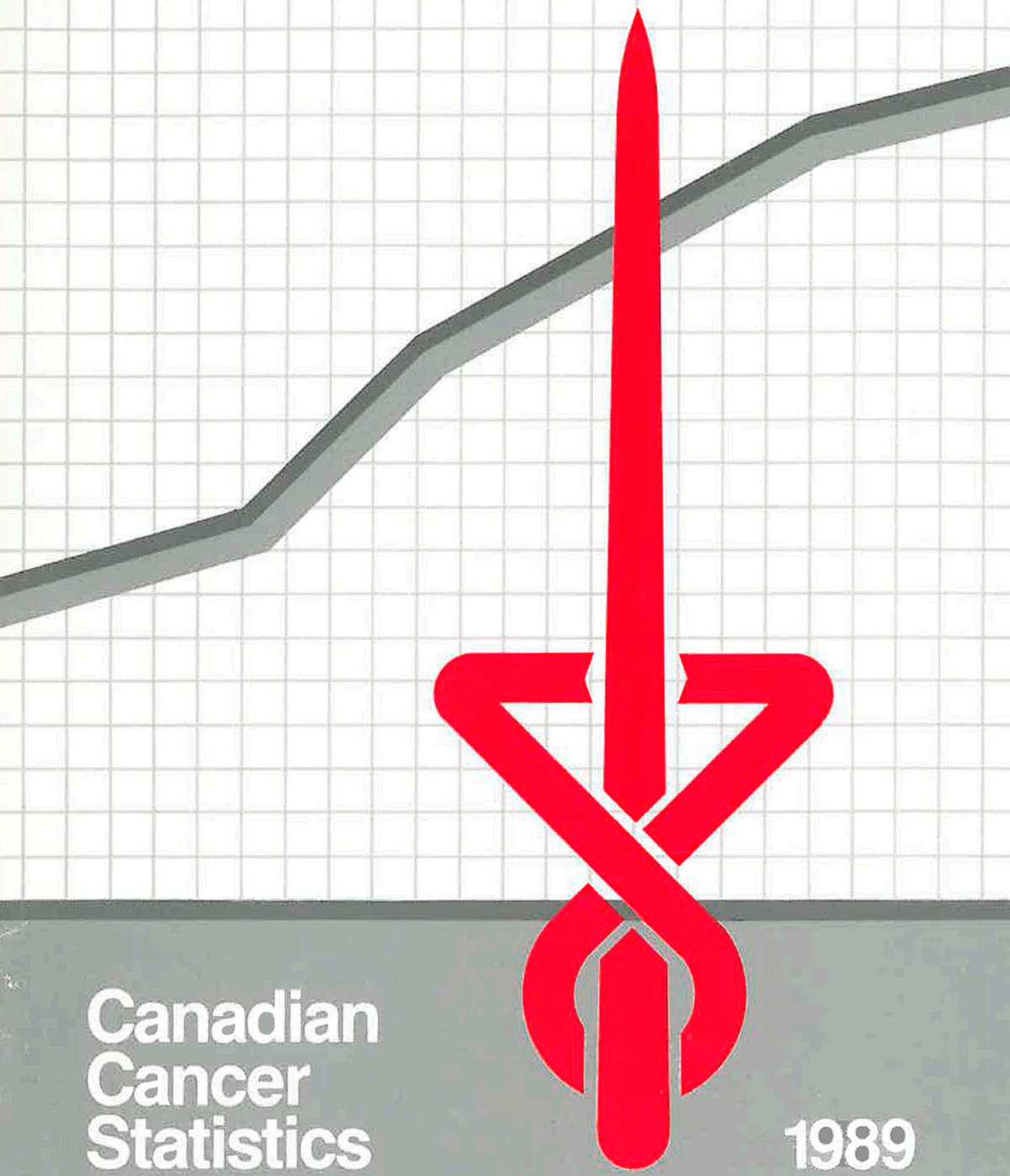
- Incidence and Mortality
- Survival rates
- Prevalence
- Probability of developing cancer



Canadian Cancer Statistics

1989

Canadian Cancer Statistics 1989

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- provincial and territorial cancer registries which supply the cancer incidence and survival data used to produce the statistics in this report;
- Dr. Georgia Roberts of Statistics Canada for her work in developing the methodology used to produce the estimates of incidence and mortality,
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- Dr. Gerry Hill for his able chairmanship of the committee and for authoring the commentary; and
- last but not least, Leslie Gaudette of Statistics Canada for managing the preparation of the manuscript and providing a secretariat to the Committee.

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INTRODUCTION

This is the third of the annual series of monographs on Canadian Cancer Statistics, produced jointly by the National Cancer Institute of Canada, Statistics Canada and Health and Welfare Canada. Previous issues have been well received, and the steering committee has attempted to respond to several suggestions for improving the publication. Further comments and suggestions would be welcomed.

The overall objective of the series is to provide health professionals and others having an interest in cancer with a current overview of the incidence of, and mortality from, the commoner types of cancer. Trends in the reported rates of new cases of cancer and cancer deaths are shown from 1970 up to the latest year for which complete statistics are available (Figures 2-7). Based on the trends for the corresponding incidence and mortality rates, estimates of the rates for 1989 have been made, and these have been applied to the current population estimates to produce estimated numbers and rates of new cases and deaths (Figure 1, Tables 1-5). The statistical methods used to make these short term projections are described in the Appendix. The techniques have been refined following consultation with statisticians in Canada and abroad.

The term "estimates" must be emphasized. Readers are cautioned that due to fluctuations in the historical data series on which these estimates are based, the actual figures may vary from these estimates. This is particularly true for cancer incidence figures, which are subject to variations in completeness of cancer registration both among the provinces and over time. It is in the nature of published statistics that they are never current, due to the inevitable lag between the recording of events and their central collection and processing.

The content of the monograph is much the same as last year, apart from up-dating and minor changes in format. The cancer 5-year survival rates for selected sites published previously have been replaced by relative survival rates at 1, 3 and 5 years following diagnosis (Figures 9.1, 9.2). The most recent actual data available on numbers of hospital separations and average days stay by detailed diagnosis codes (Table 8) now supplements similar tables included in previous editions on new cases of cancer (Table 6) and cancer deaths (Table 7). Graphs of age-specific incidence and mortality rates have been added (Figure 10). The statistics on person years of life lost due to cancer have been supplemented by estimates of the lifetime probability of dying from cancer (Table 12). Estimates of the prevalence of cancer (or the number of Canadians currently alive who have had cancer) are published for Canada for the first time in this report (Table 14). International incidence, as well as mortality, rates have been included in Figures 15.1 and 15.2.

CURRENT INCIDENCE AND MORTALITY

It is estimated that over a hundred thousand new cases of cancer will be diagnosed in 1989, and just over half that number of patients will die from the disease. These are underestimates since cancers of the skin, other than melanoma, are excluded from the estimates for technical reasons. Since the skin is the organ most frequently affected by cancer among Canadians, the number of new cases including skin cancer would be much larger, probably just over 140,000. However the effect on cancer mortality estimates would be less marked since almost all patients with non-melanoma skin cancer are cured.

About half the new cases and deaths are accounted for by the three most frequent sites. In males, these are lung, prostate and colorectal, and in females breast, lung and colorectal cancer.

The ratio of deaths to new cases is a rough measure of how lethal the tumour is. Among the cancer sites listed, four (melanoma, cervix, uterus and bladder) have a deaths/cases ratio below 33 per cent, and four (pancreas, lung, stomach and brain) have a ratio of 67 per cent or over. For all cancers combined the ratio is 53 per cent. A high ratio indicates that treatment is ineffective and the only hope of controlling the disease is by preventing it. Looking at sites with a high ratio of deaths to cases, the majority of lung cancers could be avoided if tobacco smoking were eliminated, and this might also reduce the incidence of pancreatic cancer. Unfortunately we do not yet know enough about cancers of the stomach and the brain to be able to prevent them. And although the incidence of cancer of the stomach is falling, we do not know why.

Tables 2 and 3 show the estimated numbers and rates of cancer incidence for major sites of cancer by sex and province while estimated deaths and rates are shown in Tables 4 and 5. Figures for the two territories are not presented in these tables, however it is estimated that in 1989 about 60 new cases of cancer will be diagnosed in residents of the Northwest Territories and a further 40 new cases in the Yukon. To compare cancer risks, allowance must be made for differences in the size and age structure of the population, and rates so adjusted are also given in these tables. Caution is necessary when these figures are used to make interprovincial risk comparisons. The provincial cancer registries are working to standardize their approach but inevitably some differences persist. The death registration system is more uniformly organized but the diagnostic information on the death certificate is less than perfect, and differences in mortality may reflect variation in case-fatality rather than incidence.

Nevertheless there is some consistency in the patterns of incidence and mortality. In both sexes the overall risk of cancer tends to be higher in central Canada and decline towards each coast. The high incidence and mortality rates among Quebec males are due to increased risks of cancer of the lung and other smoking-related cancers. The high incidence rates among Manitoba females are due to above average registration of new cases of cancer of the breast and uterus; however similar excesses are not seen in mortality statistics.

Readers requiring more detailed data on new cases and deaths due to cancer are referred to Tables 6 and 7, which present information for the most recent year for which actual figures are available. Provincial cancer registries will often have more recent actual data on new cases available upon request.

The number of hospital separations due to cancer plus the average days stay are also presented in a similar format to facilitate comparisons (Table 8). Hospital separations provide information on the number of patient stays (but not on numbers of patients) by type of cancer. More detailed breakdowns of actual data by age, sex and province are available from Statistics Canada for new cases of, and deaths and hospital separations due to, cancer.

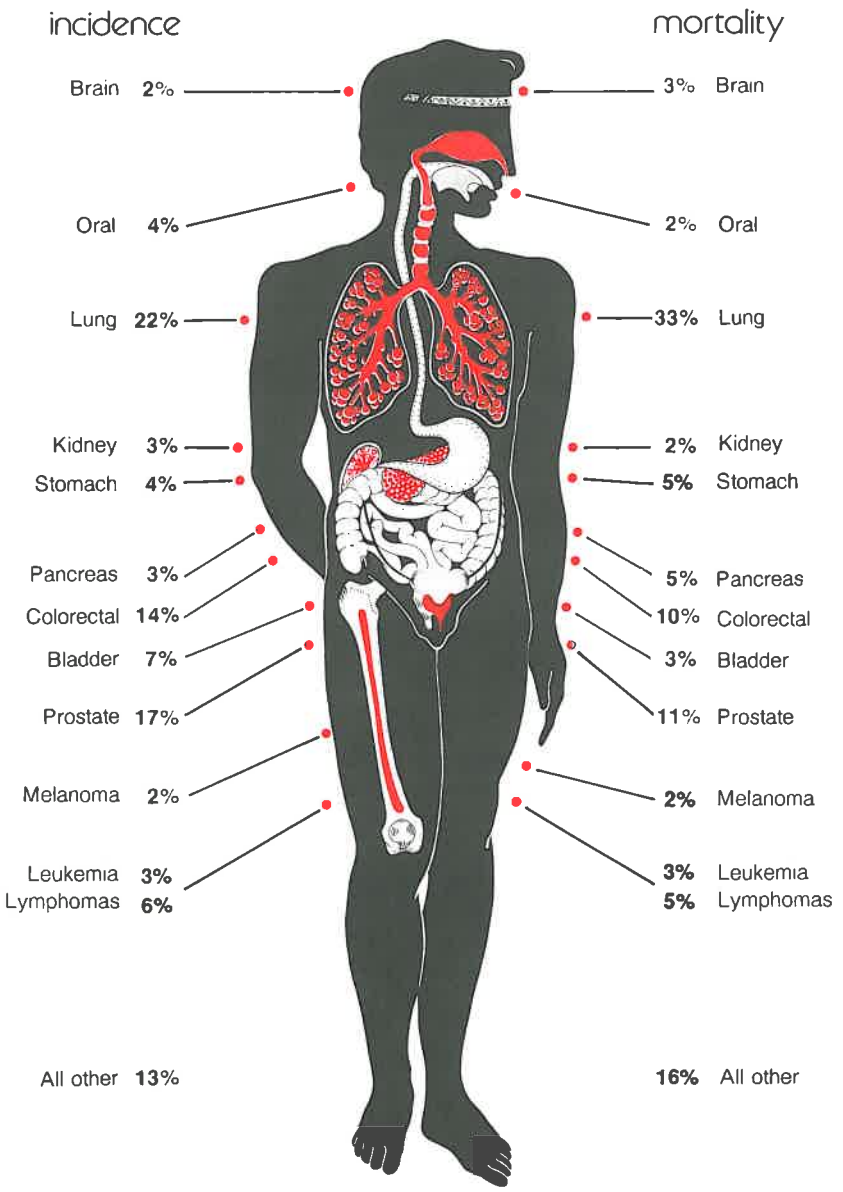
TABLE 1. Estimated New Cases and Deaths for Major Sites of Cancer, Canada, 1989

Site	Estimated number of new cases in 1989			Estimated number of deaths in 1989			Deaths/Cases ratio[1]		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
All cancers[2]	**101,000**	**52,900**	**48,100**	**52,500**	**28,800**	**23,700**	**0.52**	**0.54**	**0.49**
Oral	2,790	2,000	790	970	690	280	0.35	0.35	0.35
Stomach	3,000	1,900	1,100	2,070	1,300	770	0.69	0.68	0.70
Colorectal	14,600	7,400	7,200	5,900	3,000	2,900	0.40	0.41	0.40
Pancreas	2,700	1,400	1,300	2,700	1,400	1,300	1.00	1.00	1.00
Lung	16,800	11,700	5,100	13,500	9,400	4,100	0.80	0.80	0.80
Melanoma	2,400	1,100	1,300	500	290	210	0.21	0.26	0.16
Breast	12,300	..	12,300	4,800	..	4,800	0.39	..	0.39
Cervix	1,500	...	1,500	380	...	380	0.25	...	0.25
Uterus (Body)	3,000	...	3,000	380	...	380	0.13	...	0.13
Ovary	2,000	...	2,000	1,200	...	1,200	0.60	...	0.60
Prostate	9,000	9,000	...	3,200	3,200	...	0.36	0.36	...
Bladder	4,700	3,500	1,200	1,100	780	320	0.23	0.22	0.27
Kidney	2,370	1,500	870	1,040	640	400	0.44	0.43	0.46
Brain	1,980	1,100	880	1,330	730	600	0.67	0.66	0.68
Lymphoma	5,800	3,100	2,700	2,600	1,400	1,200	0.45	0.45	0.44
Leukemia	3,000	1,700	1,300	1,790	1,000	790	0.60	0.59	0.61
All other sites[2]	13,060	7,500	5,560	9,540	5,260	4,280	0.73	0.70	0.77

[1] *Based on estimates.*
[2] *Excludes non-melanoma skin cancer.*
.. *figures not available.*
... *figures not appropriate or not applicable.*
Source: *Tables 2 - 5.*

Figure 1.1

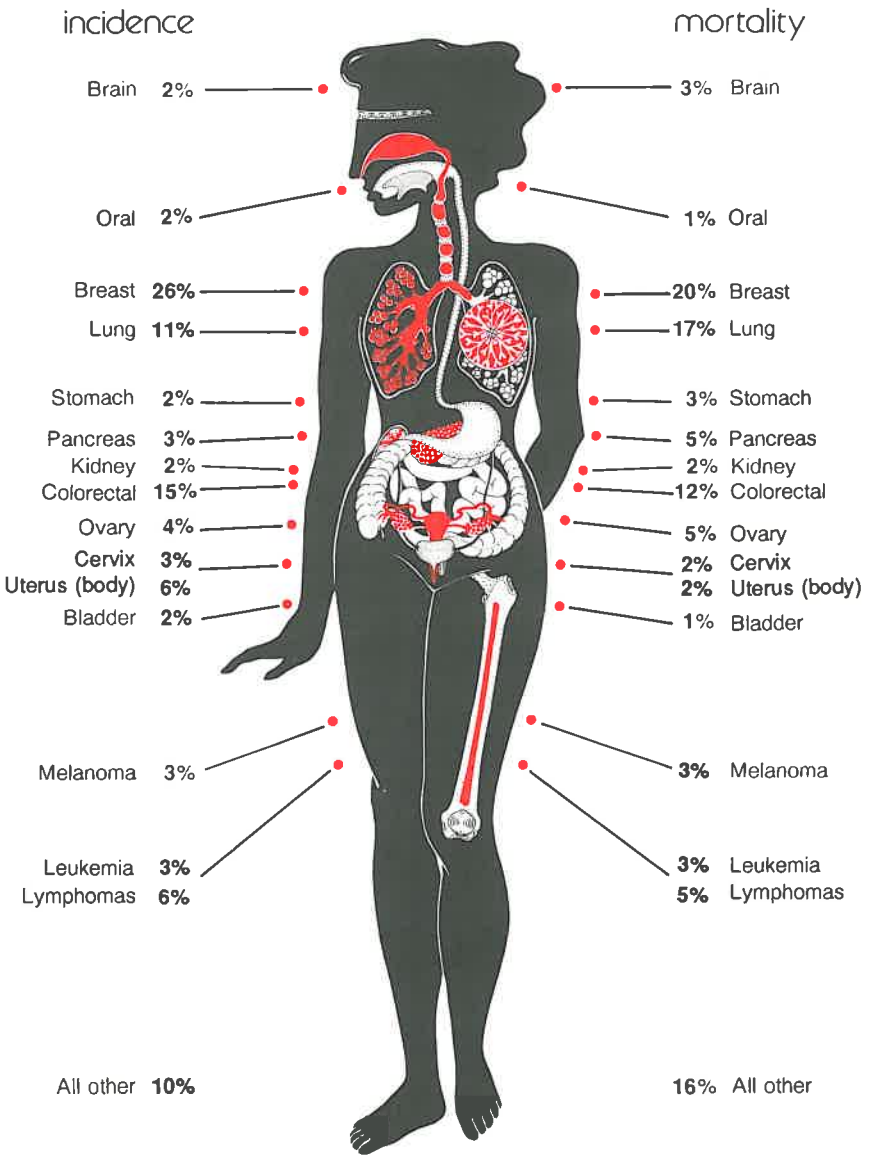
Per cent Distribution of Estimated Cancers by Site,[1] Males, Canada, 1989



[1] Excluding non-melanoma skin cancer and carcinoma in situ.

Figure 1.2

Per cent Distribution of Estimated Cancers by Site,[1] Females, Canada, 1989



[1] Excluding non-melanoma skin cancer and carcinoma in situ.

TABLE 2. Estimated New Cases and Age-standardized Incidence Rates for Major Sites of Cancer for Males, Canada and Provinces, 1989

	All cancers[1,2,3]	Oral	Stomach	Colorectal	Pancreas	Lung	Melanoma of skin	Prostate	Bladder	Kidney	Brain	Lymphoma	Leukemia
	Estimated New Cases: Males[4]												
CANADA	**52,900**	**2,000**	**1,900**	**7,400**	**1,400**	**11,700**	**1,100**	**9,000**	**3,500**	**1,500**	**1,100**	**3,100**	**1,700**
Nfld.	820	30	50	140	25	190	10	110	60	30	15	35	15
P.E.I.	300	10	10	40	10	70	5	50	20	10	5	15	5
N.S.	1,700	60	70	260	40	410	35	280	120	50	30	90	35
N.B.	1,400	40	60	200	45	360	20	240	100	45	20	70	35
Que.	14,400	460	600	1,900	430	3,700	110	2,100	1,000	410	280	860	500
Ont.	19,800	750	570	2,900	470	4,100	540	3,200	1,500	510	450	1,200	690
Man.	2,400	120	80	360	60	510	40	470	150	60	40	140	70
Sask.	2,300	120	80	310	70	430	40	520	150	70	40	130	80
Alta.	3,800	140	130	470	120	660	80	690	220	100	70	240	130
B.C.	6,000	230	200	850	160	1,200	200	1,400	170	160	120	320	140
	Estimated Age-standardized Incidence Rates per 100,000 Population: Males												
CANADA	**336**	**13**	**11**	**46**	**9**	**75**	**7**	**54**	**22**	**10**	**8**	**20**	**12**
Nfld.	274	8	17	49	8	67	4	35	21	10	6	11	5
P.E.I.	343	15	9	42	10	85	6	44	20	13	4	19	5
N.S.	298	11	11	46	6	73	7	44	21	9	6	17	6
N.B.	326	9	14	46	10	88	4	50	22	10	5	18	8
Que.	389	11	15	50	12	101	3	54	27	12	8	23	14
Ont.	335	13	9	48	8	70	10	52	26	9	9	21	13
Man.	320	17	10	48	8	69	5	56	19	9	6	19	10
Sask.	315	17	10	43	9	61	6	62	20	10	7	20	13
Alta.	313	13	12	42	11	60	7	61	19	9	6	21	11
B.C.	301	12	10	42	8	60	11	65	7	8	7	17	8

1 *Excludes non-melanoma skin cancer.*
2 *Columns may not add due to rounding.*
3 *Due to changes and improvements in source data and methodology, the 1989 estimates may not be directly comparable to the figures published in previous years. Please refer to methodological appendix for further details.*
4 *Estimates will vary from actual figures; the error will generally be less than 10 to 15 per cent. Provincial cancer registries may be contacted for the most current actual data.*

Source: *Health Division, Statistics Canada.*

TABLE 3. Estimated New Cases and Age-standardized Incidence Rates for Major Sites of Cancer for Females, Canada and Provinces, 1989

	All cancers[1,2,3]	Oral	Stomach	Colorectal	Pancreas	Lung	Melanoma of skin	Breast	Cervix	Body of uterus	Ovary	Bladder	Kidney	Brain	Lymphoma	Leukemia
	Estimated New Cases: Females[4]															
CANADA	**48,100**	**790**	**1,100**	**7,200**	**1,300**	**5,100**	**1,300**	**12,300**	**1,500**	**3,000**	**2,000**	**1,200**	**870**	**880**	**2,700**	**1,300**
Nfld.	650	10	30	140	15	40	15	160	40	35	20	15	15	15	30	10
P.E.I.	260	--	5	40	10	20	5	70	10	10	15	5	5	--	15	10
N.S.	1,500	20	35	250	40	190	50	400	45	90	60	40	30	25	80	25
N.B.	1,100	20	30	200	35	120	30	300	35	60	40	30	25	10	60	25
Que.	12,800	150	340	1,900	350	1,100	120	3,400	350	760	540	380	250	220	790	370
Ont.	18,500	360	380	2,800	460	2,000	600	4,600	470	1,300	760	530	310	400	1,000	560
Man..	2,400	40	50	340	70	260	50	600	230	160	80	50	45	30	130	50
Sask.	1,800	35	40	260	60	180	50	470	35	100	80	50	40	35	100	50
Alta.	3,600	60	80	460	100	380	110	840	110	190	160	70	70	60	180	90
B.C.	5,400	100	110	810	140	790	230	1,500	130	290	230	60	90	80	270	100
	Estimated Age-standardized Incidence Rates per 100,000 Population: Females															
CANADA	**256**	**4**	**5**	**34**	**6**	**26**	**8**	**70**	**8**	**16**	**11**	**6**	**5**	**6**	**15**	**7**
Nfld.	205	2	7	42	4	13	5	53	14	11	6	4	5	5	9	3
P.E.I.	254	1	3	31	8	16	5	76	11	14	13	3	3	3	8	5
N.S.	231	3	4	32	5	27	9	66	8	13	10	6	5	4	12	3
N.B.	224	4	5	36	5	24	6	64	8	14	9	6	5	2	11	4
Que.	274	3	6	37	7	25	3	74	7	16	12	7	5	6	17	8
Ont.	262	5	4	34	5	27	10	68	7	19	11	7	5	7	15	8
Man.	292	4	4	34	7	29	7	77	35	19	10	5	5	4	15	6
Sask.	238	4	4	30	6	23	8	69	6	13	12	6	5	5	14	7
Alta.	252	4	5	33	7	25	8	68	9	16	13	5	5	5	13	7
B.C.	240	5	4	31	5	30	12	71	6	13	10	2	4	4	12	5

1 *Excludes non-melanoma skin cancer.*
2 *Columns may not add due to rounding.*
3 *Due to changes and improvements in source data and methodology, the 1989 estimates may not be directly comparable to the figures published in previous years. Please refer to methodological appendix for further details.*
4 *Estimates will vary from actual figures; the error will generally be less than 10 to 15 per cent. Provincial cancer registries may be contacted for the most current actual data.*
-- *less than 5 cases, or estimated ASIR less than 0.5.*
Source: *Health Division, Statistics Canada.*

TABLE 4. Estimated Deaths and Age-standardized Mortality Rates per 100,000 Population for Major Sites of Cancer for Males, Canada and Provinces, 1989

	All cancers[1,2,3]	Oral	Stomach	Colorectal	Pancreas	Lung	Melanoma of skin	Prostate	Bladder	Kidney	Brain	Lymphoma	Leukemia
	Estimated Deaths: Males												
CANADA	**28,800**	**690**	**1,300**	**3,000**	**1,400**	**9,400**	**290**	**3,200**	**780**	**640**	**730**	**1,400**	**1,000**
Nfld.	510	10	45	60	30	170	5	40	10	10	10	20	15
P.E.I.	180	5	5	10	10	70	--	25	5	5	--	10	5
N.S.	1,100	20	45	90	50	340	10	120	30	25	20	50	40
N.B.	830	15	45	80	40	310	5	80	20	25	20	40	30
Que.	8,000	200	360	780	400	3,000	60	770	190	160	200	340	270
Ont.	10,700	280	430	1,200	490	3,300	130	1,100	310	235	270	530	390
Man.	1,300	30	60	160	65	380	10	170	40	30	25	70	50
Sask.	1,200	25	60	120	60	330	10	160	30	30	30	60	55
Alta.	1,800	40	80	170	90	490	25	220	40	50	50	110	75
B.C.	3,300	70	140	320	170	1,000	40	420	90	75	100	150	110
	Estimated Age-standardized Rates per 100,000 Population: Males												
CANADA	**171**	**4**	**7**	**18**	**9**	**57**	**2**	**16**	**5**	**4**	**5**	**9**	**7**
Nfld.	162	2	13	18	9	53	2	12	4	2	4	5	3
P.E.I.	173	2	3	11	11	76	1	18	3	4	2	9	4
N.S.	182	4	7	15	8	56	1	17	5	4	4	8	7
N.B.	180	3	9	18	9	68	1	16	5	5	5	10	5
Que.	197	5	8	20	10	76	2	16	5	4	5	9	7
Ont.	168	5	7	19	8	53	2	15	5	4	5	9	7
Man.	165	4	6	19	8	48	1	17	4	3	4	9	6
Sask.	151	3	7	15	8	46	1	18	3	4	5	8	8
Alta.	149	3	6	14	8	41	2	16	4	4	4	10	7
B.C.	150	4	6	15	8	46	2	16	4	4	5	7	5

1 *Excludes non-melanoma skin cancer.*
2 *Estimates are calculated by extrapolating trends in cancer incidence and mortality as reported by provincial agencies.*
3 *Due to changes and improvements in source data and methodology, the 1989 estimates may not be directly comparable to the figures published in previous years. Please refer to methodological appendix for further details.*
-- *less than 5 cases or estimated ASMR less than 0.5.*
Source: *Health Division, Statistics Canada.*

TABLE 5. Estimated Deaths and Age-standardized Mortality Rates per 100,000 Population for Major Sites of Cancer for Females, Canada and Provinces, 1989

	All cancers[1,2,3]	Oral	Stomach	Colorectal	Pancreas	Lung	Melanoma of skin	Breast	Cervix	Body of uterus	Ovary	Bladder	Kidney	Brain	Lymphoma	Leukemia
	Estimated Deaths: Females															
CANADA	**23,700**	**280**	**770**	**2,900**	**1,300**	**4,100**	**210**	**4,800**	**380**	**380**	**1,200**	**320**	**400**	**600**	**1,200**	**790**
Nfld	360	5	20	50	20	30	5	70	10	5	15	5	10	15	20	10
P.E.I.	120	5	5	10	10	15	--	30	5	--	10	--	--	--	5	5
N.S.	900	10	30	90	50	150	10	190	20	5	45	10	15	20	40	30
N.B.	610	5	25	70	35	90	5	120	10	5	20	10	10	15	30	20
Que.	6,200	60	210	800	340	1,000	40	1,200	70	110	280	90	100	160	310	210
Ont.	9,200	120	280	1,200	470	1,700	90	1,900	170	180	480	130	150	240	470	310
Man.	1,100	10	40	130	70	180	10	220	20	20	50	10	20	25	70	30
Sask.	860	10	30	110	50	130	10	160	10	10	50	10	20	30	45	30
Alta.	1,600	20	50	160	90	260	20	310	30	20	70	15	30	40	90	60
B.C.	2,800	30	80	300	150	580	30	510	35	30	160	30	40	60	140	80
	Estimated Age-standardized Mortality Rates per 100,000 Population: Females															
CANADA	**109**	**1**	**3**	**12**	**6**	**20**	**1**	**24**	**2**	**2**	**6**	**1**	**2**	**3**	**6**	**4**
Nfld.	100	1	4	14	5	11	1	19	4	1	4	1	2	4	5	3
P.E.I.	103	1	2	7	5	15	--	26	2	1	7	--	1	4	4	2
N.S.	119	1	3	10	6	23	1	26	2	1	6	1	2	2	6	4
N.B.	105	1	3	11	5	19	1	24	1	1	4	2	2	2	4	3
Que.	108	1	3	14	6	19	1	23	1	2	6	1	2	4	6	4
Ont.	114	2	3	12	5	22	1	25	2	2	6	1	2	4	6	4
Man.	110	1	3	12	6	20	--	23	3	1	5	--	2	2	7	3
Sask.	99	1	3	12	5	17	1	20	1	1	7	1	2	4	5	3
Alta.	104	1	3	10	6	18	1	23	2	1	5	1	2	3	6	4
B.C.	106	1	3	10	6	24	1	22	1	1	6	1	2	3	5	3

1 *Excludes non-melanoma skin cancer.*
2 *Estimates are calculated by extrapolating trends in cancer incidence and mortality as reported by provincial agencies.*
3 *Due to changes and improvements in source data and methodology, the 1989 estimates may not be directly comparable to the figures published in previous years. Please refer to methodological appendix for further details.*
-- *less than 5 cases, or estimated ASMR less than 0.5.*
Source: *Health Division, Statistics Canada.*

TABLE 6. Actual New Cases by Cancer Site and Sex, Canada, 1984

Site	ICD-9[1]	Total	Male	Female
All cancer sites[2]	**140-208**	**87,436**	**45,628**	**41,808**
Oral (Buccal cavity and pharynx)	**140-149**	**2,701**	**2,009**	**692**
Lip	140	703	632	71
Tongue	141	470	331	139
Salivary gland	142	220	123	97
Floor of the mouth	144	239	184	55
Pharynx	146,147,148	556	406	150
Other and unspecified buccal cavity	143,145,149	513	333	180
Digestive organs	**150-159**	**20,797**	**11,224**	**9,573**
Esophagus	150	810	582	228
Stomach	151	2,855	1,812	1,043
Small intestine	152	218	123	95
Large intestine	153	8,690	4,186	4,504
Rectum	154	4,007	2,271	1,736
Liver and biliary passages	155,156	1,326	676	650
Pancreas	157	2,368	1,304	1,064
Other and unspecified digestive	158,159	523	270	253
Respiratory system	**160-165**	**15,284**	**11,244**	**4,040**
Larynx	161	1,143	964	179
Lung	162	13,686	9,972	3,714
Other and unspecified respiratory	160,163,164, 165	455	308	147
Bone tissue and skin[2]	**170-172**	**2,565**	**1,273**	**1,292**
Bone	170	307	172	135
Connective tissue	171	597	331	266
Skin (melanoma)	172	1,661	770	891
Breast	**174,175**	**11,410**	**89**	**11,321**
Genital organs	**179-187**	**14,749**	**8,207**	**6,542**
Cervix uteri	180	1,577	...	1,577
Corpus, endometrium	182	2,585	...	2,585
Ovary	183	1,869	...	1,869
Prostate	185	7,617	7,617	...
Other and unspecified genitals	179,181,184, 186,187	1,101	590	511
Urinary organs	**188-189**	**6,266**	**4,419**	**1,847**
Bladder	188	4,129	3,069	1,060
Kidney and other urinary	189	2,137	1,350	787
Eye	**190**	**205**	**108**	**97**
Brain and central nervous system	**191-192**	**1,706**	**956**	**750**
Endocrine glands	**193-194**	**972**	**308**	**664**
Thyroid	193	828	225	603
Other endocrine	194	144	83	61
Leukemia	**204-208**	**2,677**	**1,535**	**1,142**
Other blood and lymph tissues	**200-203**	**4,807**	**2,572**	**2,235**
Hodgkins disease	201	768	432	336
Multiple myeloma	203	1,069	573	496
Other lymphomas	200-202	2,970	1,567	1,403
All other and unspecified sites	**195-199**	**3,297**	**1,684**	**1,613**

1 *ICD-9 refers to the ninth revision of the International Classification of Diseases.*
2 *Excludes non-melanoma skin cancer (ICD-9 = 173).*
... *figures not appropriate or not applicable.*
Source: *Cancer in Canada, 1984. Statistics Canada Catalogue 82-207.*

TABLE 7. Actual Deaths by Cancer Site and Sex, Canada, 1987

Site	ICD-9[1]	Total	Male	Female
All cancer sites[2]	**140-208**	**48,460**	**26,649**	**21,811**
Oral (Buccal cavity and pharynx)	**140-149**	**934**	**662**	**272**
Lip	140	21	16	5
Tongue	141	219	152	67
Salivary gland	142	67	35	32
Floor of the mouth	144	62	49	13
Pharynx	146,147,148	275	206	69
Other and unspecified buccal cavity	143,145,149	290	204	86
Digestive organs	**150-159**	**13,992**	**7,562**	**6,430**
Esophagus	150	887	671	216
Stomach	151	2,186	1,357	829
Small intestine	152	89	49	40
Large intestine	153	4,358	2,104	2,254
Rectum	154	1,384	802	582
Liver and biliary passages	155,156	1,248	637	611
Pancreas	157	2,620	1,357	1,263
Other and unspecified digestive	158,159	1,220	585	635
Respiratory system	**160-165**	**12,967**	**9,265**	**3,702**
Larynx	161	488	402	86
Lung	162	12,281	8,733	3,548
Other and unspecified respiratory	160,163,164, 165	198	130	68
Bone tissue and skin[3]	**170-172**	**798**	**431**	**367**
Bone	170	139	87	52
Connective tissue	171	224	110	114
Skin (melanoma)	172	435	234	201
Breast	**174,175**	**4,381**	**31**	**4,350**
Genital organs	**179-187**	**5,187**	**2,925**	**2,262**
Cervix uteri	180	415	...	415
Corpus, endometrium	182	368	...	368
Ovary	183	1,152	...	1,152
Prostate	185	2,847	2,847	...
Other and unspecified genitals	179,181,184, 186,187	405	78	327
Urinary organs	**188-189**	**2,142**	**1,433**	**709**
Bladder	188	1,085	784	301
Kidney and other urinary	189	1,057	649	408
Eye	**190**	**53**	**28**	**25**
Brain and central nervous system	**191-192**	**1,279**	**720**	**559**
Endocrine glands	**193-194**	**177**	**85**	**92**
Thyroid	193	101	40	61
Other endocrine	194	76	45	31
Leukemia	**204-208**	**1,794**	**1,023**	**771**
Other blood and lymph tissues	**200-203**	**2,454**	**1,309**	**1,145**
Hodgkins disease	201	167	103	64
Multiple myeloma	203	764	423	341
Other lymphomas	200-202	1,523	783	740
All other and unspecified sites	**195-199**	**2,302**	**1,175**	**1,127**

1 ICD-9 refers to the ninth revision of the International Classification of Diseases.
2 Excludes non-melanoma skin cancer (ICD-9 173).
... figures not appropriate or not applicable.
Source: *"Causes of Death. Vital Statistics Volume IV" Statistics Canada Catalogue 84-203.*

TABLE 8. Hospital Separations with a Diagnosis of Cancer, Canada,[1] 1984[2]

Site of cancer	No. of separations		Average days stay	
	Male	Female	Male	Female
All separations	**1,524,181**	**2,116,352**	**11.7**	**11.2**
All cancer sites,[3]	**94,753**	**87,579**	**17.8**	**18.0**
Oral (Buccal cavity and pharynx)	**3,172**	**1,276**	**17.4**	**18.9**
Lip	324	50	8.2	8.9
Tongue	717	309	17.0	18.3
Salivary gland	239	153	16.4	18.8
Floor of the mouth	351	88	21.3	18.8
Pharynx	876	353	19.3	21.6
Other and unspecified buccal cavity	665	323	18.2	18.4
Digestive organs	**18,875**	**15,801**	**21.0**	**23.6**
Esophagus	1,384	579	20.6	24.3
Stomach	3,254	1,667	20.8	25.3
Small intestine	235	163	22.2	21.8
Large intestine	5,642	6,267	20.0	23.7
Rectum	4,476	3,625	22.1	24.1
Liver and biliary passages	1,135	1,115	18.6	20.9
Pancreas	2,201	1,830	21.9	22.8
Other and unspecified digestive	548	555	24.7	21.0
Respiratory system	**22,181**	**8,255**	**18.3**	**19.5**
Larynx	1,935	380	19.4	19.0
Lung	19,641	7,568	18.3	19.2
Other and unspecified respiratory	605	307	14.2	26.8
Bone tissue and skin[3]	**2,226**	**2,002**	**14.6**	**15.3**
Bone	724	583	17.4	18.1
Connective tissue	719	639	15.0	15.8
Skin (melanoma)	783	780	11.6	12.9
Breast	**112**	**17,769**	**11.4**	**15.7**
Genital organs	**14,659**	**15,557**	**16.4**	**11.7**
Cervix uteri	...	3,657	...	12.1
Corpus, endometrium	...	4,332	...	10.3
Ovary	...	6,337	...	11.3
Prostate	13,512	...	17.0	...
Other and unspecified genitals	1,147	1,231	9.4	17.6
Urinary organs	**10,888**	**4,072**	**13.0**	**15.7**
Bladder	8,663	2,786	11.5	13.4
Kidney and other urinary	2,225	1,286	18.6	20.6
Eye	**172**	**152**	**9.6**	**9.0**
Brain and central nervous system	**2,432**	**1,907**	**28.1**	**34.1**
Endocrine glands	**656**	**1,109**	**10.3**	**10.6**
Thyroid	453	946	8.9	16.9
Other endocrine	203	163	13.6	16.9
Leukemia	**3,694**	**2,888**	**17.1**	**19.3**
Other blood and lymph tissues	**6,503**	**5,507**	**15.3**	**18.4**
Hodgkins disease	1,255	860	11.3	12.6
Multiple myeloma	1,513	1,283	20.0	23.9
Other lymphomas	3,735	3,364	14.8	17.8
All other and unspecified sites	**9,183**	**11,284**	**18.5**	**20.4**

1 *Canada totals exclude Yukon and Northwest Territories.*
2 *The year 1984 refers to fiscal year ending March 31, 1985.*
3 *Excludes non-melanoma skin cancer (ICD-9 173).*
... *figures not appropriate or not applicable.*
Source: *Hospital Morbidity Catalogue 82-206, Statistics Canada.*

TRENDS IN INCIDENCE AND MORTALITY

Figures 2-7 show the trends in the incidence of, and mortality from, the major types of cancer since 1970. The rates for each sex have been adjusted for changes in the age distribution of the population over time. The graphs speak for themselves but, when comparing the magnitudes of the trends for the different types of cancer, the percentage increase per year is a useful summary index (Table 9).

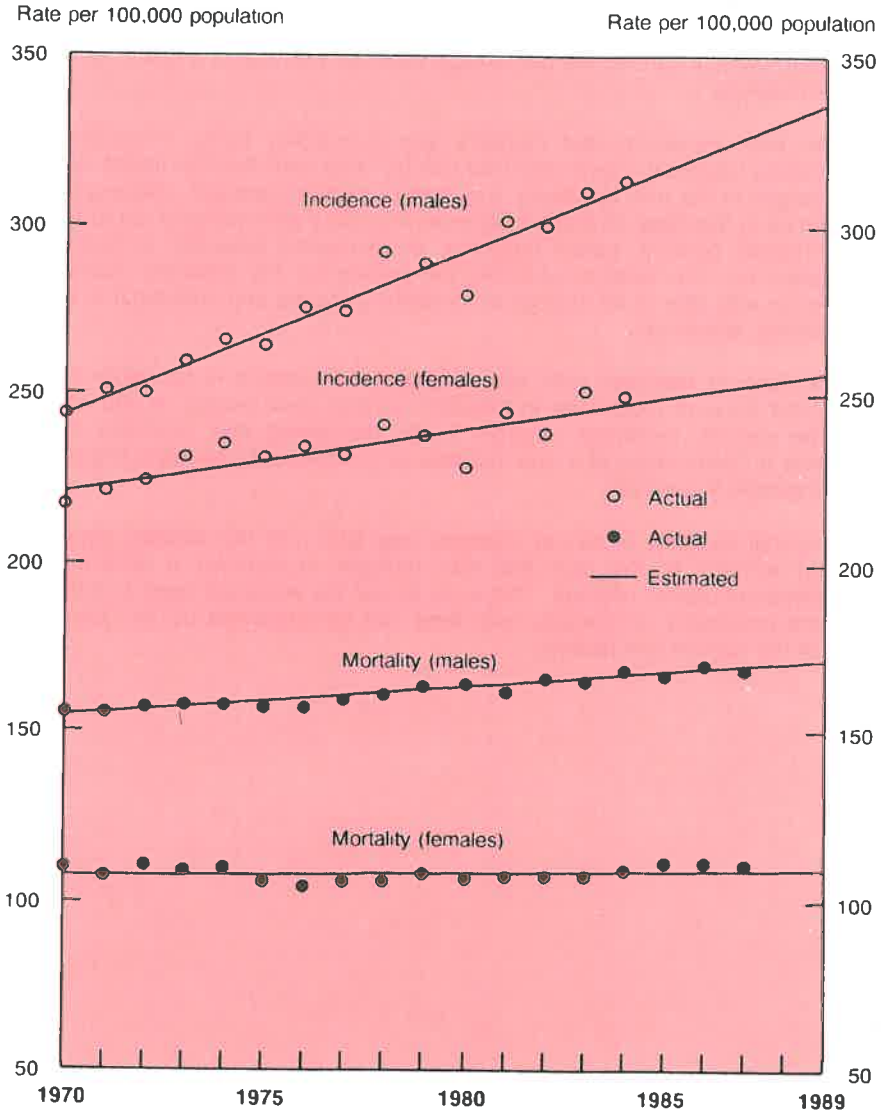
Where both incidence and mortality are increasing (lung, melanoma) or decreasing (stomach, cervix uteri) we can be fairly sure that the trends are due to changes in the true incidence. For some cancers (stomach, melanoma) the difference in the rates of change between incidence and mortality could be due to improved survival, better reporting, or increased detection of borderline malignancies. The latter is probably the reason for the apparent increase in incidence with little or no change in mortality (prostate and colorectal in males, lymphoma, leukemia).

A decrease in mortality with little change in incidence is probably due to improved survival (colorectal in females, corpus uteri, ovary). In the case of bladder cancer, incidence appears to be increasing and mortality falling, possibly a combination of a true increase in incidence, better reporting and an improvement in survival.

The overall mortality of cancer changes very little over the decade, especially among women. In the past this was thought to support a deterministic hypothesis of cancer etiology. This is no longer the accepted view. It is thought that the constancy of mortality over time can be explained by an "averaging out" of the various risk factors.

Figure 2

Age-standardized Incidence and Mortality Rates [1,2,3] for All Cancers by Sex, Canada, 1970-1989



[1] Rates are adjusted to the age distribution of the world population.

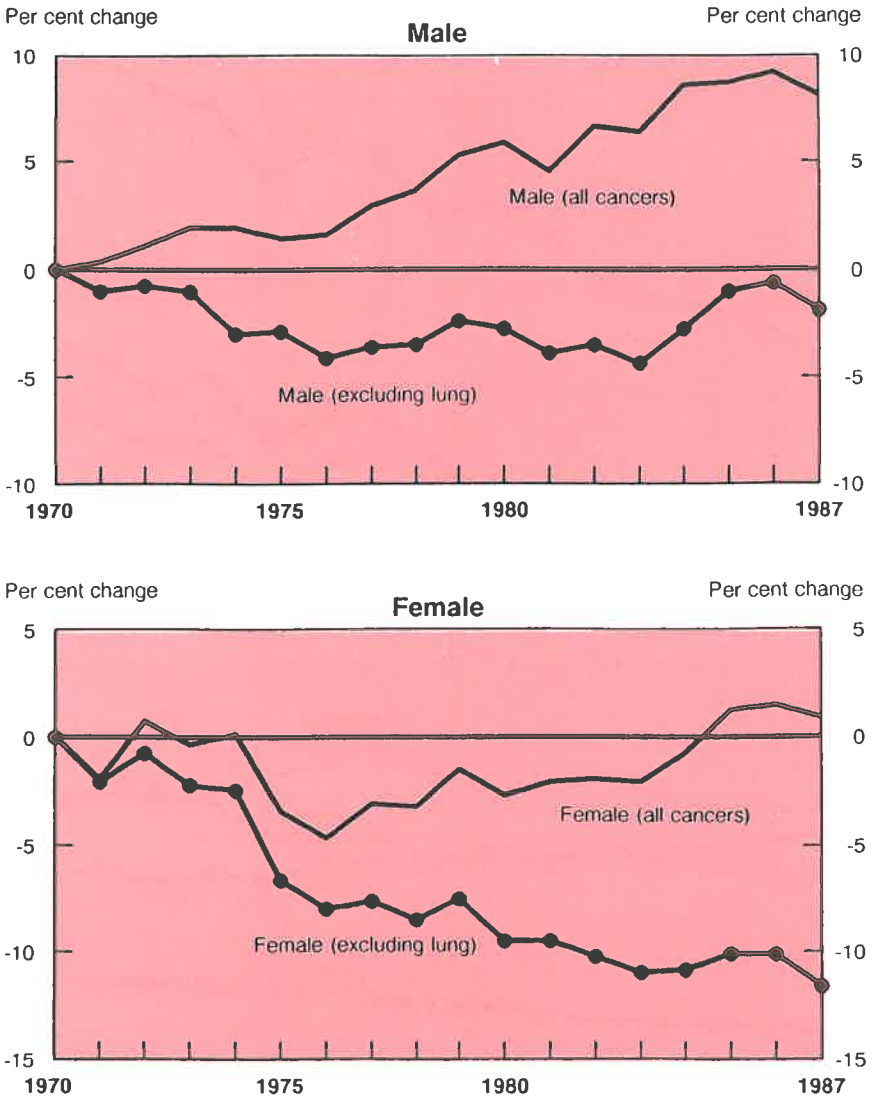
[2] All figures exclude non-melanoma skin cancer.

[3] Incidence rates prior to 1977 have been adjusted for underregistration in one province.

Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

Figure 3

Per Cent Change in Age-standardized Mortality Rates[1,2] by Sex, Including and Excluding Lung Cancer, Canada, 1970-1987



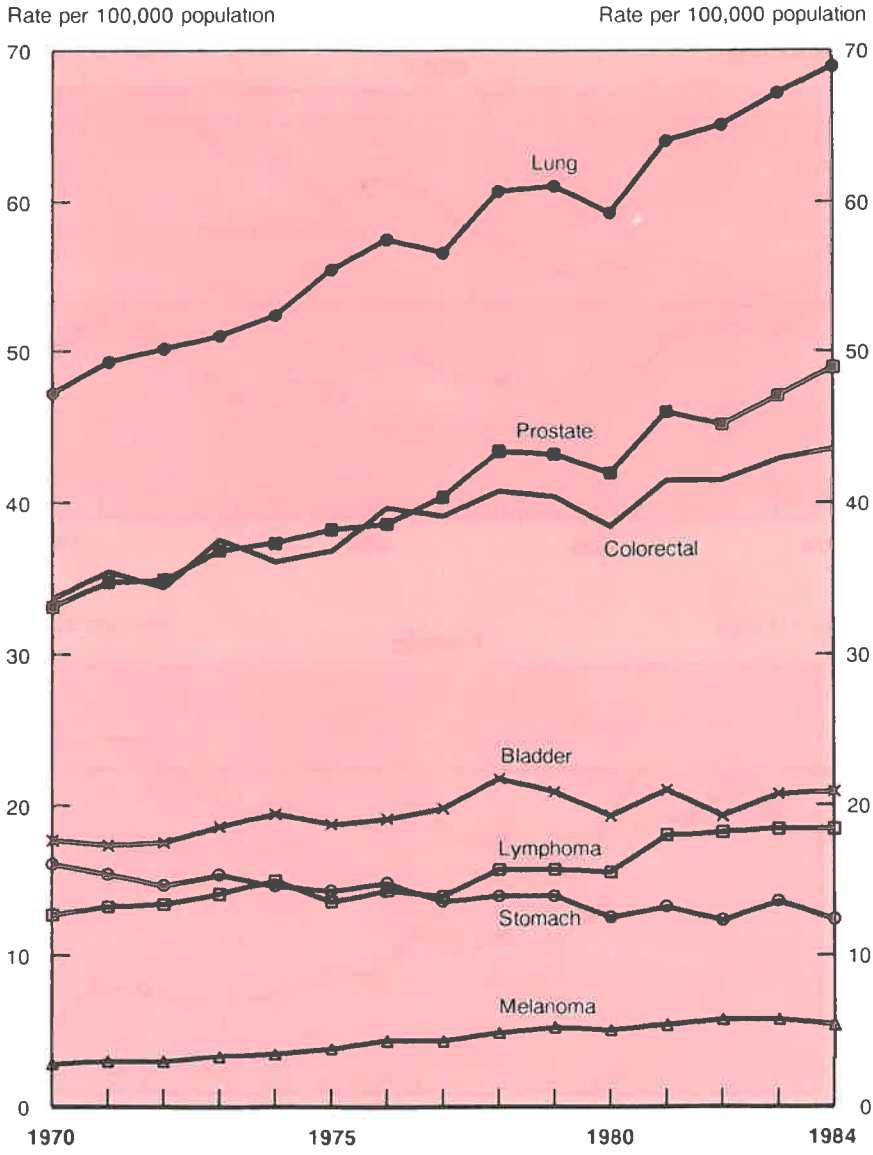
[1] Rates are adjusted to the age distribution of the world population.

[2] All figures exclude non-melanoma skin cancer.

Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

Figure 4

Age-standardized Incidence Rates[1,2] for Selected Cancer Sites, Males, Canada, 1970-1984



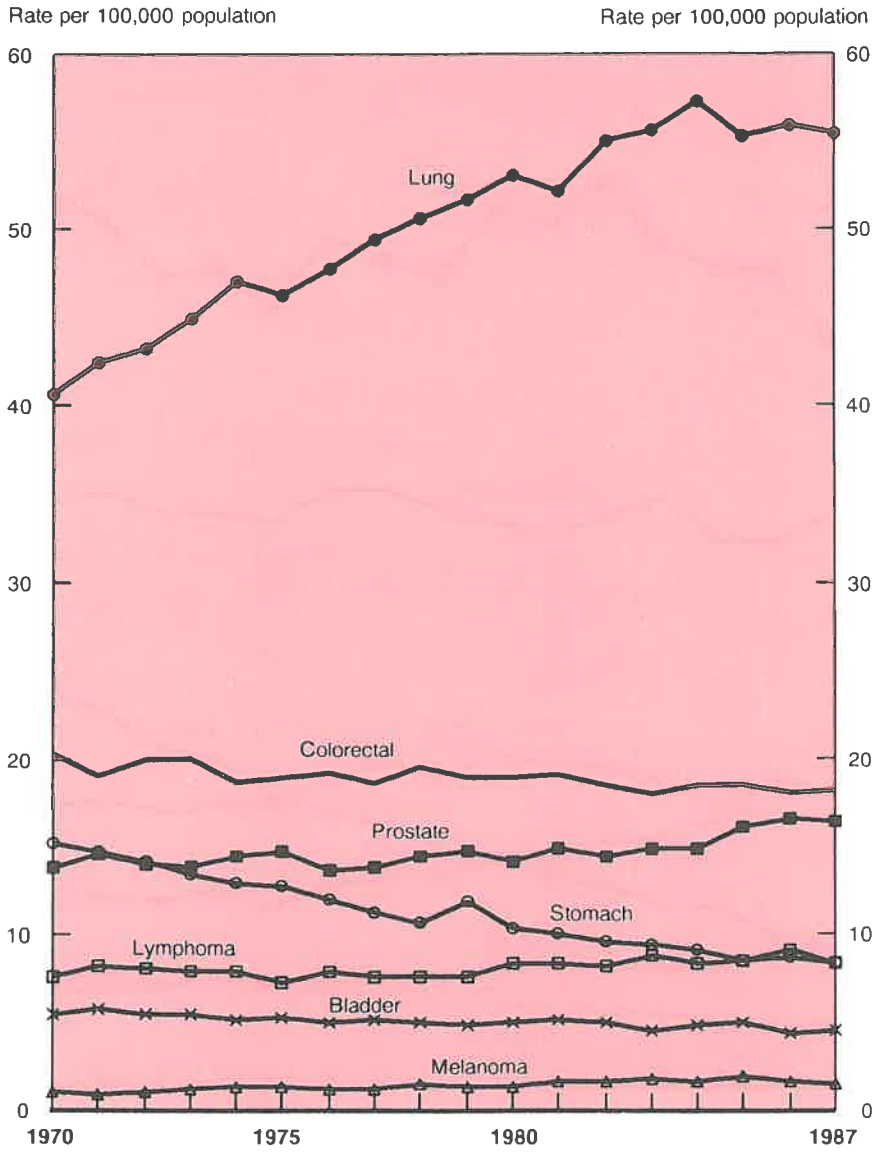
[1] Rates are adjusted to the age distribution of the world population.

[2] Rates prior to 1977 have been adjusted for underregistration in one province.

Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

Figure 5

Age-standardized Mortality Rates[1] for Selected Cancer Sites, Males, Canada, 1970-1987

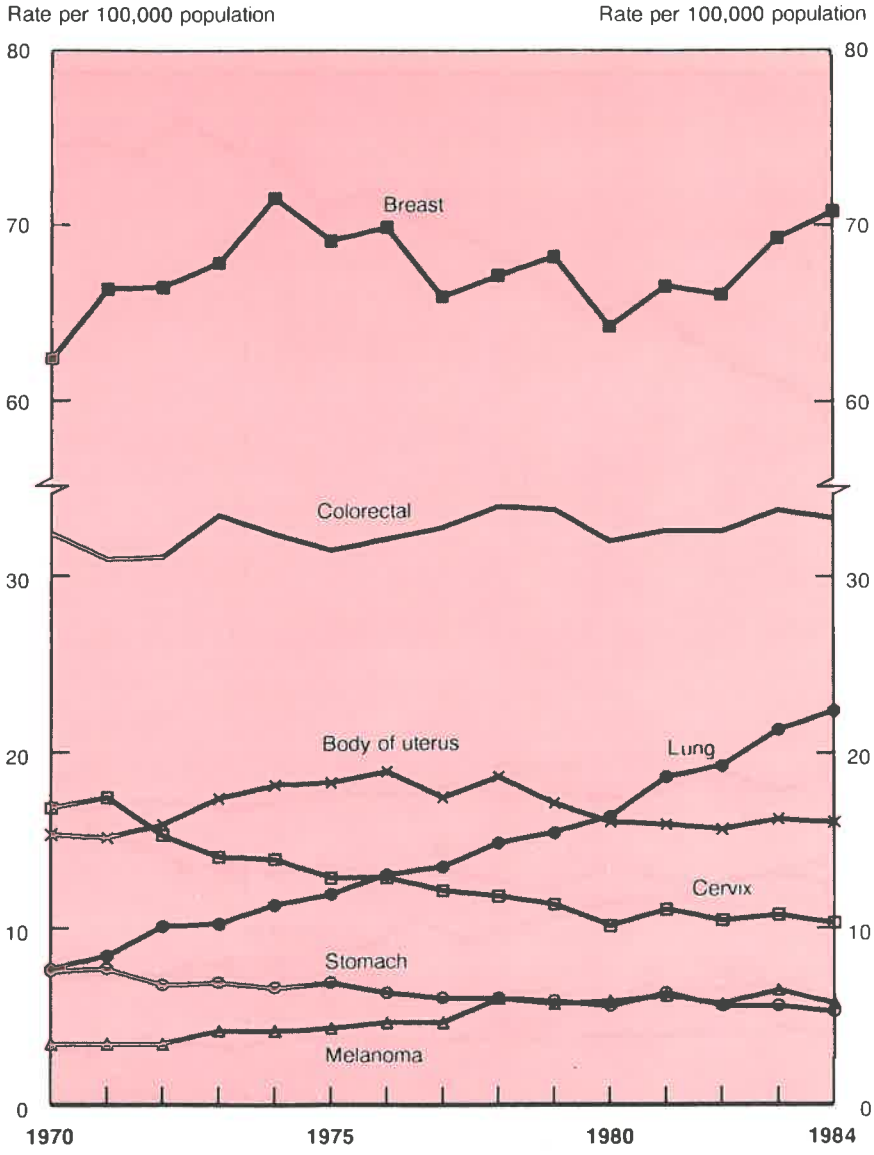


[1] Rates are adjusted to the age distribution of the world population.

Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

Figure 6

Age-standardized Incidence Rates[1,2] for Selected Cancer Sites, Females, Canada, 1970-1984



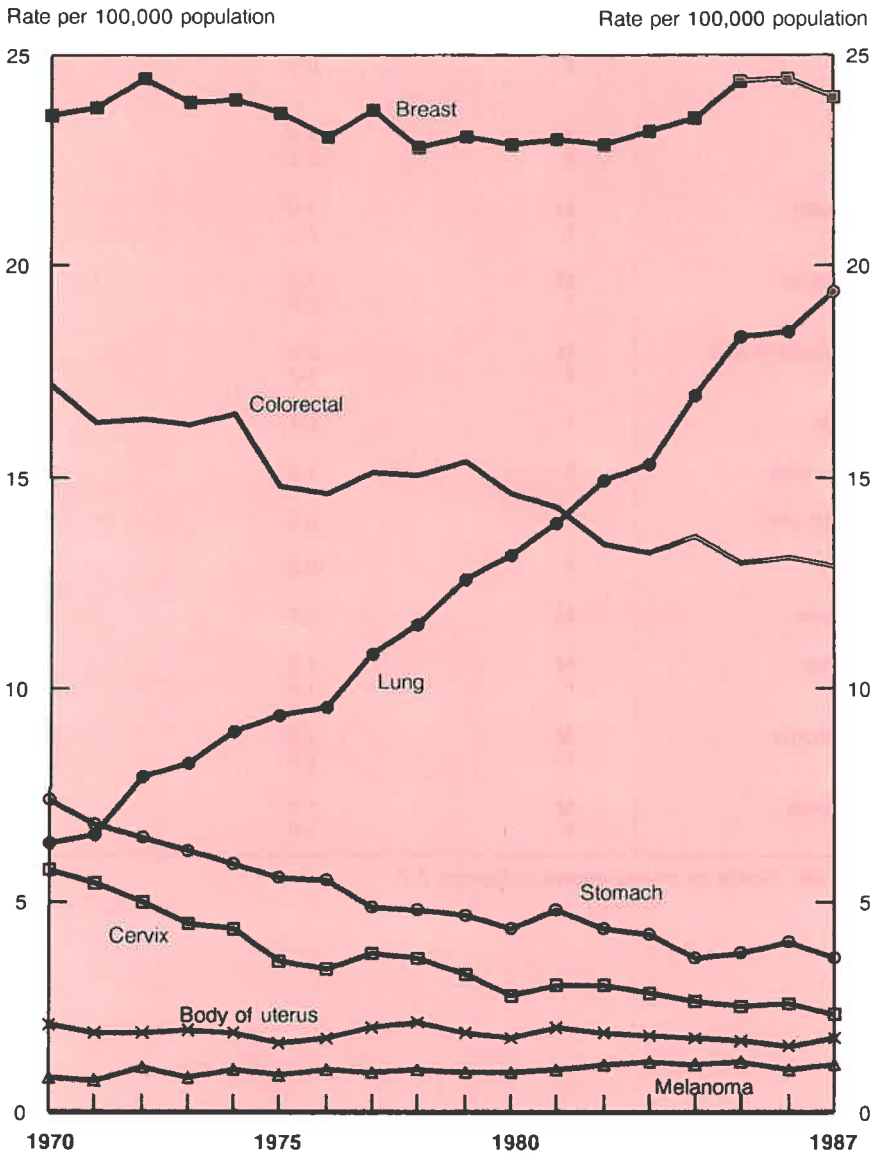
[1] Rates are adjusted to the age distribution of the world population.

[2] Rates prior to 1977 have been adjusted for underregistration in one province.

Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

Figure 7

Age-standardized Mortality Rates[1] for Selected Cancer Sites, Females, Canada, 1970-1987



[1] Rates are adjusted to the age distribution of the world population.

Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

TABLE 9. Average Annual Per Cent Increase in Cancer Incidence 1970-1984 and Mortality 1970-1987

		Incidence	Mortality
All Cancers	**M**	**1.8**	**0.5**
	F	**0.8**	**0.0**
Lung	M	2.6	2.0
	F	7.4	6.7
Stomach	M	-1.6	-4.3
	F	-2.3	-4.1
Colorectal	M	1.7	-0.6
	F	0.4	-1.7
Melanoma of skin	M	5.8	3.8
	F	5.2	1.9
Breast	F	0.1	0.0
Cervix uteri	F	-4.0	-5.0
Corpus uteri	F	-0.0	-0.5
Ovary	F	-0.3	-1.2
Prostate	M	2.7	0.1
Bladder	M	1.3	-1.2
	F	1.5	-1.6
Lymphoma	M	2.8	0.7
	F	2.8	0.5
Leukemia	M	1.6	-0.4
	F	1.6	-0.8

Source: *Based on trends shown in Figures 2-7.*

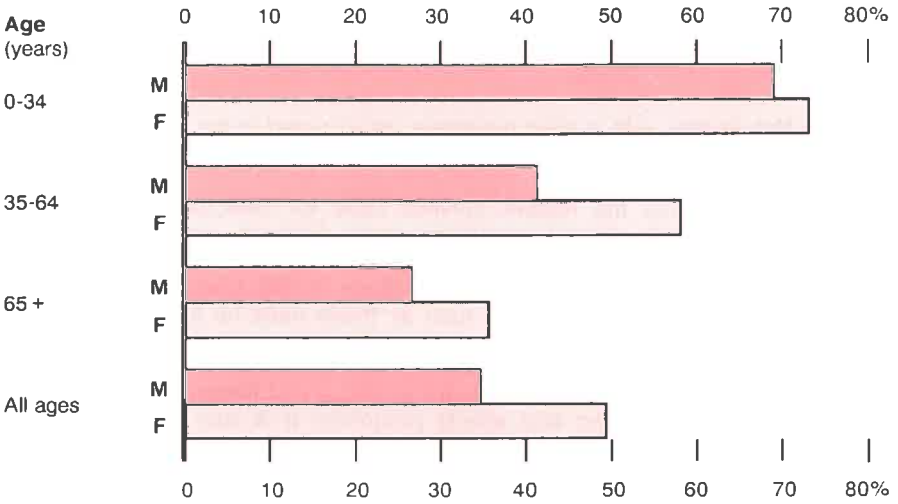
SURVIVAL RATES

The most recent five-year survival rates are shown in Figures 8 and 9. They are from one province only but as shown in Table 10, they are typical of current North American experience.

Figure 8 shows the five year survival for all cancers combined, for all ages and for broad age groups. About half the females treated for cancer survived five years, the proportion being considerably less, 35%, in males. This difference in prognosis is due primarily to the greater incidence among males of cancers with low survival rates, such as lung cancer. Survival rates decrease with age. Again this is because the incidence of the more lethal forms of cancer increases with age. Among children and young people the prognosis for some of the commoner forms, such as leukemia, lymphoma and testicular cancer, has been improved markedly by the introduction of new forms of treatment. The male/female differential is most marked in middle age due to the relatively favourable prognosis for female breast cancer.

Figure 8

Five Year Cancer Survival by Age Group and Sex, Cases Diagnosed, 1979-1981



Source: Alberta Cancer Registry.

Figures 9.1 and 9.2 show the survival over the five years following diagnosis by sex and type of cancer. The statistics have been derived from a follow-up study of patients registered by the Alberta Cancer Registry in the period 1974-78. These are **relative** survival rates, adjusted for the risk of dying from causes other than the diagnosed cancer. With this adjustment 58 percent of all females and 43 percent of all males with cancer survive five years following diagnosis, most of the deaths occurring in the first year. With relative survival rates it is possible to compare the Canadian results with those from other population-based statistics. For example the 5 year relative survival rates for all patients registered in England and Wales in 1974 were 42 percent for females and 30 percent for males.

Survival rates differ markedly between sites. For any given site it is generally true that survival rates decrease with increasing age even after adjustment for mortality from other causes. For sites where both sexes are affected the survival rates differ very little. The various sites can be grouped with respect to prognosis as follows:

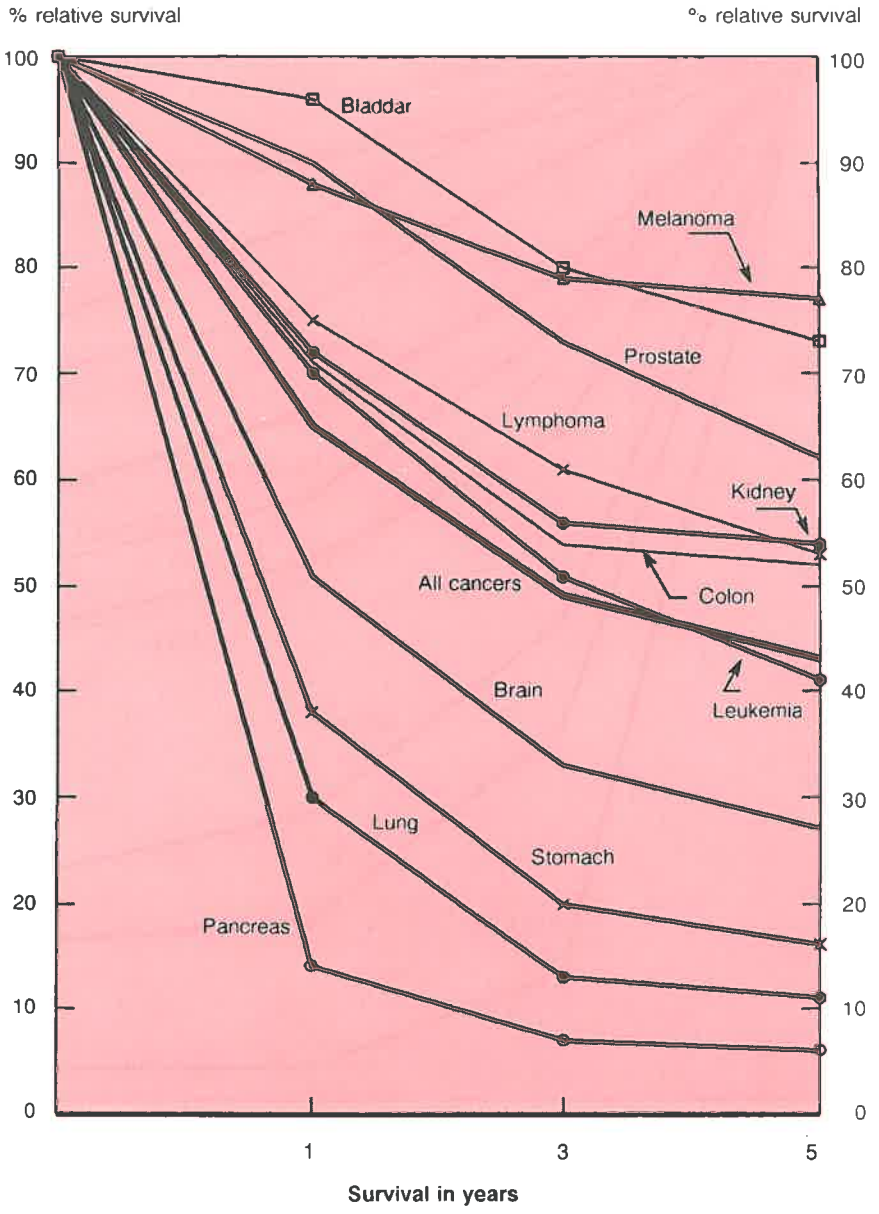
Poor prognosis: (< 30% survival)	stomach, pancreas, lung, brain, myeloid leukemia
Fair prognosis: (30-69% survival)	colon and rectum, cervix uteri, ovary, prostate, kidney, non-Hodgkin's lymphoma, multiple myeloma, lymphatic leukemia
Good prognosis: (70 + % survival)	melanoma of skin, breast, corpus uteri, bladder, Hodgkin's disease

[Note: Not all sites with a good prognosis are included in the diagram e.g. lip, larynx and non- melanotic skin cancer]

Table 10 compares the relative survival rates for selected sites in three jurisdictions, Canada (based on Alberta data), England and Wales and the United States. The Canadian rates compare favourably with those reported elsewhere and are in general closer to those in the United States than in England and Wales. Comparisons such as these must be treated cautiously. Even though the relative survival rates make some adjustment for general mortality, age differences may still be important. Even if the differences are not artifactual they may not be due entirely to efficacy of treatment. The stage at which cancers are treated also affects prognosis. It is also possible that the Alberta rates are not fully representative of the total Canadian experience.

Figure 9.1

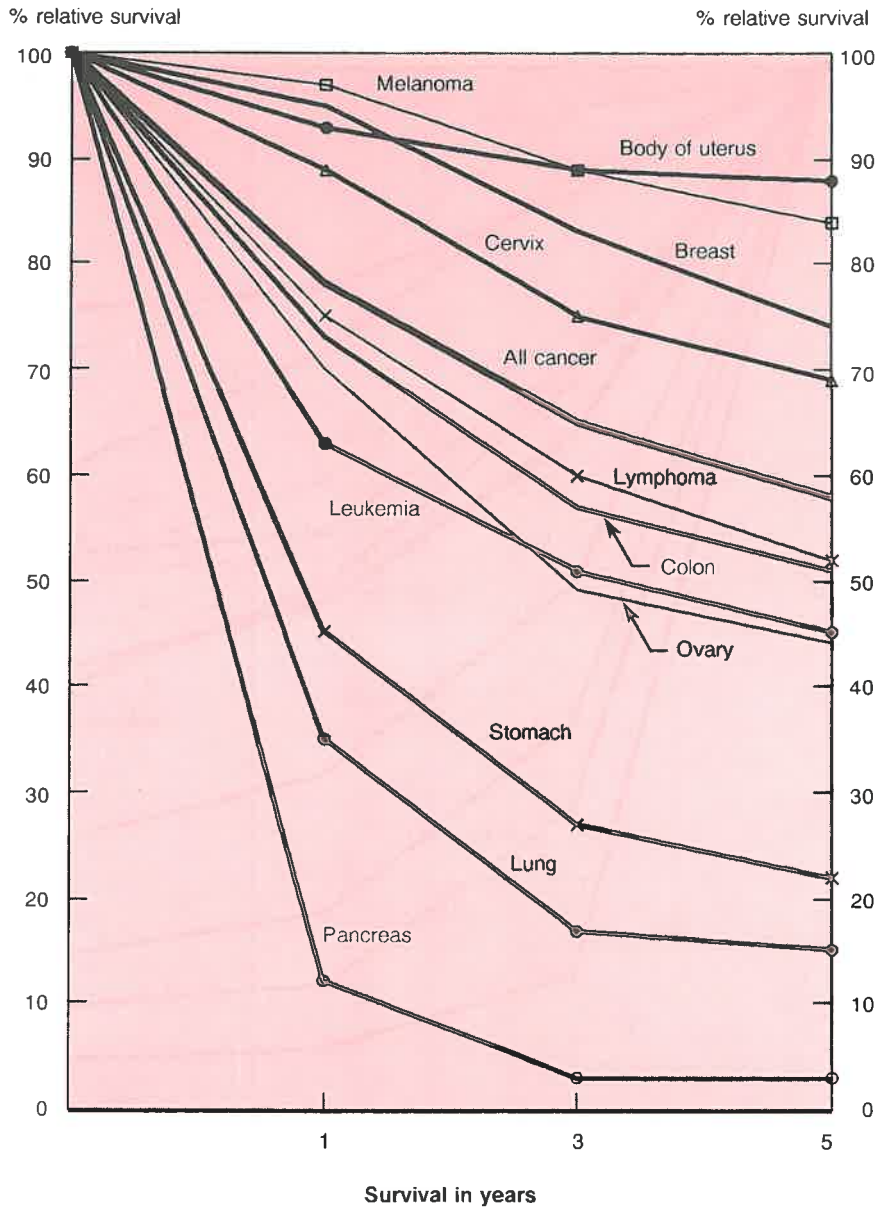
Relative Survival Rates for Males at One, Three and Five Years for Selected Sites, Cases Diagnosed in Alberta, 1974 -1978



Source: Surveillance and Risk Assessment Division, Health and Welfare Canada.

Figure 9.2

Relative Survival Rates for Females at One, Three and Five Years for Selected Sites, Cases Diagnosed in Alberta, 1974 -1978



Source: Surveillance and Risk Assessment Division, Health and Welfare Canada.

TABLE 10. Five Year Relative Survival Rates for Selected Cancer Sites in Canada (Alberta 1974-78), England and Wales (1975) and the United States (1970-73)

Site	5-year relative survival (%)					
	Canada		England and Wales		United States	
	M	F	M	F	M	F
Stomach	16	22	7	7	12	14
Colon	52	51	31	30	47	50
Rectum	47	46	31	31	43	48
Pancreas	6	3	3	4	2	2
Lung	11	15	7	7	9	14
Melanoma of skin	73	84	52	66	62	75
Breast	..	74	..	57	..	68
Cervix uteri	...	69	...	52	...	64
Corpus uteri	...	88	...	67	...	81
Ovary	...	44	...	24	...	36
Prostate	62	...	35	...	63	...
Bladder	77	75	54	48	61	60
Kidney	54	57	36	34	44	50
Brain	27	25	12	15	18	22
Non-Hodgkins lymphoma	45	48	33	33	39	43
Hodgkin's disease	77	77	58	53	66	69
Multiple myeloma	33	30	19	16	20	17
Lymphatic leukemia	64	71	31	34	..	..
Myeloid leukemia	18	17	8	8	..	..

.. figures not available.
... figures not appropriate or not applicable.
Source: *See Appendix.*

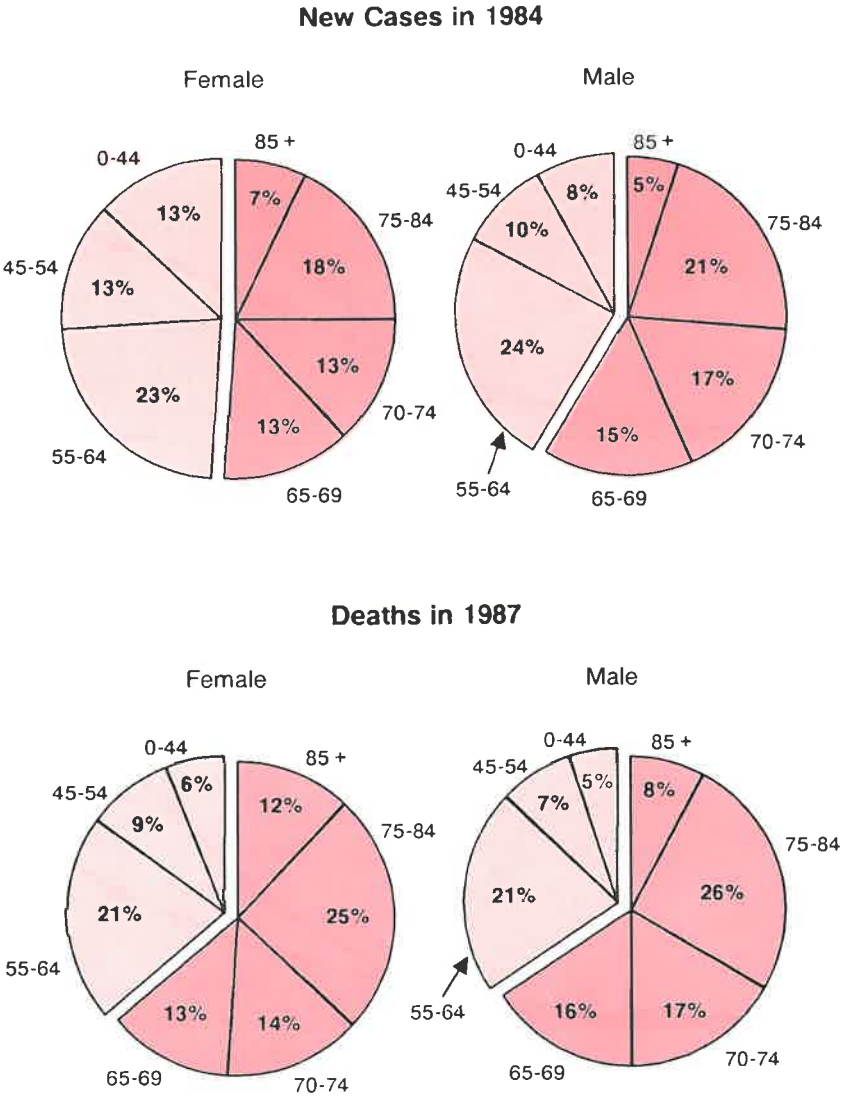
AGE AND SEX DISTRIBUTION OF CANCER

Figure 10 shows, for each sex, the proportion of new cancer cases and cancer deaths in each age group while age-specific rates for new cases and deaths are shown in Figure 11. The patterns for deaths among females and for both new cases and deaths among males are very similar: over 60% occur in the elderly (65 years and older) and only 5 to 8% in people under 45 years of age. Of new cases among females, half occur in those 65 or older. This is due to the relatively high incidence of cancer among women of reproductive age, (see also the higher incidence rates for middle-age women than men in Figure 11) and generally of the types of cancer associated with a good prognosis.

The fall off in rates for the very oldest age groups seen in the incidence, but not mortality chart, is sometimes attributed to less effective registration of new cases of cancer in the elderly.

Figure 10

Percentage Distribution by Age Group and Sex of New Cases of Cancer in 1984[1] and Cancer Deaths, Canada, 1987[1]

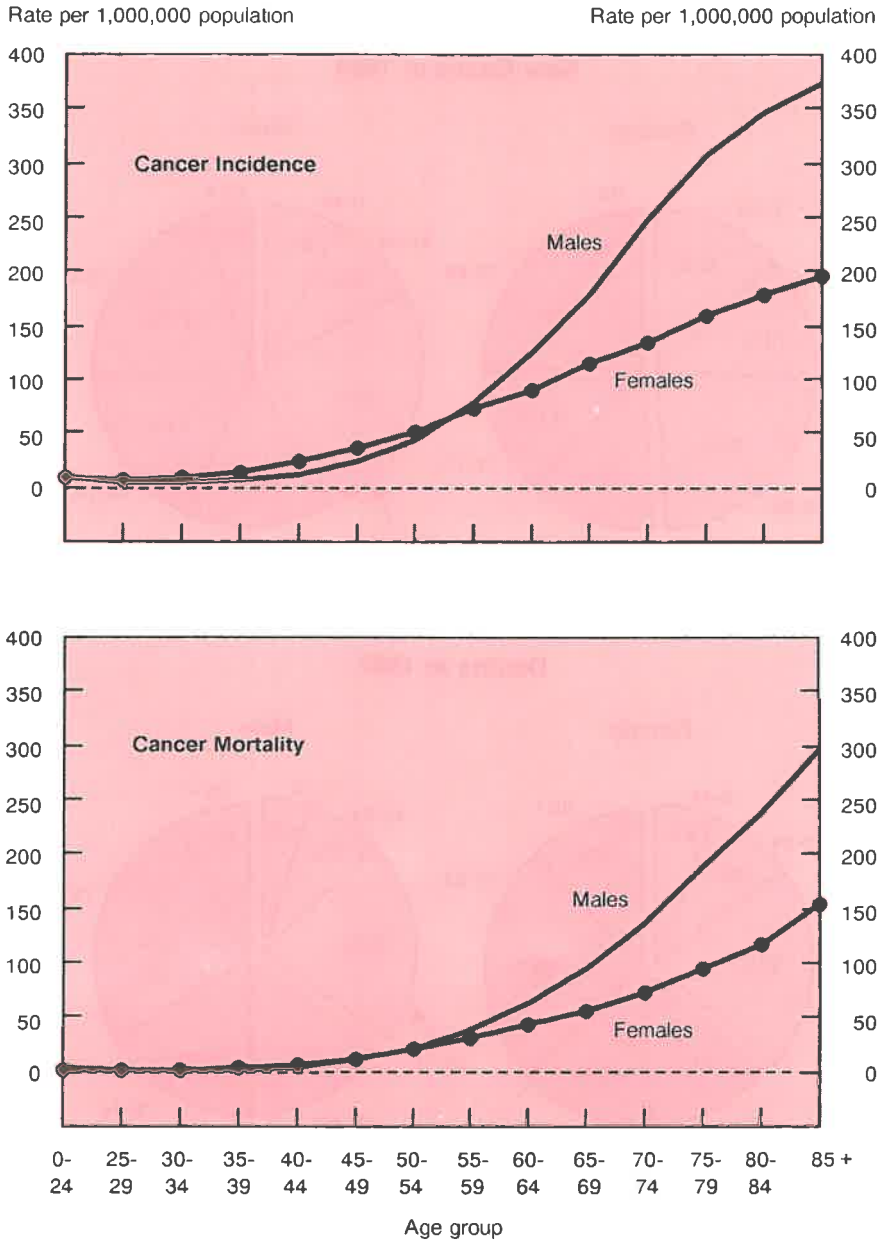


[1] Data shown are the most current available.

Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

Figure 11

Age-specific Rates for Cancer Incidence 1984 and Mortality, Canada, 1987



Source: Vital Statistics and Disease Registries Section, Health Division, Statistics Canada.

CANCER IN CHILDHOOD

Table 11 shows that over 800 children develop cancer each year and about a quarter of that number die of the disease. The types of cancer in childhood differ from those in later life. A greater proportion are found in the deeper tissues of the body – brain, bone and bone marrow, lymph glands - and fewer in the skin and the cells lining the internal organs. This probably reflects, to some extent, the differences in the growth rates of the various organs throughout life, but probably also the differences in exposure to agents which cause cancer. Genetic abnormalities are also important for some forms of cancer in childhood.

There is some evidence of a decline in mortality from cancer in childhood, but not in incidence. This indicates improved prognosis, especially for leukemia. As Figure 12 shows, cancer is the fourth most important cause of death in childhood, after causes of perinatal mortality, fatal congenital anomalies, and motor vehicle accidents. However the first two causes of deaths on this list affect mostly children in the first year of life, and in children aged 1-14, cancer is the second leading cause of death.

TABLE 11. New Cases and Deaths for Leading Sites of Cancer for Children Aged 0-14, Canada, 1984 and 1987

Cancer sites[1]	New cases 1984		Deaths 1987	
	Number	Per cent	Number	Per cent
All cancers[2,3]	**851**	**100.0**	**249**	**100.0**
Leukemia	259	30.4	97	39.0
Brain and other nervous system	172	20.2	59	23.7
Lymphomas	96	11.3	12	4.8
Kidney	51	6.0	6	2.4
Bone	41	4.8	7	2.8
Connective tissue	40	4.7	8	3.2
Adrenal glands	28	3.3	20	8.0
Eye	25	2.9	2	0.8
All other cancer	139	16.3	38	15.3

1 *Ranked in order of number of incidence cases.*
2 *Excludes non-melanoma skin cancer (ICD-9 173).*
3 *Percentage totals may not add due to rounding.*

MORTALITY FOR LEADING CAUSES OF DEATHS

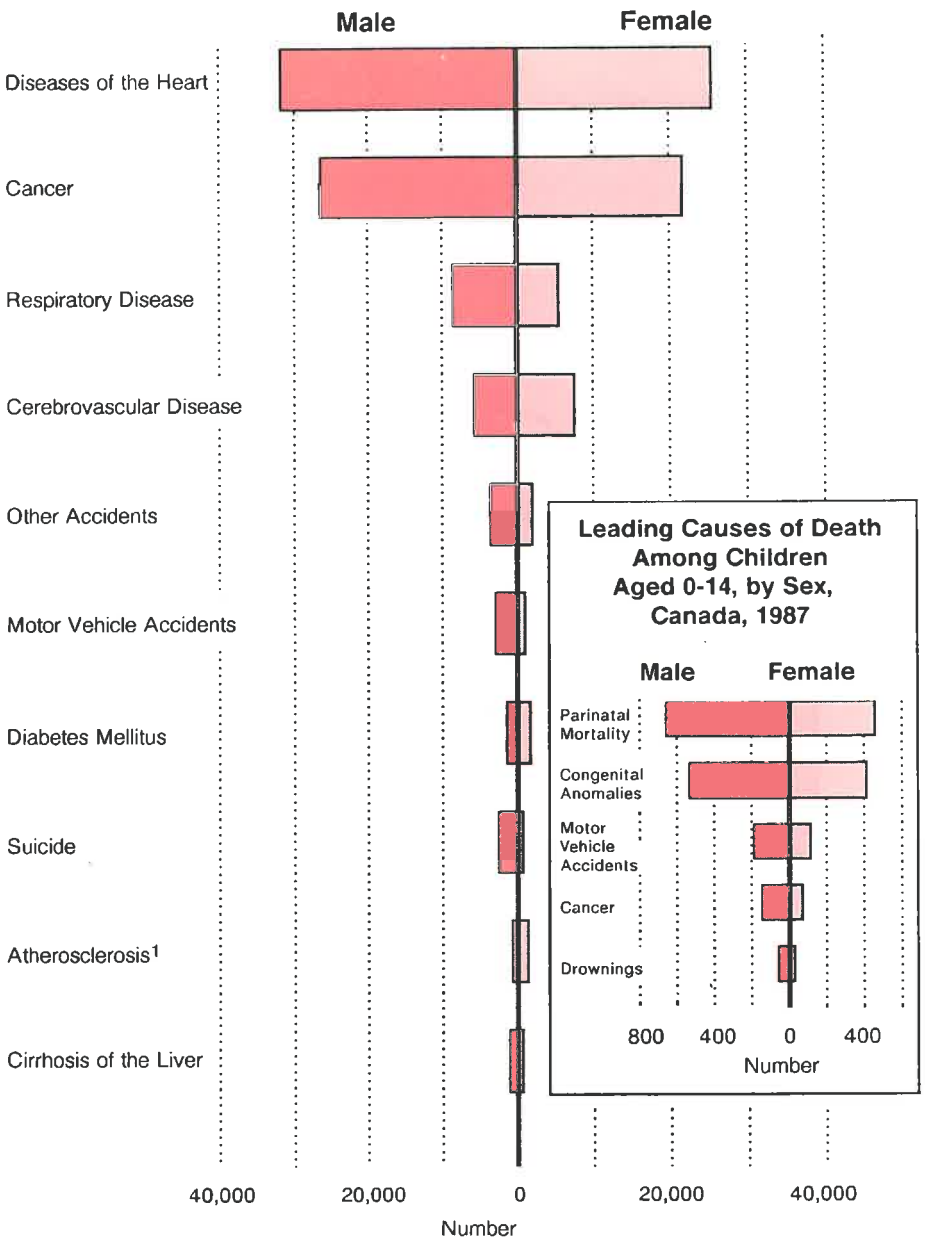
PERSON YEARS OF LIFE LOST DUE TO CANCER

In 1987, cancer was second only to diseases of the heart in terms of the number of deaths in both males and females, accounting for about a quarter of all deaths in both sexes (Figure 12).

Table 12 shows estimates for the lifetime probability of dying from cancer, as well as the person-years of life lost due to cancer. The latter is calculated by subtracting the age at death of each victim from the expectation of life at that age, and adding over all cancer deaths in a given year. The toll of three quarters of a million expected years of life lost each year is enormous. Lung, breast and colorectal cancer account for over half of it.

Although there are more male than female cancer deaths, females live longer than males and many of the cancer deaths among females occur at somewhat younger ages, due to cancers of the breast and female genital organs. In consequence, the person-years of life lost due to cancer is a little higher in females (380,000 person-years) than in males (368,000 person-years). Figure 13 shows that the toll has increased steadily (2.6 per cent per year) in both sexes since 1970.

Figure 12
Mortality for Leading Causes of Death, by Sex, Canada, 1987

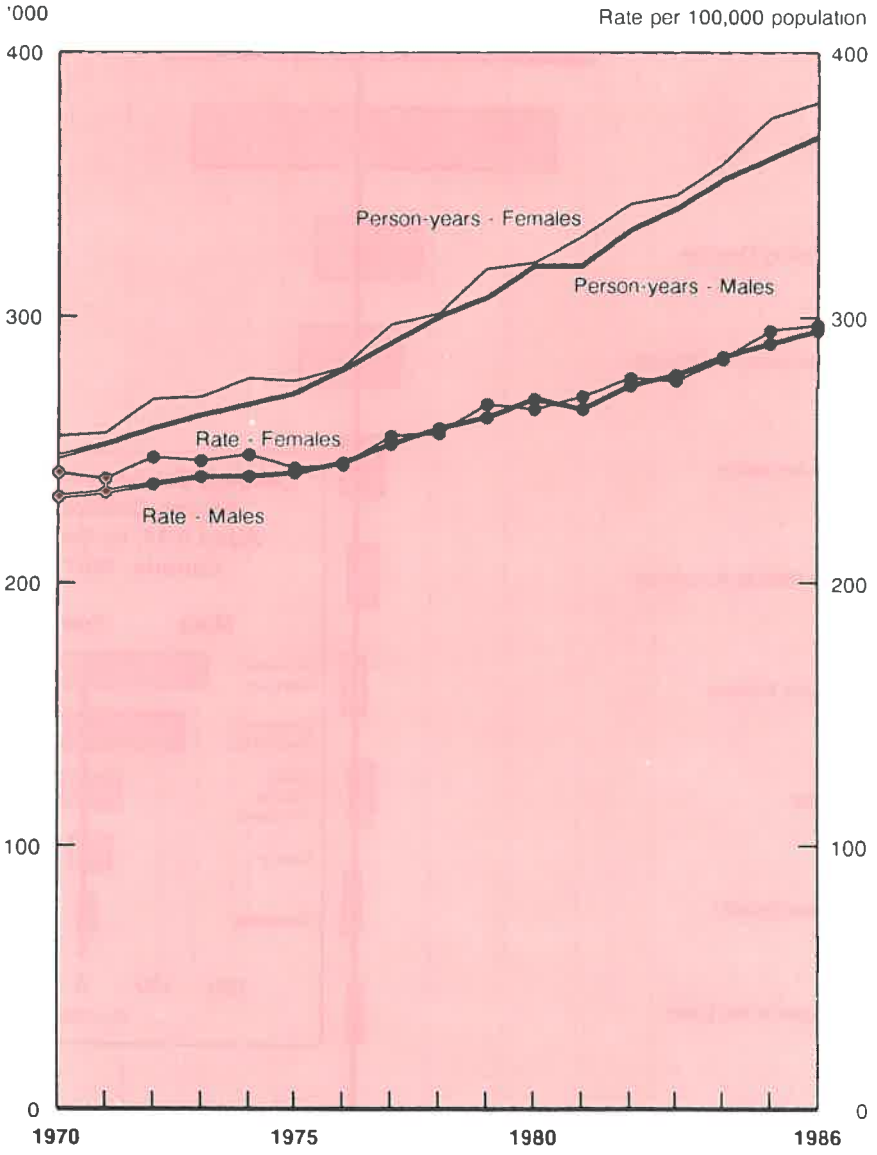


[1] Includes atherosclerotic regions other than heart or brain.

Source: Vital Statistics and Disease Registries Section, Statistics Canada

Figure 13

Person Years of Life Lost from Cancer,[1] Canada, 1970-1986 (number and rate per 100,000)



[1] Based on life expectancy.

Source: Surveillance and Risk Assessment Division, Health and Welfare Canada.

TABLE 12 Person Years of Life Lost and Lifetime Probability of Death from Cancer in Canada, 1986

	Person years of life lost[1,2]						Lifetime probability of death (%)	
	Total[3]		Males		Females			
	Years	%	Years	%	Years	%	Male	Female
All cancers	**749,000**	**100.0**	**368,000**	**100.0**	**380,000**	**100.0**	**25.1**	**21.4**
Lung	181,000	24.2	119,000	32.3	62,000	16.2	8.0	3.0
Breast	87,000	11.6	..	..	87,000	22.9	..	4.1
Colorectal	78,000	10.4	37,000	10.1	41,000	10.7	2.8	3.1
Lymphomas	44,000	5.9	23,000	6.3	21,000	5.5	1.3	1.1
Pancreas	36,000	4.8	18,000	4.9	17,000	4.6	1.3	1.3
Leukemia	34,000	4.5	19,000	5.2	15,000	4.0	0.9	0.7
Stomach	30,000	4.0	18,000	4.8	13,000	3.4	1.3	1.0
Brain	29,000	3.9	16,000	4.3	13,000	3.4	0.5	0.4
Prostate	25,000	3.3	25,000	6.9	...	...	3.1	...
Ovary	21,000	2.8	...	...	21,000	5.6	...	1.1
Oral	16,000	2.1	11,000	3.0	5,000	1.2	0.6	0.3
Kidney	15,000	2.0	9,000	2.5	6,000	1.6	0.6	0.4
Bladder	11,000	1.4	7,000	2.0	3,000	0.9	0.8	0.4
Cervix	11,000	1.4	...	...	11,000	2.8	...	0.4
Melanoma	10,000	1.3	5,000	1.5	4,000	1.1	0.2	0.2
Uterus	5,000	0.7	...	...	5,000	1.3	...	0.3

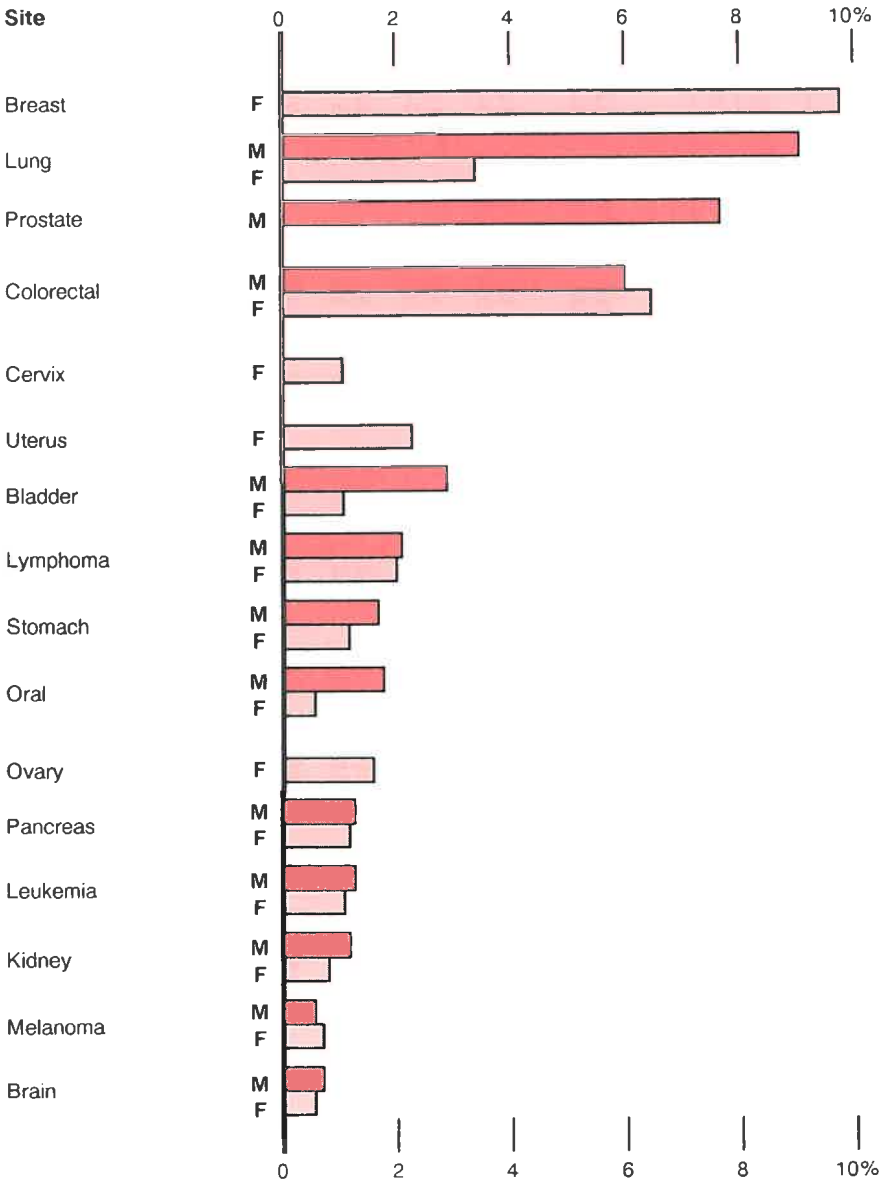
1 *Ranked in order of total PYLL for both sexes combined.*
2 *Based on life expectancy.*
3 *Totals may not add due to rounding.*
.. *figures not available.*
... *figures not appropriate or not applicable.*
Source: *Surveillance and Risk Assessment Division, Health and Welfare Canada.*

LIFETIME PROBABILITY OF DEVELOPING CANCER

Figure 14 and Table 13 show estimates of the probability that an individual Canadian will develop a particular form of cancer, assuming current incidence and mortality rates are maintained. Excluding skin cancer, over one in three Canadians will develop some form of cancer during their life. The probability of developing certain types of cancer ranges between 5% and 10% e.g., cancer of the breast in females, cancer of the prostate and lung in males and colorectal cancer in both sexes. These are clearly the targets for prevention programs. The risks for other cancers, though not negligible, are quite small, mostly less than 2%. They could be compared with the lifetime risks for accidental death of 6% in males and 4% in females, and, for suicide, 1.4% in males and 0.6% in females.

Figure 14

Probability (in per cent) at Birth[1] of Eventually Developing Cancer at Selected Sites, by Sex, Canada, 1984



[1] Probability is calculated from birth to age 90.

Source: Surveillance and Risk Assessment Division, Health and Welfare Canada.

TABLE 13. Probability of Developing Cancer of Major Sites by a Given Age for Persons at Selected Ages Previously Undiagnosed with Cancer at that Site, by Sex, Canada, 1984

Site	ICD-9[1]	Sex	Birth to age 25	Birth to age 50	Birth to age 75	Birth to age 90	Age 25 to age 50	Age 25 to age 75	Age 25 to age 90	Age 50 to age 75	Age 50 to age 90	Age 75 to age 90
			per cent									
All invasive cancer[2]	**140-208**	**M**	**0.5**	**2.9**	**24.7**	**36.8**	**2.5**	**24.9**	**37.4**	**24.0**	**37.4**	**27.6**
		F	**0.5**	**4.7**	**22.4**	**34.7**	**4.3**	**22.4**	**34.9**	**19.2**	**32.5**	**20.0**
Oral	140-149	M	0.0	0.2	1.3	1.8	0.2	1.3	1.8	1.2	1.7	1.0
		F	0.0	0.1	0.4	0.6	0.1	0.4	0.6	0.4	0.6	0.3
Stomach	151	M	0.0	0.1	1.0	1.7	0.1	1.1	1.8	1.0	1.8	1.3
		F	0.0	0.1	0.5	1.2	0.1	0.5	1.2	0.4	1.1	0.9
Colorectal	153-154	M	0.0	0.3	3.6	6.0	0.3	3.7	6.2	3.6	6.2	4.7
		F	0.0	0.3	3.2	6.5	0.3	3.3	6.5	3.1	6.5	4.6
Pancreas	157	M	0.0	0.0	0.8	1.3	0.0	0.8	1.3	0.8	1.3	0.9
		F	0.0	0.0	0.5	1.2	0.0	0.5	1.2	0.5	1.2	0.9
Lung	162	M	0.0	0.4	6.4	9.1	0.4	6.6	9.3	6.6	9.5	5.2
		F	0.0	0.2	2.4	3.4	0.2	2.5	3.5	2.3	3.3	1.4
Malignant melanoma	172	M	0.0	0.2	0.5	0.6	0.2	0.5	0.6	0.3	0.4	0.2
		F	0.0	0.2	0.5	0.7	0.2	0.5	0.7	0.3	0.5	0.2
Breast	174	F	0.0	1.6	6.8	9.8	1.7	6.9	10.0	5.5	8.7	4.4

Site	ICD-9[1]	Sex	Birth to age				Age 25 to age			Age 50 to age		Age 75 to age
			25	50	75	90	50	75	90	75	90	90
			per cent									
Cervix	180	F	0.0	0.5	0.9	1.1	0.5	0.9	1.1	0.5	0.7	0.3
Uterus	182	F	0.0	0.2	1.8	2.3	0.2	1.8	2.3	1.7	2.2	0.7
Ovary	183	F	0.0	0.3	1.2	1.6	0.2	1.1	1.6	0.9	1.4	0.7
Prostate	185	M	0.0	0.0	3.7	7.7	0.0	3.8	7.9	4.0	8.3	7.9
Bladder	188	M	0.0	0.1	1.7	2.9	0.1	1.7	3.0	1.7	3.0	2.5
		F	0.0	0.1	0.5	1.1	0.0	0.5	1.2	0.5	1.1	0.8
Kidney	189	M	0.0	0.1	0.9	1.2	0.1	0.9	1.2	0.8	1.2	0.6
		F	0.0	0.1	0.5	0.8	0.1	0.4	0.8	0.4	0.7	0.4
Brain	191,192	M	0.1	0.2	0.6	0.7	0.1	0.5	0.6	0.4	0.5	0.2
		F	0.1	0.2	0.5	0.6	0.1	0.4	0.5	0.3	0.5	0.2
Lymphoma	200-203	M	0.1	0.4	1.5	2.1	0.3	1.5	2.1	1.2	1.9	1.1
		F	0.1	0.3	1.2	2.0	0.2	1.2	2.0	1.1	1.8	1.1
Leukemia	204-208	M	0.1	0.2	0.9	1.3	0.1	0.8	1.3	0.7	1.2	0.9
		F	0.1	0.2	0.6	1.1	0.1	0.5	1.1	0.4	1.0	0.7

[1] *ICD-9 refers to the ninth revision of the International Classification of Diseases.*
[2] *Excludes non-melanoma skin cancer (ICD-9 173).*
Source: *Surveillance and Risk Assessment Division, Health and Welfare Canada.*

PREVALENCE OF CANCER

At the end of 1989, an estimated 427,000 cancer survivors will reside in Canada (Table 14). Prevalence of cancer, defined as the number of cancer patients surviving up to ten years post-diagnosis, appears to be rising in Canada. This reflects the rising incidence due not only to population growth, particularly as Canada's population ages, but also to overall increase in the incidence of certain forms of cancer, as well as any improvements in survival rates.

The estimates of prevalent cases of cancer presented here must be considered as conservative because only cases diagnosed in the last ten years are considered. Nevertheless, these data together with the data on hospital separations (Table 8) provide a useful indicator of the proportion of the population requiring specific treatment and follow-up care. Because prevalence is dependent on both incidence plus mean survival, cancers with above average survival (eg. female breast cancer) will account for proportionately more prevalent (31%) than incident (26%) cases, while cancers with poor survival (eg. stomach cancer), account for relatively few prevalent cases of cancer.

TABLE 14. Prevalence[1] of Cancer by Cancer Site and Sex, Canada, 1989

Site	Total	Males	Females
All cancers	**427,000**	**190,000**	**237,000**
Oral	16,900	12,600	4,300
Stomach	5,700	3,200	2,500
Colorectal	61,000	30,000	31,000
Pancreas	1,800	1,000	800
Lung	22,000	14,300	7,700
Melanoma	14,400	6,100	8,300
Breast (female)	78,000	...	78,000
Prostate	39,000	39,000	...
Uterus (incl. cervix)	32,000	...	32,000
Ovary	7,800	...	7,800
Kidney	10,300	6,300	4,000
Bladder	26,400	19,300	7,100
Brain	4,600	2,500	2,100
Lymphomas	28,700	12,500	16,200
Leukemia	11,400	6,400	5,000

[1] *Estimated number of persons alive at December 31, 1989 who ever developed cancer from 1980 on.*

Source: *Surveillance and Risk Assessment Division, Health and Welfare, Canada.*

CANCER INCIDENCE AND MORTALITY: AN INTERNATIONAL COMPARISON

Table 15 gives a selection of recent cancer incidence and mortality rates in those countries having a cancer incidence registry covering the entire population, as published by the World Health Organization and the International Agency for Research on Cancer. The rates have been adjusted for differences in age distribution, but other possible artifacts remain, such as differences in medical diagnosis and treatment, or in the coding procedures used to classify the cause of death or incident case of cancer. Differences in mortality are usually assumed to be due to differences in incidence, but they may also reflect differences in prognosis.

Despite these problems in interpretation, international comparisons of cancer incidence and mortality have produced many consistent patterns, raising fruitful avenues of research. Some are seen in this table - the high lung cancer incidence and mortality in Scotland and high stomach cancer and low breast cancer rates in Finland.

Canada has average mortality rates but relatively high incidence rates for most types of cancer, (Figures 15.1, 15.2); incidence rates are particularly high for oral and colorectal cancers in both men and women. Further, incidence but not mortality of female breast cancer in Canada is the highest of the countries included. Although high incidence rates for cancer of the uterine body, and average rates for the uterine cervix are found in Canada the corresponding mortality rates for the uterus (cervix plus body) are at average levels. Canadian incidence rates for prostate cancer and leukemia in males also tend to be high, with high mortality rates found for leukemia, but average mortality for prostate.

While some of these differences in incidence and mortality rankings for Canada may be due to more thorough registration of cancer cases in Canada, others may reflect differences in the nature of disease as it occurs in different countries, as well as possible differences in the level of patient care and cancer survival rates.

TABLE 15. Cancer: An International Comparison. Age-standardized[1] Incidence and Mortality Rates for Major Sites for Selected Countries with Cancer Registries

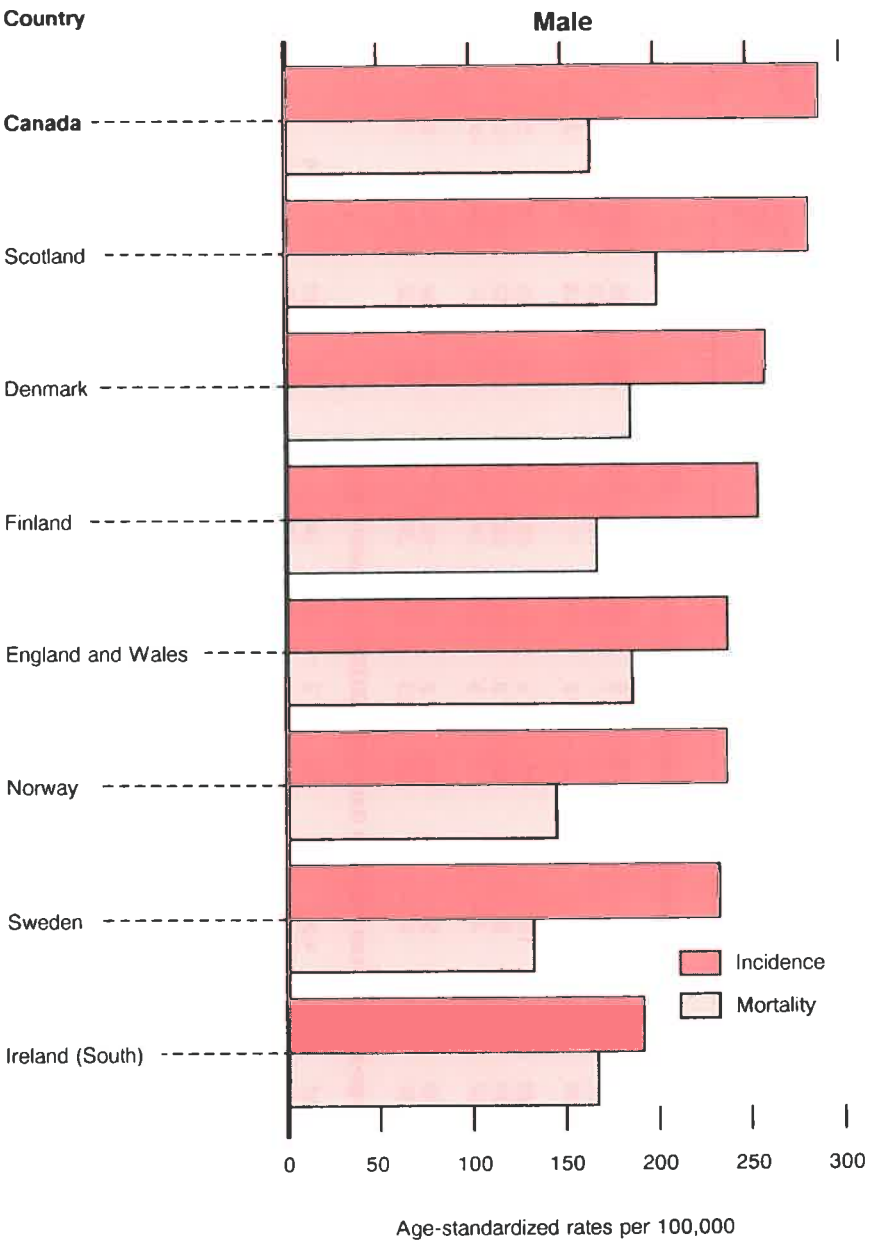
Country	All sites (except 173)		Oral 140-149		Stomach 151		Colorectal 153-154		Lung 162		Breast 174	Cervix 180	Uterus 182	Prostate 185	Leukemia 204-208	
	M	F	M	F	M	F	M	F	M	F	F	F	F	M	M	F
Age-standardized Incidence Rates per 100,000 population 1978-1982																
CANADA	**289**	**236**	**15**	**4**	**13**	**6**	**39**	**32**	**61**	**17**	**66**	**11**	**17**	**44**	**10**	**6**
Denmark	261	241	9	3	14	7	36	30	57	17	63	19	15	28	9	6
Finland	256	175	9	3	25	13	20	17	74	7	45	6	12	34	8	6
Ireland, Southern	192	181	17	3	12	4	31	26	36	12	60	6	5	20	6	5
Norway	238	212	8	2	18	9	32	28	31	7	52	16	12	42	8	5
Sweden	233	224	7	3	15	8	28	24	25	8	61	10	13	46	8	6
UK, England and Wales	239	192	5	2	19	8	30	23	72	19	54	12	8	21	7	4
UK, Scotland	284	224	8	4	20	10	34	27	91	26	60	12	7	23	7	5
Age-standardized Mortality Rates per 100,000 population 1984																
CANADA	**167**	**109**	**4.3**	**1.5**	**9**	**3**	**18**	**14**	**57**	**17**	**24**	**5.4**		**15**	**6.6**	**4.1**
Denmark	188	142	3.4	1.3	10	5	23	19	56	21	27	9.7		18	6.7	4.5
Finland	169	95	2.1	0.9	16	9	13	10	58	6	16	4.6		16	6.2	4.1
Ireland, Southern	168	124	4.3	1.2	15	8	21	17	51	18	26	6.3		16	5.0	3.2
Norway	147	103	3.2	1.2	13	7	19	14	29	8	18	6.6		20	6.2	3.3
Sweden	133	101	2.7	1.0	10	5	15	12	25	8	18	5.6		18	5.1	3.5
UK, England and Wales	188	129	3.0	1.3	16	7	21	15	67	20	29	7.6		14	5.7	3.5
UK, Scotland	202	139	3.4	1.4	14	8	21	16	81	27	28	8.7		5	4.7	3.2

[1] *Age-standardized to the world population.*

Source: *Incidence Rates: Cancer Incidence in Five Continents, Vol. V. Mortality Rates: World Health Statistics Annual 1985-1986.*

Figure 15.1

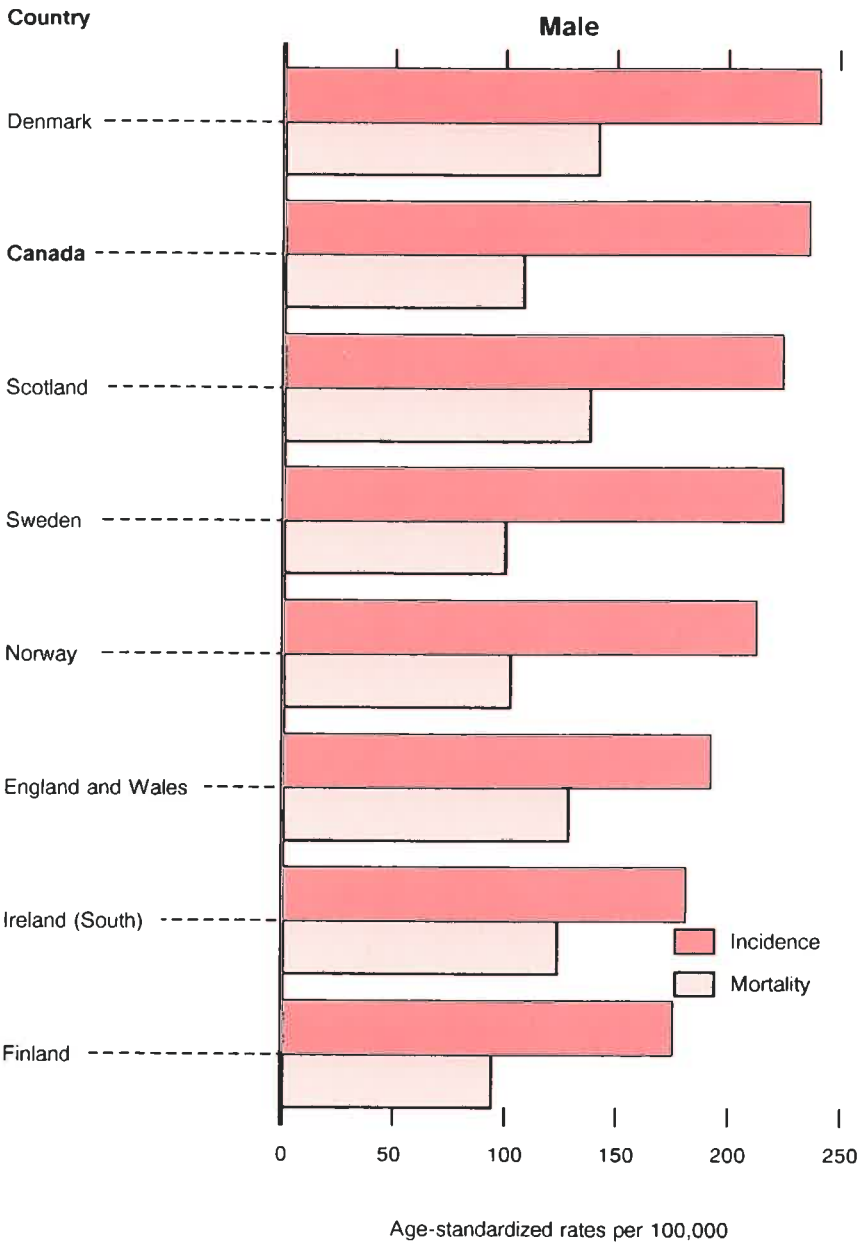
Cancer Incidence and Mortality in Selected Countries by Sex (All Cancers, Male), by Rank Order of Incidence Rates



Source: Table 15.

Figure 15.2

Cancer Incidence and Mortality in Selected Countries by Sex (All Cancers, Female), by Rank Order of Incidence Rates



Source: Table 15.

METHODOLOGICAL APPENDIX

Data Sources and Processing

The cancer incidence and mortality data used in the presentation of actual levels and rates (to 1984 for incidence and to 1987 for mortality) and in the estimation of 1989 mortality levels and rates were obtained from three sources: mortality data files (1970-1987) and the National Cancer Incidence Reporting System (1970-1984), both maintained by the Vital Statistics and Disease Registries Section, Statistics Canada (1,2), and aggregate data on cancer incidence by age and sex (1970-1984) provided by the Ontario Cancer Treatment and Research Foundation. For the estimation of 1989 incidence levels and rates these sources were supplemented by preliminary cancer incidence data extracted from the original provincial data tapes for the following provinces and years: Alberta, 1985; Newfoundland, British Columbia and Saskatchewan, 1985, 1986; Nova Scotia and Manitoba, 1985-1987. Descriptions of the collection and processing mechanisms used in creating these data bases and discussion of quality issues are given in (1),(2), and (3).

Records for each of the ten provinces and for both sexes were extracted from these data bases. The records were then classified, using the ninth revision of the International Classification of Diseases or ICD-9(4), into the following categories: oral, 140-149; stomach, 151; colorectal, 153-154; pancreas, 157; lung, 162; melanoma, 172; breast, 174; cervix, 180; body of uterus, 182; ovary, 183; prostate, 185; bladder, 188; kidney, 189; brain, 191-192; lymphoma, 200-203; leukemia, 204-208 and all cancers, 140- 208 (excluding 173, non-melanoma skin cancer). Canada totals for each category were then determined as the sum of the 10 provinces.

Population figures for Canada and the provinces were taken from censal, inter-censal, and post-censal estimates for 1970-1988 and from population projections for 1989.

Calculation of Estimates of New Cases and Deaths (Tables 1-5, Figures 1 - 7)

Crude incidence and mortality rates for each province, sex, site, and year were computed by dividing the number of cases by the corresponding population figures. Age-standardized incidence and mortality rates were calculated using a World population(5).

Cancer mortality counts in 1989 for each site and sex of interest were estimated by maximum likelihood fitting of models to the provincial and Canadian yearly values. The yearly counts were assumed to follow independent Poisson distributions, with mean values being a product of yearly population sizes and yearly death rates. For all sites, except those noted below, a linear model for death rates, with year as the only independent variable, was used. Year-squared terms were also included for all cancer sites, lung, prostate and breast cancer. For cervical cancer and stomach cancer, a linear model for the log transformation of death rates was used. A further adjustment to the estimated death counts was made to have the provincial values sum to the Canadian figure.

Cancer incidence counts for 1989 in each province except Quebec were estimated in a similar manner, with linear models having year as the only independent variable being used for all sites. Exceptions were: all cancers in Alberta, and female lung (all provinces) where a year-squared term was also included; and cervix where a linear model on the log-transformed rates was used. For Quebec, an additional parameter was included to account for underregistration known to have occurred prior to 1977; this parameter was assumed to have been a fixed proportion of the true number of cases in that time period. A model was not fitted to the Canadian data; instead, to take advantage of the longer data series available for some provinces, estimates for Canada were computed as the sum of the estimates for each province.

Age-standardized incidence rates (ASIRs) and **mortality rates** (ASMRs) for 1989 were estimated using weighted linear regression. The weights, which were taken as the inverse of the estimated variances of the age-standardized rates, were calculated under the assumption that the age-specific counts employed 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 the Quebec ASIRs, regressions again included an additional parameter to account for the period of underregistration prior to 1977. Canadian ASIRs prior to 1977 (presented in Figures 2-6) were adjusted to account for the estimated underregistration in Quebec.

Accuracy and precision: The standard error and coefficient of variation were computed to indicate the precision of each estimate; these values are available upon request to Vital Statistics and Disease Registries Section of Statistics Canada. Readers are reminded that estimates are subject to error and that the degree of precision depends on the adequacy of the model, as well as the number of observed cases and population size in each site – sex – province domain.

Due to changes and improvements to the cancer incidence data provided by the provinces, and the changes in the methodology for producing the estimates of cancer incidence and deaths, estimates in the 1989 report may not be directly comparable to those published in 1987 and 1988. More detailed information on these methods can be found in technical papers available from Vital Statistics and Disease Registries Section, Statistics Canada(6,7).

Cancer Survival (Table 10, Figures 8 and 9)

Survival data provided by the Alberta Cancer Registry for new cases diagnosed between 1974 and 1978 were analyzed to determine one, three, and five year relative survival rates. Relative survival rates were calculated by adjusting the crude survival for the normal life expectancy of the Alberta population of the same age and sex for the same time periods(8). Relative survival rates for the United States were obtained from the SEER program(9) and for Britain from published sources(10).

Lifetime Probability of Developing Cancer (Table 13, Figure 14)

Probabilities were calculated based on the age- and sex-specific cancer incidence rates for Canada in 1984, using methodology based on Zdeb(11) and Seidman(12). 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.

Person Years of Life Lost (Table 12, Figure 13)

This indicator 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 can be seen as 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(13).

Life Time Probability of Death from Cancer (Table 12)

This probability represents the proportion of persons dying from cancer in a cohort subjected to the mortality conditions prevailing in the population at large(14). This indicator 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.

Prevalence of Cancer(Table 14)

Prevalence of a specific cancer at the end of 1989 can be calculated by summing up estimated incidence in 1989 multiplied by the one year estimated survival rate, estimated incidence in 1988 multiplied by the two year survival rate and so on. In our case, calculations were performed on monthly intervals over a ten year period.

The incidence data used were actual counts for the years 1980-84, and estimates from 1985-89. Survival rates over the 10 year period for three age groups (0-34, 35-64, 65 +) were obtained by fitting Weibull log-normal and log-logistic survival distributions to the Alberta survival data (8), and selecting the best model according to log-likelihood criteria. Prevalence for all ages was then calculated as the sum of prevalence for each age group.

Prevalence counts calculated by this method can be considered as underestimates as we are unable to account for persons surviving longer than 10 years, due to lack of reliable information on survival rates.

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(11) Zdeb MS "The probability of developing cancer", Am. J. Epidemiol. 106:6-16, 1977.

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(14) Ibid pp. 155-157.

FOR FURTHER INFORMATION:

More detailed information on numbers and rates of cancer incidence, mortality and hospital morbidity are found in several Statistics Canada Catalogues.

If you require more detailed information on cancer, you may wish to order one of the following:

Cancer in Canada, 1984
Catalogue 82-207

Causes of Death, 1987
Catalogue 84-203

Mortality - Summary List of Causes, 1987
Catalogue 84-206

Please contact the Statistics Canada, reference centre nearest you for further information.

St. John's	(772-4073)	Winnipeg	(983)4020)
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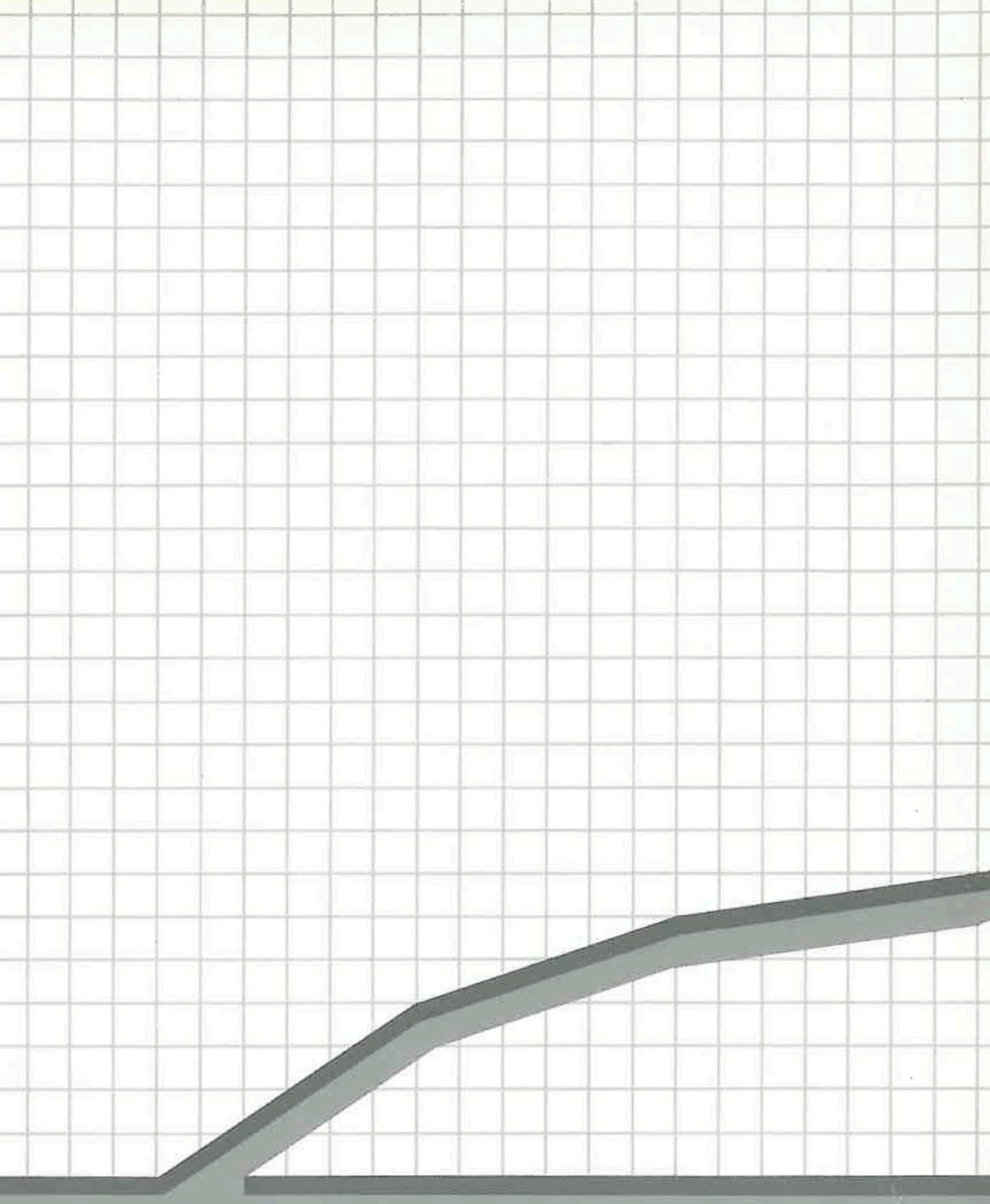

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