistics,
The Ontario Cancer Treatment and Research
Foundation,
620 University Avenue,
Toronto, Ontario M5G 2L7
Tel. (416) 971-9800
Fax. (416) 971-6888

Manitoba
Director, Oncology Records and
Registry,
Manitoba Cancer Treatment and
Research Foundation,
100 Olivia Street,
Winnipeg, Manitoba R3E 0V9
Tel. (204) 787-4187
Fax. (204) 783-6875

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Director of Data Services,
Saskatchewan Cancer Foundation,
2631-28th Avenue,
Regina, Saskatchewan
S4S 6X3
Tel. (306) 585-1831
Fax. (306) 584-2733

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Acting Director, Cancer Registry
Cross Cancer Institute
11560 University Avenue
Edmonton, Alberta T6G 1Z2
Tel. (403) 482-8518
Fax. (403) 433-0214

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Director of Data Services
British Columbia Cancer Agency,
600 West Tenth Avenue,
Vancouver, British Columbia
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Fax. (604) 872-4596

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Health Researcher, Medical
Directorate,
Department of Health,
Government of the Northwest
Territories,
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Yellowknife, N.W.T. X1A 2L9
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Assistant Deputy Minister,
Health Services,
Health and Human Resources,
P.O. Box 2703,
Whitehorse, Yukon Y1A 2C6
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Fax. (403) 667-3096

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Canadian Cancer Society,
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Freshwater & Crosbie Road,
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A1B 3R9
Tel. (709) 753-6320 Fax. (709) 753-9314

Prince Edward Island Division,
Canadian Cancer Society,
P.O. Box 115,
131 Water St., 2nd floor,
Charlottetown, Prince Edward Island
C1A 1A8
Tel. (902) 566-4007

Nova Scotia Division,
Canadian Cancer Society,
5826 South Street, Suite 1,
Halifax, Nova Scotia
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New Brunswick Division,
Canadian Cancer Society,
63 Union Street,
P.O. Box 2089,
Saint John, New Brunswick
E2L 3T5
Tel. (506) 634-6272 Fax. (506) 634-3808

Quebec Division,
Maison de la société canadienne du cancer,
5151 Boul. l'Assomption,
Montréal (Québec)
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Tel. (514) 255-5151 Fax. (514) 255-2808

National Office,
Canadian Cancer Society,
10 Alcorn Avenue, Suite 200,
Toronto, Ontario
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Tel. (416) 961-7223 Fax. (416) 961-4189

Manitoba Division,
Canadian Cancer Society,
193 Sherbrook Street,
Winnipeg, Manitoba
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Fax. (204) 786-6286

Saskatchewan Division,
Canadian Cancer Society,
201-2445 13th Avenue,
Regina, Saskatchewan
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Tel. (306) 757-4260
Fax. (306) 569-2133

Alberta & N.W.T. Division,
Canadian Cancer Society,
2424-4th Street S.W., 2nd floor,
Calgary, Alberta
T2S 2T4
Tel. (403) 228-4487
Fax. (403) 228-4506

British Columbia & Yukon Division,
Canadian Cancer Society,
565 West Tenth Avenue,
Vancouver, British Columbia
V5Z 4J4
Tel. (604) 872-4400
Fax. (604) 879-4533

Ontario Division,
Canadian Cancer Society,
1639 Yonge Street,
Toronto, Ontario
M4T 2W6
Tel. (416) 488-5400
Fax. (416) 488-2872

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