Cancer in Alberta

2008 Report on Cancer Statistics in Alberta

November 25, 2011

ERRATUM: *Cancer in Alberta,* 2008 Report on Cancer Statistics in Alberta

There was an error in the title of **Table 2-6** (page 15) where there was a repetition of the words 'Sexes, Alberta, 2008'.

The title of **Table 2-6** (page 15) should read:

"*Table 2-6:* **Incidence and Mortality Counts by Cancer Type, Both Sexes, Males and Females, Alberta, 2008**"

This report has been updated with the correct title.

Acknowledgements

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Cancer Surveillance: *2008 Report on Cancer Statistics in Alberta.* Edmonton: Surveillance and Health Status Assessment, Alberta Health Services, 2010.

For More Information:
Visit our website: http://www.albertahealthservices.ca/1703.asp

Cancer Surveillance
Surveillance and Health Status Assessment
Alberta Health Services
Telephone: (780) 643-4496
Fax: (780) 643-4380
Email: ACB.surveillance@albertahealthservices.ca

Surveillance and Health Status Assessment
Cancer Surveillance

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Purpose of the Report

Cancer Surveillance, a specialized team within Surveillance and Health Status Assessment, Alberta Health Services actively contributes to Becoming the Best: Alberta's 5-year Health Action Plan and the goal to create the best-performing publicly funded health system in Canada. This is accomplished by conducting cancer *surveillance* through the collection, integration, analysis and dissemination of cancer related data and information.

The report is designed to provide comprehensive and detailed information regarding cancer in Alberta. It will help support health professionals, researchers and policy makers in the planning, monitoring and evaluation of cancer-related health programs and initiatives. It will also be a useful education tool for the general public and media.

Navigating the Report

This document provides information on cancer statistics in Alberta. Details about individual cancer types are available within separate documents. The words highlighted in *dark blue* are terms described in detail within the **Glossary**.

Data Notes

In this document, the term "cancer" refers to *invasive cancers* unless otherwise specified. It is important to note that this document contains both actual and estimated data; distinctions are made where applicable. The numbers published in this report should be considered provisional, as a few cases and deaths may be registered in subsequent years. The data in this report reflect the state of the Alberta Cancer Registry as of August 6, 2010.

Incidence *rates* presented in this document exclude non-melanoma skin cancer cases (basal and squamous). Although approximately 30% of the *malignant* cancers diagnosed among Albertans each year are non-melanoma skin cancer, these *tumours* are generally not life-threatening and are inconsistently reported and coded inconsistently across registries; therefore non-melanoma skin cancer is rarely included in cancer registry reports.

For detailed descriptions about data sources and how they affect data presented in this report, please see the **Data Sources and Quality** section.

Summary

- In 2008, there were **14,605** new cancer cases diagnosed in Alberta and **5,610** Albertans died from the disease.
- Cancer accounted for **27%** of deaths in the province for all ages in 2008; the second leading cause of death in Alberta after circulatory system diseases (**32%**). It accounted for **36%** of deaths in the 35-64 age group which is more than circulatory system, respiratory system and digestive system diseases combined.
- In 2008, cancer was the second leading contributor, after injury, to potential years of life lost (PYLL) for males and females, representing **21%** of the PYLL resulting from all causes of death in Alberta.
- Approximately **1 in 2** males and **1 in 3** females in Alberta will develop cancer in their lifetime, and **1 in 4** Albertans will die from cancer.
- As of December 31, 2008, approximately **105,020** Albertans were alive who had previously been diagnosed with cancer.
- The most commonly diagnosed cancers in Alberta in 2008 were prostate, breast, lung and colorectal. These four cancers accounted for **53%** of new cancer cases and about half of cancer deaths.

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Cancer in Alberta

Cancer is a group of more than 200 different diseases that are characterized by abnormal cells in the body that divide and spread without control.[1]

Cancer is a significant health issue that affects a large number of people in Alberta. In 2008 there were 14,605 cancer cases diagnosed in Alberta and 5,610 Albertans died from the disease. According to the most recent statistics available from the Government of Alberta, 27% of all deaths in Alberta in 2008 were attributable to cancer.[2] For those 35-64 years of age, 36% of deaths were due to cancer; more than deaths from circulatory system diseases, respiratory system diseases and digestive system diseases combined.

In order to develop a clear understanding of the effect of cancer on the population in the province, it is important to consider the numbers of people affected, their age and sex, and also where people live in the province. This can be done through an assessment of the burden cancer imposes on our population (New Cancer Cases, Cancer Deaths, Lifetime Probability of Developing or Dying from Cancer) as well as through an examination of the size and structure of the Alberta population (Demography). It is also important to evaluate the extent to which various types of cancers contribute to the overall cancer burden (New Cancer Cases by Site, Cancer Deaths by Site, Potential Years of Life Lost and Cancer Prevalence).

Provincial cancer statistical information helps health professionals develop screening, prevention and treatment programs that can lessen the effect of cancer on the population (Incidence and Mortality Trends, Cancer Projections, Relative Survival and Incidence of Selected Cancer Sites by Zones).

The following sections will outline all of these points in detail.

Demography of the Alberta Population

Demography is the study of population characteristics including population size, distribution, structure and change. Estimation of changes in the size and age structure of a population over time can help predict trends in the number of cancer diagnoses over time. Even if cancer rates remained constant, as the population of Alberta increases due to immigration and population growth (births), a rise in the total number of people diagnosed with cancer would be expected. Higher overall cancer incidence counts would also be expected as the proportion of the population within older age groups increases because many cancers occur more frequently in older age groups.

 Comparing population estimates in 1988 and 2008 with projections for 2028[3] shows that the population of Alberta is aging (*Figure 2-1*).

Population size

The population of Alberta has increased 40% over the past 20 years from 2.5 million in 1988 to 3.5 million in 2008. This growth is expected to continue over the next two decades and by 2028, the population is expected to increase an additional 33% to approximately 4.4 million.[3]

Population structure

The percentage of the population aged 65 and over has increased from 9% in 1988 to 11% in 2008. This older adult age group is expected to also increase to 18% of the total population in 2028. The proportion of the Alberta population

Figure 2-1: **Historical (1988), Actual (2008) and Projected (2028) Population Structure by Age Group and Sex, Alberta**
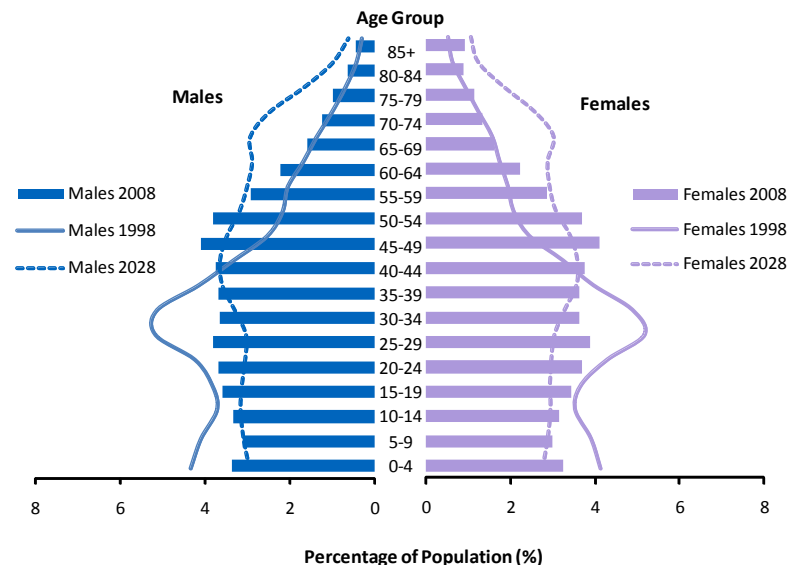
Data Source: Alberta Health and Wellness (AHW)[3]

Table 2-1: **Population, Mean Age, Median Age and Interquartile Age Range across Health Zones, Alberta, 2008**

Zone	Population	Mean Age	Median Age	25th Percentile Age	75th Percentile Age
South	272,105	37	35	18	54
Calgary	1,285,972	36	36	19	51
Central	431,194	37	36	18	53
Edmonton	1,092,220	37	36	20	52
North	413,455	34	32	16	49
Alberta	**3,494,946**	**36**	**35**	**19**	**52**

Data Source: Alberta Population Data, Alberta Health and Wellness (AHW)[3]

Figure 2-2: Trends in New Cases Attributed to Aging Population, Population Growth and Cancer Rate, Both Sexes, Alberta, 1988-2008
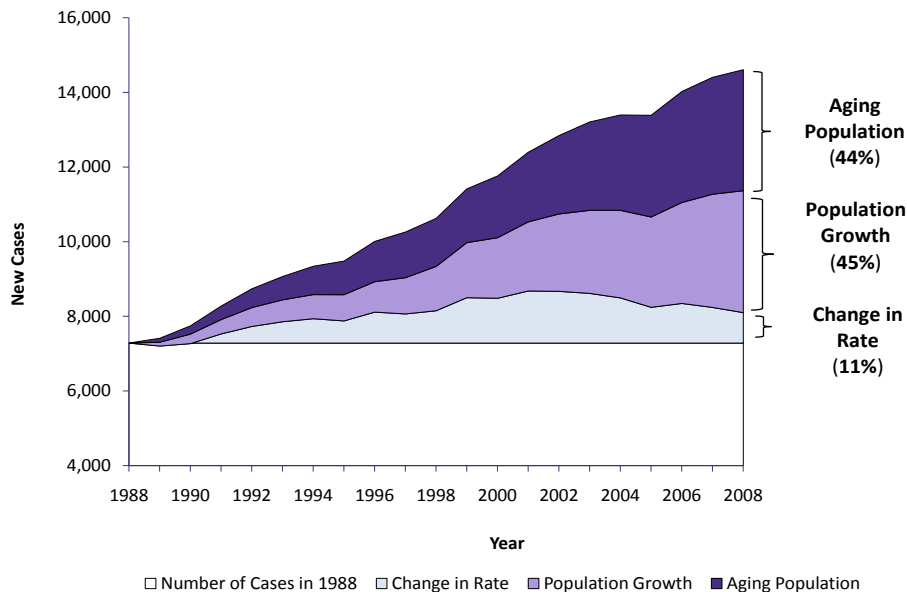
Data Source: Alberta Health and Wellness, Alberta Cancer Registry

Figure 2-3: Causes of Death in Alberta, All Ages, Both Sexes, Alberta, 2008
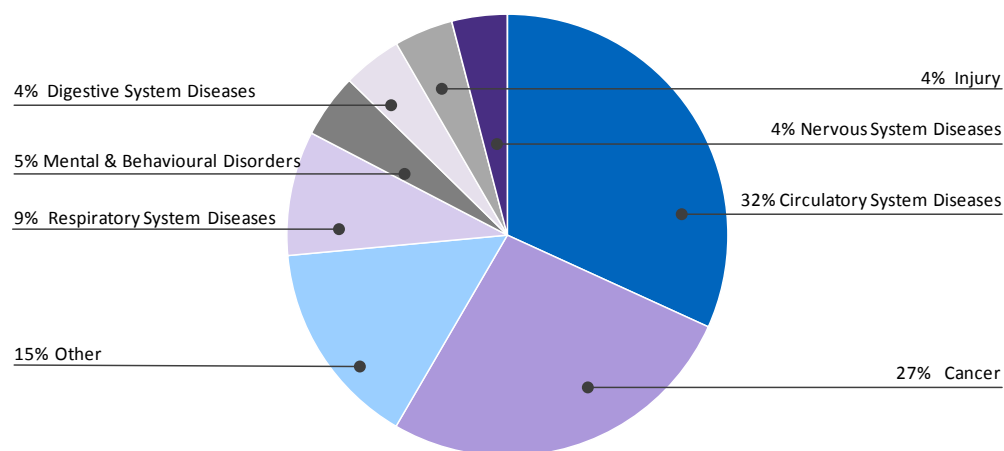
Data Source: Surveillance and Health Status Assessment with data obtained from Alberta Vital Statistics, Government of Alberta[2]

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aged 35-64 has increased in the last twenty years; in 1988, 35-64 year olds made up 31% of the population and in 2008 they made up 41% of the total population. The proportion of the population in this age group is expected to remain fairly constant over the next 20 years. In 1988, the ***median age*** of the population was 29 years. The median age of the population rose to 35 years in 2008 (***Table 2-1***) and is expected to increase to 41 years by 2028.

In 2008 the North Zone had the youngest age distribution with a median age of 32 years and 25% of the population less than 16 years of age, and 25% of the population greater than 49 years of age. The three central zones (Calgary, Edmonton and Central Zone) had the highest median age (36 years) with 25% of the population less than 19 years, 18 years and 20 years of age and 25% greater than 51 years, 53 years and 52 years respectively.

The South Zone had the same median age as the provincial median (35 years) but a wider distribution of ages with 25% of the population less than 18 years and 25% of the population greater than 54 years. This compares to 25% of the total population being less than 19 years and 25% of the total population being greater than 52 years (***Table 2-1***).

Changes in demography in Alberta (aging of the population and population growth) contributed far more new cases of cancer over the last two decades as compared to the minor change in the cancer rate (***Figure 2-2***).

The horizontal black line indicating 7,283 new cases in ***Figure 2-2*** represents the number of cancer cases that occurred in 1988. The line at the top of the purple-shaded area of the graph represents the number of new cases that actually occurred

between 1988 and 2008. Between these two lines, the three coloured areas reflect the increase in cases due to the impact of rate change, population growth and aging population.

The light blue shaded area (lower) represents the total number of new cases that would have occurred each year if the cancer incidence rates alone had changed but the population had remained the same as in 1988.

The light purple shaded area (middle) represents the number of new cases that would have occurred each year if the population alone had grown larger but the population age distribution had remained the same as in 1988. This accounts for 45% of the total increase in new cancer cases.

The dark purple shaded area (top) represents the number of new cases attributed to increases in the older adult population - the aging population. This accounts for 44% of the total increase in new cancer cases.

Causes of Death in Alberta

Cancer is one of the leading causes of death in Alberta; over a quarter of the deaths in the province in 2008 were due to cancer. The following two figures compare cancer-related deaths and deaths from other causes in Alberta.

According to the most recent statistics available from the Government of Alberta[2] (*Figure 2-3*), 27% of deaths in Alberta for all ages in 2008 were attributable to cancer, 32% were attributable to circulatory system diseases and 9% to respiratory system diseases. All other causes combined accounted for the remaining 32% of all deaths.

Figure 2-4: **Causes of Death, Ages 35-64, Both Sexes, Alberta, 2008**
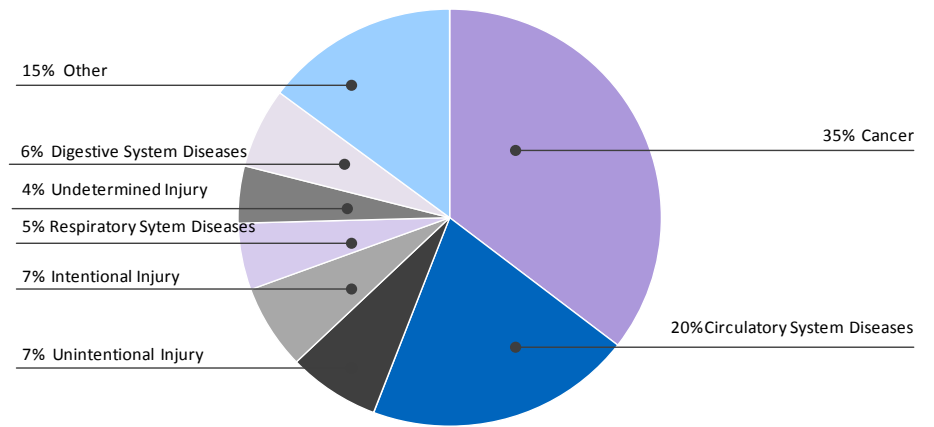
15% Other
6% Digestive System Diseases
4% Undetermined Injury
5% Respiratory Sytem Diseases
7% Intentional Injury
7% Unintentional Injury
35% Cancer
20% Circulatory System Diseases

Data Source: Surveillance and Health Status Assessment with data obtained from Alberta Vital Statistics, Government of Alberta[2]

Figure 2-5: **Selected Causes of Potential Years of Life Lost (PYLL) by Sex, Alberta, 2008[2], as Estimated by Alberta Health and Wellness**

Cancer
Diseases of the circulatory system
Unintentional injury
Ischaemic heart diseases
Intentional self-harm (Suicide)
Land transport
Diseases of the respiratory system
Cerebrovascular disease (stroke)

■ Males
■ Females

30 20 10 0 10 20 30

PYLL (1,000 Person Years)
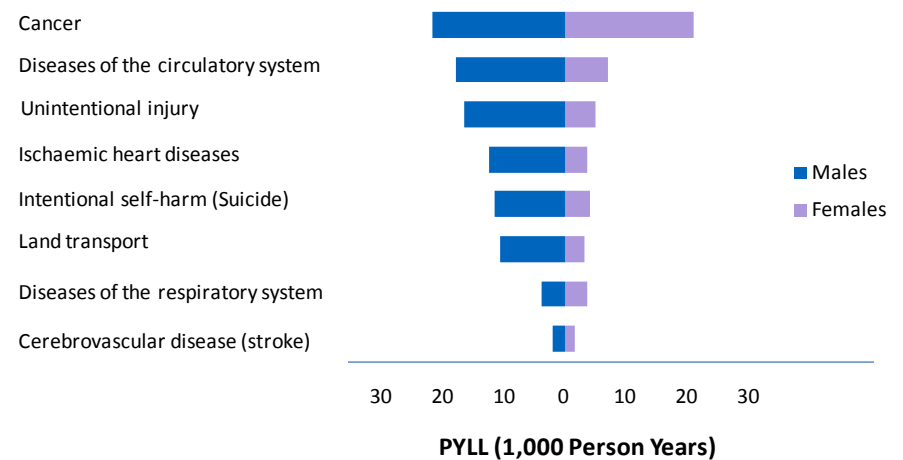
Data Source: Alberta Health and Wellness

Table 2-2: **Potential Years of Life Lost by Cancer Site and Sex, Alberta, 2008, as Estimated by Cancer Surveillance**

Cancer Type	Total		Male		Female	
	Years	%	Years	%	Years	%
All Cancers	87,106	**100.0**	42,018	**100.0**	45,088	**100.0**
Lung and Bronchus	21,401	**24.6**	9,842	**23.4**	11,559	**25.6**
Colorectal	9,000	**10.3**	4,940	**11.8**	4,060	**9.0**
Breast	7,744	**8.9**	43	**0.1**	7,701	**17.1**
Pancreas	4,498	**5.2**	2,220	**5.3**	2,278	**5.1**
Brain	4,124	**4.7**	2,604	**6.2**	1,520	**3.4**
Leukemia	3,294	**3.8**	1,796	**4.3**	1,498	**3.3**
Non-Hodgkin Lymphoma	3,275	**3.8**	1,909	**4.5**	1,366	**3.0**
Stomach	3,049	**3.5**	2,014	**4.8**	1,035	**2.3**
Prostate	2,972	**3.4**	2,972	**7.1**	0	**0.0**
Ovary	2,360	**2.7**	0	**0.0**	2,360	**5.2**
Kidney and Renal Pelvis	2,294	**2.6**	1,490	**3.5**	804	**1.8**
Esophagus	2,215	**2.5**	1,717	**4.1**	498	**1.1**
Oral	2,065	**2.4**	1,508	**3.6**	557	**1.2**
Liver	2,040	**2.3**	1,461	**3.5**	579	**1.3**
Bladder (including *in situ*)	1,432	**1.6**	973	**2.3**	459	**1.0**
Body of Uterus	1,327	**1.5**	0	**0.0**	1,327	**2.9**
Multiple Myeloma	1,220	**1.4**	585	**1.4**	635	**1.4**
Melanoma of the Skin	1,140	**1.3**	745	**1.8**	395	**0.9**
Cervix Uteri	828	**1.0**	0	**0.0**	828	**1.8**
Larynx	446	**0.5**	405	**1.0**	41	**0.1**
Testis	166	**0.2**	166	**0.4**	0	**0.0**
Thyroid	147	**0.2**	75	**0.2**	72	**0.2**
Hodgkin's Disease	143	**0.2**	42	**0.1**	101	**0.2**
All Other Cancers	9,925	**11.4**	4,512	**10.7**	5,413	**12.0**

Note: Count and percentage totals may not add up due to rounding.

Data Source: Alberta Cancer Registry

Although cancer is associated with aging, it is important to note that, for the 35–64 age group (*Figure 2-4*) cancer is the leading cause of death, accounting for 36% of all deaths, which is more than deaths from circulatory system disease, respiratory system diseases and digestive system diseases combined.

Potential Years of Life Lost

One frequently used measure of premature death is *potential years of life lost (PYLL)*, which is the number of years of life lost when a person dies prematurely from any cause, given their life expectancy.

Alberta Health and Wellness[13] calculates PYLL by taking the mid-point age in each age group, subtracting from 75 (the overall Canadian life expectancy), and multiplying by the number of deaths in that age group disaggregated by sex and cause of death to determine the years of life lost in each cohort (*Figure 2-5*).

The top nine causes of premature death in Alberta in 2008 are represented by potential years of life lost (PYLL) and are ranked in order of total PYLL for both males and females combined (*Figure 2-5*).

Overall, injury (unintentional injury, intentional self-harm and land transport) was the leading contributor to PYLL, representing about 26% of the total PYLL in the province. Cancer was the second leading contributor to PYLL for males and females, representing about 21% of the PYLL resulting from all causes of death in Alberta.

Cancer Surveillance calculates PYLL due to cancer by multiplying the number of deaths in each age group and the absolute difference between the mid-point age of an age group and the age-specific life expectancy. The age-specific life expectancy is calculated by determining the age to which an individual would have been expected to live had they not died from cancer.

Since cancer tends to affect people in older age-groups, this method accounts for deaths due to cancer that occur even after the 75-year cutoff that Alberta Health and Wellness uses. Therefore, the estimated PYLL due to cancer in *Table 2-2* is larger than that estimated by Alberta Health and Wellness (*Figure 2-5*).

 The PYLL for cancer sites shown in *Table 2-2* are ranked in decreasing order of total PYLL for both sexes combined and are calculated based on the age-specific life expectancy at the time of death. Lung cancer was the leading contributor to PYLL (21,401 years).

Even though pancreatic cancer comprised of only 2% of the total cancer cases diagnosed in Alberta in 2008, it was the fourth highest contributor to PYLL (4,498) among all cancer sites. On the other hand, prostate cancer is the most commonly diagnosed cancer yet it was ninth on the list of PYLL (2,972) attributable to cancer.

The top six cancer sites in terms of potential years of life lost (PYLL) for both sexes in decreasing order are lung, colorectal, breast, pancreas, brain and leukemia (*Figure 2-6*).   Deaths due to all cancers resulted in 87,106 potential years of life lost in Alberta in 2008 (*Table 2-2*).
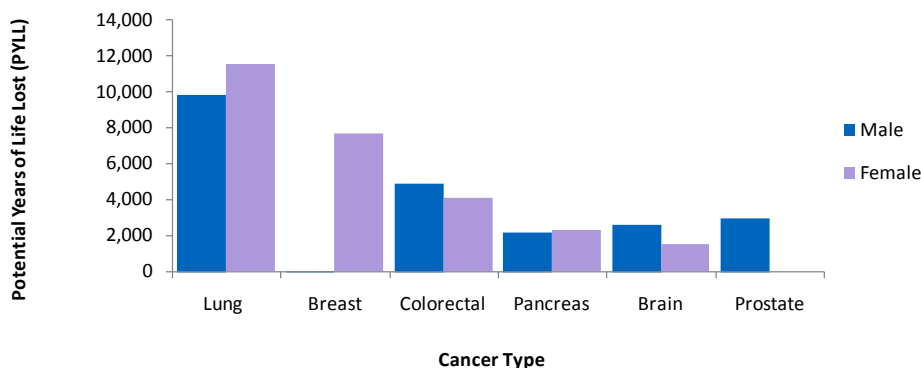
Figure 2-6: **Potential Years of Life Lost by Top Six Cancer Sites, Both Sexes, Alberta, 2008**
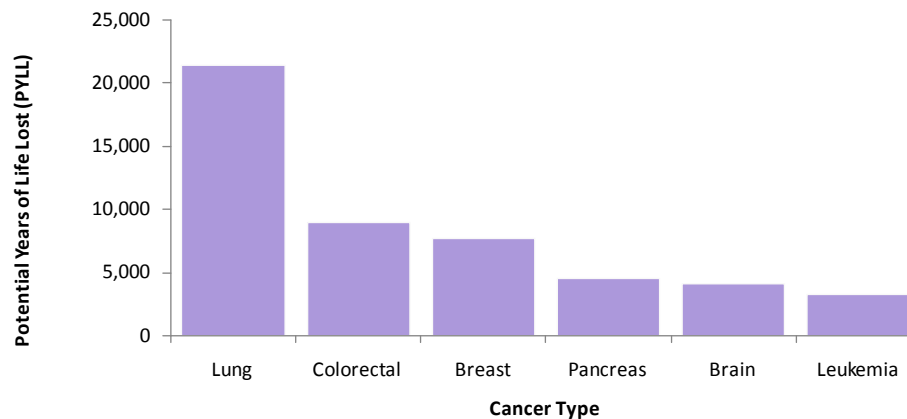
Breast cancer - female only

Data Source: Alberta Cancer Registry

Figure 2-7: **Potential Years of Life Lost by Top Six Cancer Sites and Sex, Alberta, 2008**

Data Source: Alberta Cancer Registry

Table 2-3: **Lifetime Probability of Developing Cancer by Sex, Alberta, 2006-2008**

Cancer Type	Males	Females
All Cancers (excluding NMSC)	1 in 2	1 in 3
Prostate	1 in 6	---
Breast	Less than 1 in 10,000	1 in 9
Lung and Bronchus	1 in 13	1 in 16
Colorectal	1 in 14	1 in 17
Body of Uterus	---	1 in 39
Non-Hodgkin's Lymphoma	1 in 42	1 in 49
Leukemia	1 in 51	1 in 67
Kidney and Renal Pelvis	1 in 56	1 in 84
Pancreas	1 in 72	1 in 67
Melanomas of the Skin	1 in 65	1 in 80
Bladder (including *in situ*)	1 in 48	1 in 151
Ovary	---	1 in 84
Stomach	1 in 75	1 in 145
Thyroid	1 in 210	1 in 75
Oral	1 in 87	1 in 164
Cervix Uteri	---	1 in 135
Multiple Myeloma	1 in 138	1 in 162
Brain	1 in 131	1 in 208
Esophagus	1 in 115	1 in 292
Liver	1 in 147	1 in 332
Larynx	1 in 252	1 in 950

--- Not applicable

Data Source: Alberta Cancer Registry

More years of life are lost due to cancers that are more common, have an earlier age of onset and/or a more rapid progression to mortality.

The PYLL due to the six types of cancer shown in *Figure 2-6* account for 57.5% of the total potential years of life lost due to cancer.

Lung cancer alone was responsible for 21,401 PYLL, which represents 24.6% of premature mortality caused by cancer.

PYLL due to specific cancer types show that lung, colorectal and prostate were the top three cancers in males responsible for PYLL, accounting for 42.3% of the total PYLL in males due to cancer (*Figure 2-7*). Although prostate cancer is more common than lung cancer among men, the PYLL due to lung cancer is 3.3 times higher than that for prostate cancer, reflecting higher mortality rates for lung cancer and the younger age at which males develop and die from this disease.

Among women, the top three cancers responsible for PYLL are lung, breast and colorectal, accounting for 51.7% of the total PYLL in females due to cancer (*Figure 2-7*).

Probability of Developing and Dying from Cancer

The ***probability of developing or dying of cancer*** measures the risk of an individual in a given age range developing or dying of cancer, and is conditional on the person being cancer-free prior to the beginning of that age range.

It is important to note that the probabilities of developing and dying of cancer represent all of Alberta's population on average.

and should be interpreted with caution at the individual level as the probabilities will be affected by the risk behaviours of the individual. In addition, someone diagnosed with cancer has a higher probability of developing another cancer in the future.[4]

The **_probability of developing cancer_** differs by cancer site (**_Table 2-3_**). The probability of an Albertan male developing cancer within his lifetime is approximately 1 in 2 while for females it is 1 in 3.

A male is more likely to develop prostate cancer (1 in 6) than lung cancer (1 in 13), while a female born in Alberta is more likely to develop breast cancer (1 in 9) than lung cancer (1 in 16). Some cancers affect one sex more than another, for example males are more likely to develop bladder cancer (1 in 48) than females (1 in 151).

 Approximately 1 in 4 Albertans will die of cancer in their lifetime (**_Table 2-4_**).

Cancer site and sex affect the **_probability of dying from cancer_** (**_Table 2-4_**). A male born in Alberta has a higher chance of dying from lung cancer (1 in 16) than dying from prostate cancer (1 in 27). Similarly, a female born in Alberta today has a higher chance of dying from lung cancer (1 in 19) than dying from breast cancer (1 in 32). A male has a higher chance of dying from kidney cancer (1 in 144) than a female (1 in 208).

It should be noted that common cancers do not necessarily have higher mortality rates. Even though a female is more likely to develop breast cancer, breast cancer survival is higher than that of lung cancer.

Table 2-4: **Lifetime Probability of Dying from Cancer by Sex, Alberta, 2006-2008**

Cancer Type	Males	Females
All Cancers	1 in 4	1 in 4
Lung and Bronchus	1 in 16	1 in 19
Prostate	1 in 27	---
Breast	Less than 1 in 10,000	1 in 32
Colorectal	1 in 33	1 in 37
Pancreas	1 in 78	1 in 68
Non-Hodgkin's Lymphoma	1 in 95	1 in 110
Ovary	---	1 in 111
Leukemia	1 in 107	1 in 145
Stomach	1 in 91	1 in 215
Bladder (including *in situ*)	1 in 98	1 in 255
Kidney and Renal Pelvis	1 in 144	1 in 208
Body of Uterus	---	1 in 178
Brain	1 in 149	1 in 222
Esophagus	1 in 139	1 in 356
Multiple Myeloma	1 in 226	1 in 231
Oral	1 in 174	1 in 362
Liver	1 in 192	1 in 363
Melanomas of the Skin	1 in 324	1 in 570
Cervix Uteri	---	1 in 484
Larynx	1 in 597	1 in 3,106
Thyroid	1 in 1,266	1 in 1,403

--- Not applicable

Data Source: Alberta Cancer Registry

Table 2-5: **Limited-Duration and Complete Prevalence for All Cancers, Both Sexes, Alberta, 2008**

Duration	Prevalence		
	Both sexes	*Males*	*Females*
2-Year	21,572	11,138	10,434
5-Year	44,770	22,807	21,962
10-Year	71,522	36,058	35,464
20-Year	94,295	45,657	48,638
Complete	105,018	49,113	55,905

Data Source: Alberta Cancer Registry

Cancer Prevalence

The ***prevalence*** of a disease is defined as the number of people who are alive who had been previously diagnosed with that disease.

Limited-duration cancer prevalence represents the number of people alive on a certain day who had previously been diagnosed with cancer within a specified number of years (e.g. 2, 5, 10 or 20 years) while complete cancer prevalence represents the proportion of people alive on a certain day who had previously been diagnosed with cancer, regardless of how long ago the diagnosis was[14].

In this section of the report, both limited-duration and complete cancer prevalence are presented; the latter describing the number of people alive as of December 31, 2008 who had ever been diagnosed with cancer.

Prevalence is a useful indicator of the impact of cancer on individuals, the healthcare system and the community as a whole. Although many cancer survivors lead healthy and productive lives, the experience can have a strong impact on the physical and emotional well-being of individuals and their families. The cancer experience can also result in the continued use of the healthcare system through rehabilitation or support services, as well as loss of work productivity that can affect the whole community.

As of December 31, 2008, approximately **105,020** Albertans were alive who had previously been diagnosed with cancer, out of which there were about **49,000** males and about **56,000** females (*Table 2-5*). Approximately **21,570** Albertans were alive on the same date who had been diagnosed with cancer in the previous two years, the period during which cases receive definitive treatments.
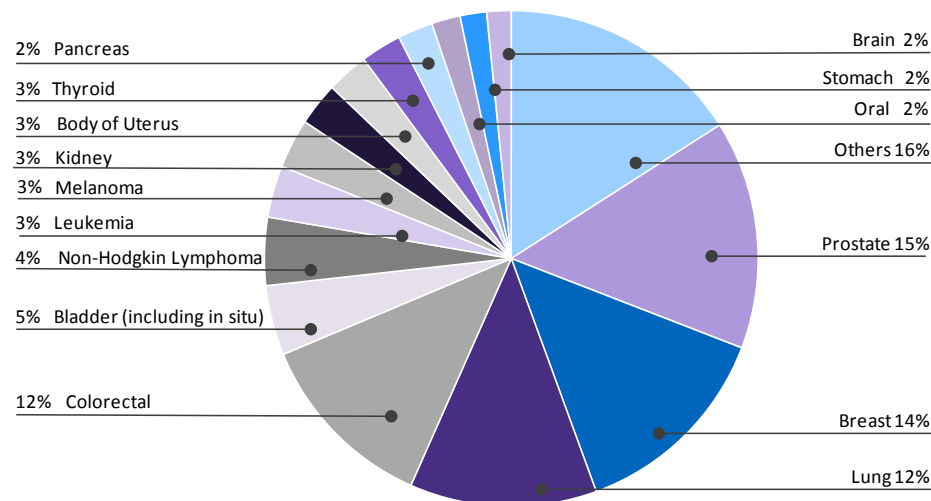
Incidence and Mortality

Incidence counts are the number of new cancer cases diagnosed during a specific time period in a specific population. In this section of the report, incidence counts refer to the number of new cancer diagnoses in Alberta in a calendar year. Incidence rates are the number of new cancer cases diagnosed per 100,000 population in a specific time period.

Mortality counts describe the number of deaths attributed to cancer during a specific period of time in a specific population. In this section of the report, mortality refers to the number of deaths due to cancer in Alberta in a calendar year, regardless of date of diagnosis. Mortality rates are the number of deaths per 100,000 population in a specific time period.

In order to compare cancer incidence or cancer mortality over time or between populations, *age-standardized incidence rates (ASIRs)* or *age-standardized mortality rates (ASMRs)* are presented. These are weighted averages of *age-specific rates* using a standard population. These rates are useful because they are adjusted for differences in age distributions in a population over time, which permit comparisons of cancer incidence or mortality among populations that differ in size, structure and/or time period. ASIRs and ASMRs give the overall incidence and mortality rates that would have occurred if the population of Alberta had been the same as the standard population. In this report the Canadian 1991 population is used as the standard population.
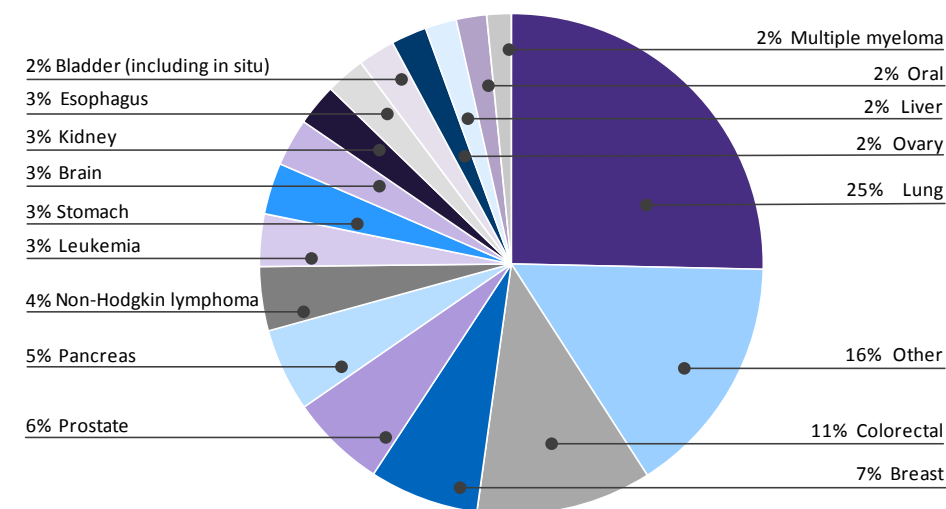
Figure 2-8: **New Cancer Cases by Site (Percentage), Both Sexes, Alberta, 2008**

2% Pancreas
3% Thyroid
3% Body of Uterus
3% Kidney
3% Melanoma
3% Leukemia
4% Non-Hodgkin Lymphoma
5% Bladder (including in situ)
12% Colorectal
Brain 2%
Stomach 2%
Oral 2%
Others 16%
Prostate 15%
Breast 14%
Lung 12%

* **Others**: comprised all other cancer sites with less than 2% of cases

Data Source: Alberta Cancer Registry

Figure 2-9: **Cancer Deaths by Site (Percentage), Both Sexes, Alberta, 2008**

2% Bladder (including in situ)
3% Esophagus
3% Kidney
3% Brain
3% Stomach
3% Leukemia
4% Non-Hodgkin lymphoma
5% Pancreas
6% Prostate
2% Multiple myeloma
2% Oral
2% Liver
2% Ovary
25% Lung
16% Other
11% Colorectal
7% Breast

* **Others**: comprised all other cancer sites with less than 2% of deaths

Data Source: Alberta Cancer Registry

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Table 2-6: **Incidence and Mortality Counts by Cancer Type, Both Sexes, Males and Females, Alberta, 2008**

Cancer Type	Incidence Counts			Mortality Counts		
	Both Sexes	**Males**	**Females**	**Both Sexes**	**Males**	**Females**
All Cancers[†]	14,605	7,721	6,884	5,610	2,954	2,656
Bronchus/Lung	1,787	908	879	1,422	735	687
Prostate Gland	2,177	2,177	---	345	345	---
Breast	1,979	9	1970	393	4	389
Colorectal	1,758	1,002	756	631	349	282
Non-Hodgkin Lymphoma	646	366	280	232	128	104
Pancreas	337	172	165	300	152	148
Leukemia	493	295	198	190	105	85
Melanoma of Skin	471	256	215	56	39	17
Kidney	411	244	167	151	95	56
Bladder (including in situ)	667	523	144	133	96	37
Stomach	253	172	81	186	133	53
Body of Uterus	400	---	400	71	---	71
Thyroid Gland	388	97	291	15	6	9
Brain	233	149	84	172	110	62
Liver	129	91	38	113	79	34
Oral	274	192	82	109	77	32
Ovary	196	---	196	128	---	128
Testis	115	115	---	4	4	---
Multiple Myeloma	183	97	86	88	43	45
Hodgkin's Disease	90	51	39	5	3	2
Esophagus	167	126	41	142	108	34
Cervix Uteri	144	---	144	30	---	30
Larynx	62	49	13	29	25	4
All Other Cancers	1,245	630	615	665	318	347

† Incidence counts exclude non-melanoma skin cancer (basal and squamous)
--- Not Applicable

Data Source: Alberta Cancer Registry

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Three-year moving averages are used to smooth out year-to-year fluctuations so that the underlying trend may be more easily observed. They are calculated based on aggregating three years of data. Age-standardized incidence rates (ASIRs) and age-standardized mortality rates (ASMRs) are presented as three-year moving averages. This smoothing of trends is especially important when the number of cancer cases per year is relatively small, where year-to-year variability can be quite large.

Incidence and mortality can be affected by the implementation of public health prevention or screening strategies that either prevent disease or find cancer in its early *stages* when treatment is generally more successful, the development of cancer treatment programs that may impact chances of survival and research innovations.

The following figures show incidence and mortality trends in Alberta. Separate analyses for both incidence and mortality are shown in subsequent sections. The statistical significance of the trends was determined by using Joinpoint[5] and is described in the text accompanying each graph. Joinpoint models are based on yearly rates; hence there may be slight differences in the rates presented in the text (from Joinpoint model) and the graphs (where ASIRs and ASMRs are shown as three-year moving averages).

Prostate, breast, lung and colorectal cancers were the most frequently diagnosed cancers in 2008 in Alberta, comprising 53% of all cancers diagnosed (*Figure 2-8*).

Lung, colorectal, breast and prostate cancers were responsible for 49% of cancer deaths in 2008 in Alberta (*Figure 2-9*). Some cancers are not very common but, due to their poor *prognosis*, make a relatively large contribution to mortality such as stomach, brain and pancreatic cancers. These three cancers combined were responsible for 11% of the cancer deaths in 2008 but less than 6% of newly diagnosed cases. Lung cancer also has a poorer prognosis relative to other cancers: it accounts for 12% of new cases but 25% of cancer deaths.

In Alberta, there were 14,605 cancer cases (excluding non-melanoma skin cancer) diagnosed in 2008 and 5,610 people died from cancer in that year. (*Table 2-6*). Prostate cancer was the most commonly diagnosed cancer among men and breast cancer was the most commonly diagnosed cancer among women. Lung cancer was the leading cause of cancer deaths among both men and women. Deaths that occurred in 2008 include cancers diagnosed in 2008 or earlier.

ASIRs for all cancers increased significantly between 1988 and 2002 by an annual average of 1.4% and decreased significantly between 2002 and 2008 by an annual average of 1.3% (*Figure 2-10*). In 2008, the ASIR for all cancers was 398.5 per 100,000 population.

Mortality rates are lower than incidence rates. ASMRs decreased significantly by an annual average of 0.3% between 1988 and 2003, and by an annual average of 2.0% between 2003 and 2008 (*Figure 2-10*). In 2008, the ASMR for all cancers was 152.5 per 100,000 population.

Figure 2-10: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Age-Standardized Mortality Rates (ASMRs)[*†] for All Cancers, Both Sexes, Alberta, 1988-2008**
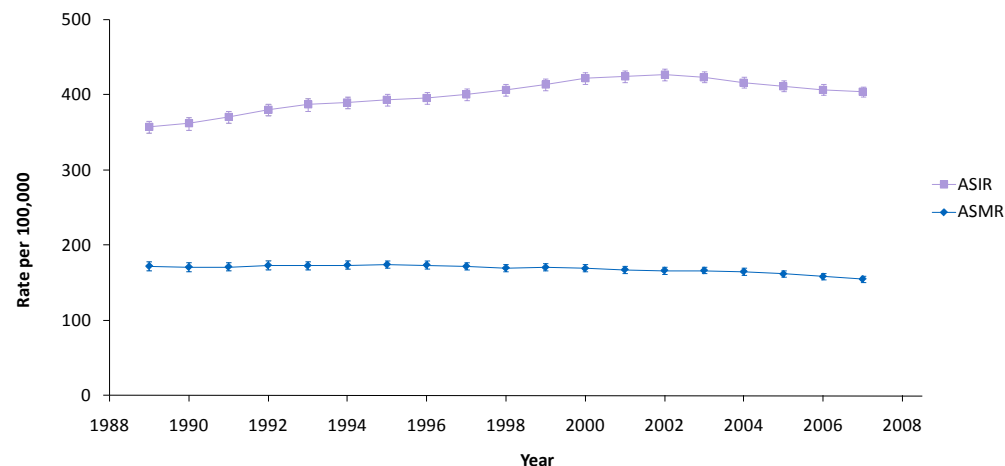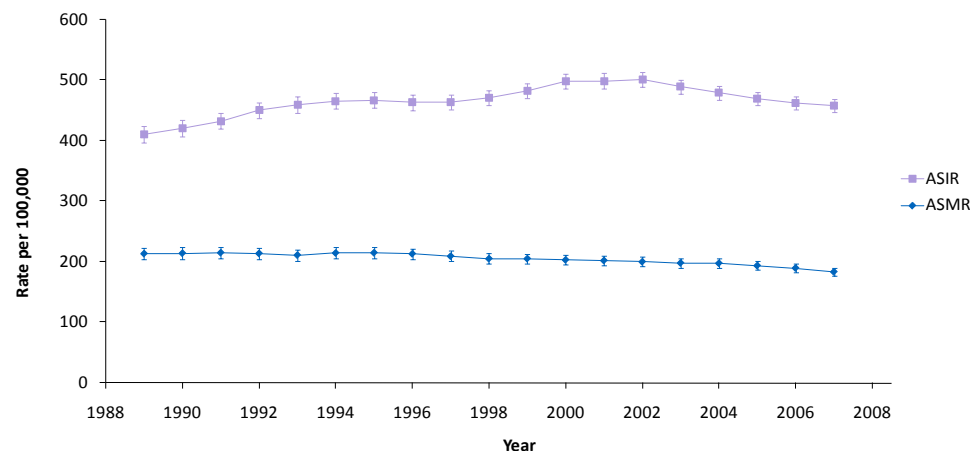

[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.
[‡] Excludes non-melanoma skin cancer (basal and squamous)

D

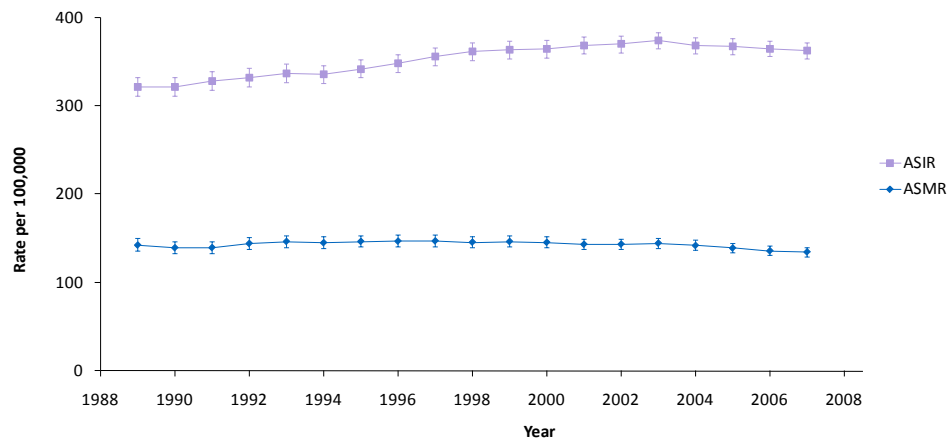**Data Source**: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-11: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Age-Standardized Mortality Rates (ASMRs)[*†] for All Cancers, Males, Alberta, 1988-2008**

[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.
[‡] Excludes non-melanoma skin cancer (basal and squamous)

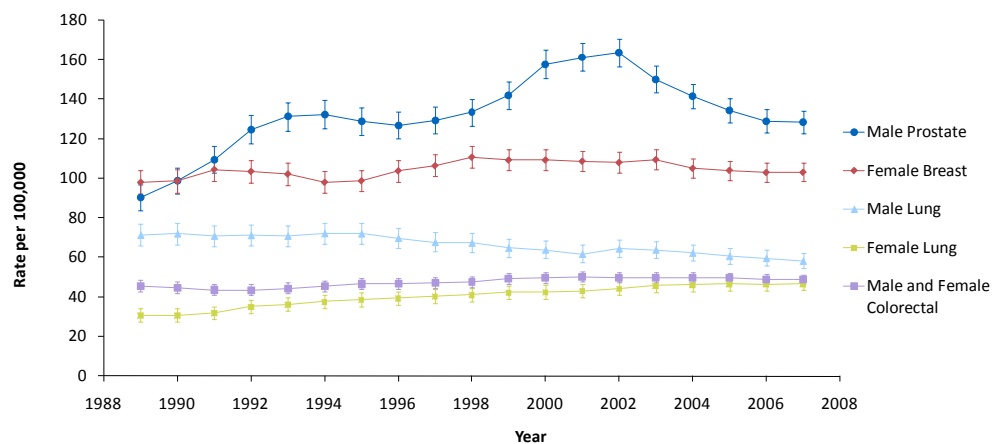**Data Source**: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-12: **Age-Standardized Incidence Rates (ASIRs)**[*†‡] **and Age-Standardized Mortality Rates (ASMRs)**[*†] **for All Cancers, Females, Alberta, 1988-2008**

[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.
[‡] Excludes non-melanoma skin cancer (basal and squamous)

Data Source: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-13: **Age-Standardized Incidence Rates (ASIRs)**[*†] **for Lung Cancer (Male, Female), Colorectal Cancer (Both Sexes), Prostate Cancer (Male), Breast Cancer (Female), Alberta, 1988-2008**

[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.

Data Source: Alberta Cancer Registry, Alberta Health and Wellness

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Male ASIRs for all cancers increased significantly between 1988 and 1993 by an annual average of 3.0%, did not significantly change between 1993 and 1997, and increased significantly again between 1997 and 2001 by an annual average of 2.4%. Male ASIRs for all cancers decreased significantly between 2001 and 2008 by an annual average of 1.8% (*Figure 2-11*). In 2008, the ASIR for all cancers in males was 451.8 per 100,000 male population.

Male mortality rates are lower than male incidence rates. Male ASMRs for all cancers decreased significantly by an annual average of 0.6% between 1988 and 2004 and by an annual average of 2.6% between 2004 and 2008 (*Figure 2-11*). In 2008, the ASMR for all cancers in males was 178.7 per 100,000 male population.

Female ASIRs for all cancers increased significantly between 1988 and 2002 by an annual average of 1.2%, but decreased significantly between 2002 and 2008 by an annual average of 0.7% (*Figure 2-12*). In 2008, the ASIR for all cancers in females was 357.0 per 100,000 female population.

Female mortality rates are lower than incidence rates. Over the period 1988 to 2003, ASMRs for all cancers in females have not significantly changed, but decreased significantly between 2003 and 2008 by an annual average of 2.0% (*Figure 2-12*). In 2008, the ASMR for all cancers in females was 132.7 per 100,000 female population.

Generally, cancer incidence rates for the four most common cancers in Alberta increased over the past 20 years except for male lung cancer (*Figure 2-13*).

Prostate cancer (males only) ASIRs have two peaks and two significant trends over time since 1988. The peaks for prostate cancer incidence occur in 1993 and 2001. Over the time period 1988 to 1993, prostate cancer ASIRs increased by an average of 11.0% annually and increased again between 1997 and 2001 by 8.0%. However, from 2001 to 2008 prostate cancer ASIRs decreased by an average of 4.6% annually. The first peak in incidence (1993) may be attributed to the introduction of prostate specific antigen (PSA) testing for prostate cancer that occurred in the early 1990s.[6] It has also been speculated that the second peak was the result of increased PSA screening test activity after the Federal Minister of Health, Allan Rock, was diagnosed with prostate cancer in 2001.[7,8]

The female breast cancer ASIR did not change significantly between 1988 and 2008.

Male lung cancer ASIRs decreased by an average annual decrease of 1.2% between 1988 and 2008. Female lung cancer ASIRs increased by an average annual increase of 3.2% between 1988 and 1999 then continued to increase at lower rate by an average annual increase of 1.1%.

Finally, colorectal cancer ASIRs increased from 1988 to 2004 by an average annual percent increase of 0.9%.

Figure 2-14: **Actual and Projected Number of New Cases and Age-Standardized Incidence Rates (ASIRs)[*†‡] for All Cancers, Males, Alberta, 1988-2013**
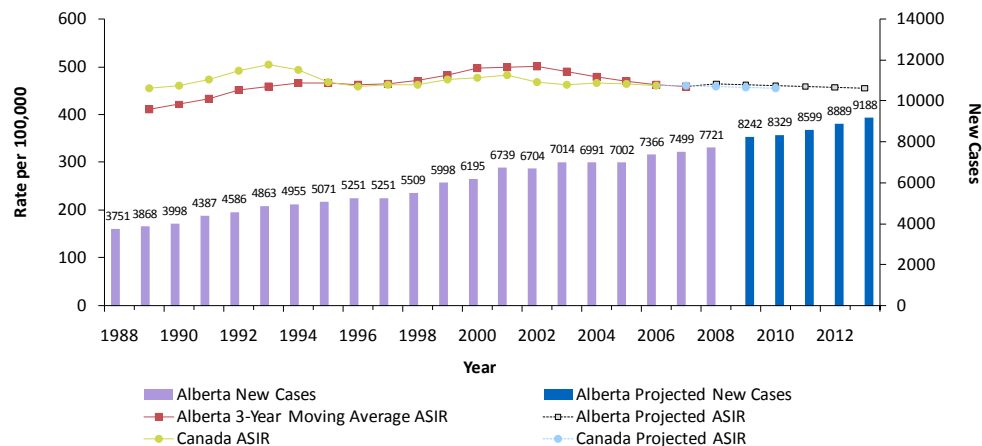
* Three-year moving average.
† Standardized to 1991 Canadian population.
‡ Excludes non-melanoma skin cancer (basal and squamous)

Data Source: Alberta Cancer Registry, Alberta Health and Wellness, Canadian Cancer Society

Figure 2-15: **Actual and Projected Number of New Cases and Age-Standardized Incidence Rates (ASIRs)[*†‡] for All Cancers, Females, Alberta, 1988-2013**
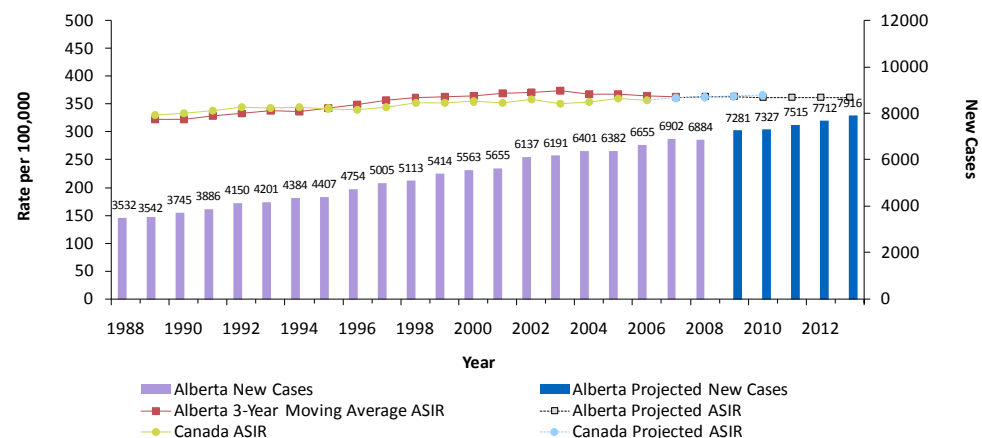
* Three-year moving average.
† Standardized to 1991 Canadian population.
‡ Excludes non-melanoma skin cancer (basal and squamous)

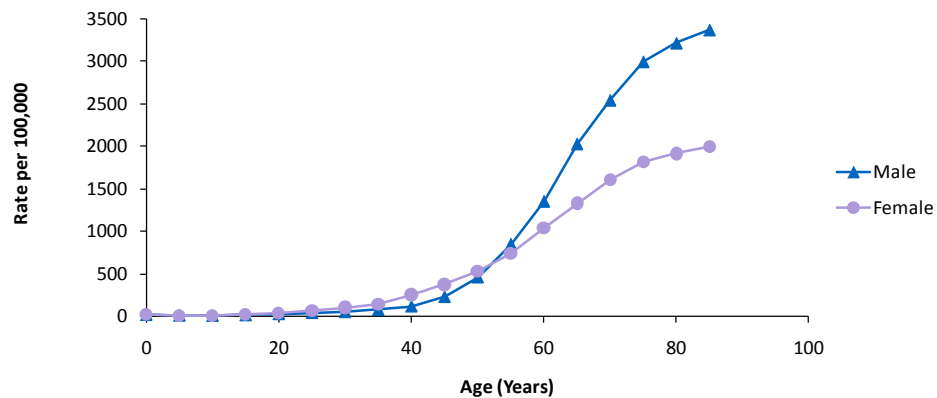**Data Source**: Alberta Cancer Registry, Alberta Health and Wellness, Canadian Cancer Society

Figure 2-16: Age-Specific Incidence Rates for All Cancers by Sex, Alberta, 2004-2008*

* Non-melanoma skin cancer (basal and squamous) is excluded

Data Source: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-17: Age-Standardized Mortality Rates (ASMRs)*† for Lung Cancer (Male, Female), Colorectal Cancer (Both Sexes), Prostate Cancer (Male), Breast Cancer (Female), Alberta, 1988-2008

* Three-year moving average.
† Standardized to 1991 Canadian population.

Data Source: Alberta Cancer Registry, Alberta Health and Wellness

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In 2008, 7,721 cases of cancer were diagnosed in males Alberta (*Figure 2-14*). ASIRs for cancer in males in Alberta were lower than ASIRs in Canada between 1988 and 1994 and higher from 1995 to 2005.

If current trends continue, about 9,200 cases of cancer will be diagnosed in males in Alberta in 2013.

In 2008, 6,884 cases of cancer were diagnosed in females in Alberta (*Figure 2-15*). ASIRs for cancer in females in Alberta were lower than ASIRs in Canada between 1988 and 1995 then slightly higher until 2007.

If current trends continue, about 7,900 cases of cancer will be diagnosed in females in Alberta in 2013.

Cancer rates increase with age (*Figure 2-16*). In females, cancer rates remain very low until about the age of 25 when they begin to increase. In males, cancer rates remain low until the age of 40, at which point they begin increasing rapidly. After the age of 50, age-specific cancer rates are higher in males than females. In both males and females, the highest cancer incidence rates occur in the oldest age groups.

Over the time period 1988 to 1995, prostate cancer ASMRs increased by an average annual percent increase of 2.4% (*Figure 2-17*). However, from 1995 to 2008, prostate cancer ASMRs decreased by an average annual percent decrease of 3.1%.

Breast cancer ASMRs (females only) decreased significantly since 1988. Between 1988 and 2008 breast cancer ASMRs decreased by an annual average of 2.5%.
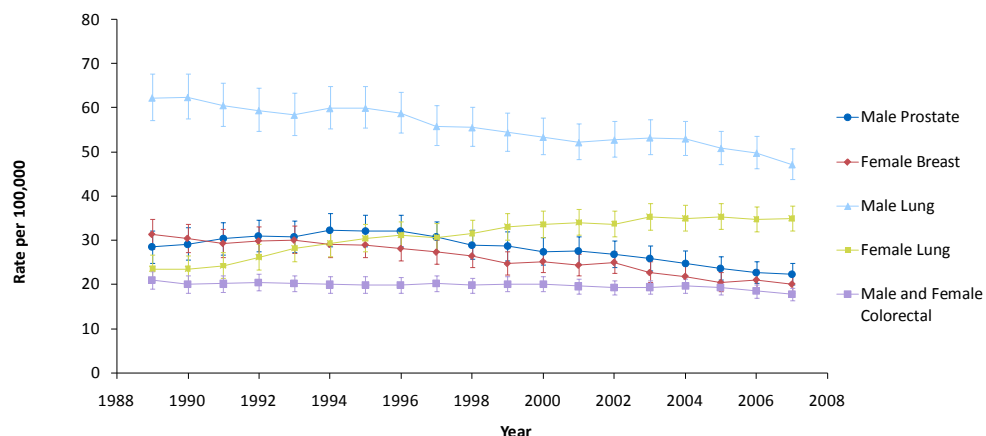
Male lung cancer ASMRs decreased significantly between 1988 and 2008 by an average annual decline of 1.4%. Female lung cancer ASMRs increased by an annual average of 3.7% between 1988 and 1999.

Over the period 1988 to 2008, colorectal cancer ASMRs decreased by an average annual percent decrease of 0.7%.

In 2008, an estimated 3,000 males died of cancer in Alberta (*Figure 2-18*). ASMRs for all cancers in males in Alberta were lower than ASMRs in Canada.

If current trends continue, about 3,400 males are expected to die from cancer in Alberta in 2013.

In 2008, approximately 2,700 females died of cancer in Alberta (*Figure 2-19*). ASMRs for all cancers in females in Alberta were lower than ASMRs in Canada.

If current trends continue, about 3,000 females are expected to die from cancer in Alberta in 2013.

For both males and females, cancer mortality rates remain very low until the age of 45, at which point they begin increasing rapidly (*Figure 2-20*). After the age of 60, females have lower cancer mortality rates than men. The highest cancer mortality rates occur in the oldest age groups.

Figure 2-18: **Actual and Projected Number of Deaths and Age-Standardized Mortality Rates (ASMRs)[*†] for All Cancers, Males, Alberta, 1988-2013**
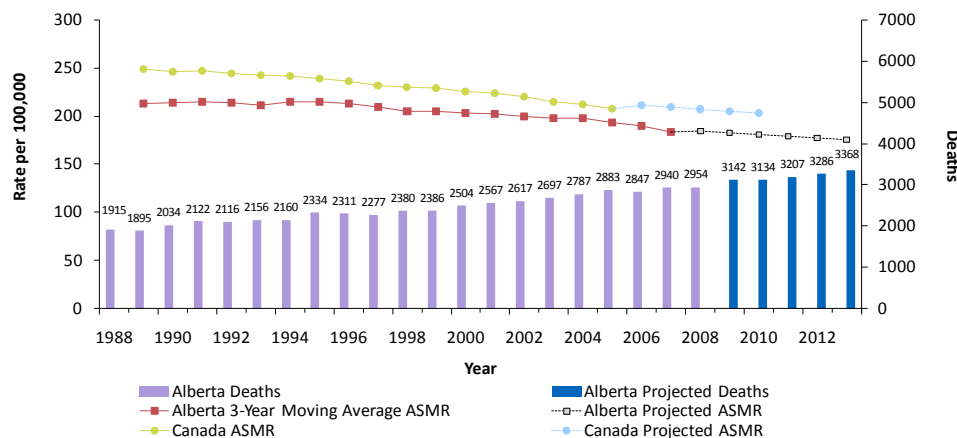
[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.
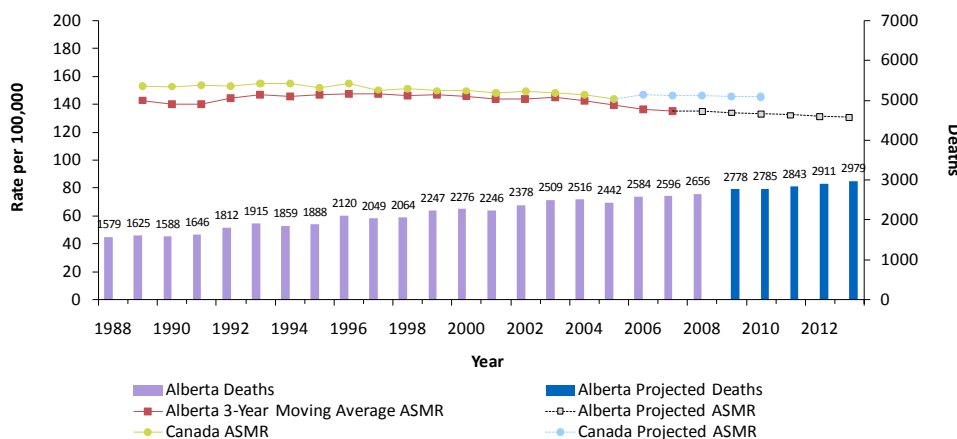**Data Source**: Alberta Cancer Registry, Alberta Health and Wellness
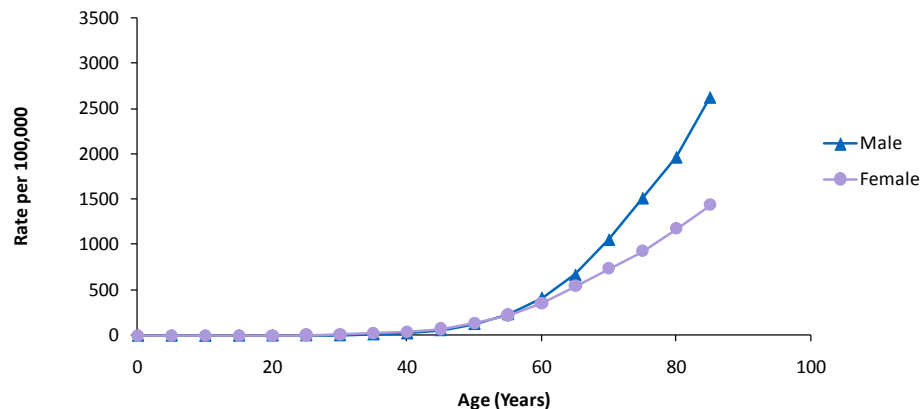
Figure 2-19: **Actual and Projected Number of Deaths and Age-Standardized Mortality Rates (ASMRs)[*†] for All Cancers, Females, Alberta, 1988-2013**

[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.
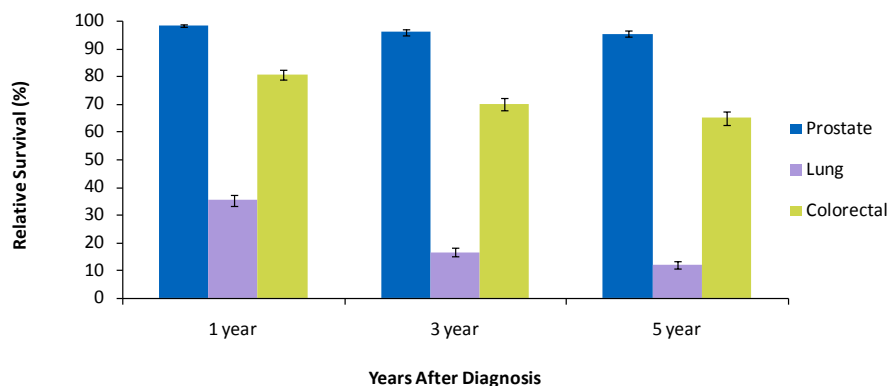**Data Source**: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-20: **Age-Specific Mortality Rates for All Cancers by Sex, Alberta, 2004-2008**[*]

* Non-melanoma skin cancer (basal and squamous) is excluded

Data Source: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-21: **Age-Standardized One, Three and Five-Year Relative Survival Ratios for Prostate, Lung and Colorectal Cancers, Males, Alberta, 2006-2008***

* Ratios calculated by period method, where complete follow-up data are not available

Data Source: Alberta Cancer Registry, Statistics Canada

Cancer Survival

Cancer survival ratios indicate the proportion of people who will be alive at a given time after they have been diagnosed with cancer. Survival is an important outcome measure and is used for evaluating the effectiveness of cancer treatment and control programs.

Survival depends on several factors including the cancer type (most importantly site, stage and morphology at diagnosis), sex, age at diagnosis, health status and available treatments for that cancer. While *relative survival ratios* (RSRs) give a general expectation of survival over the whole province, these ratios may not apply to individual cases. Individual survival outcomes depend on the stage at diagnosis, treatment and other individual circumstances.

Relative survival ratios are estimated by comparing the survival of cancer patients with that expected in the general population of Albertans of the same age, sex and in the same calendar year. In this section of the report, RSRs are standardized by the age structure in the standard population (i.e. all persons who were diagnosed with that cancer in Canada between 1992 and 2001) to permit RSRs to be compared over time, independent of differences in age distribution of cancer cases.

RSRs are estimated by the *cohort method* when complete follow-up data (e.g., at least five years of follow-up to estimate five-year rate) after diagnosis are available. For recently diagnosed cases, whose complete follow-up data are not available, the up-to-date estimates are computed using the *period method*. However, comparison between cohort and

period RSRs should be interpreted with caution because of the two different methods used to derive the respective ratios.

The relative survival ratio is usually expressed as a percentage (%) and the closer the value is to 100%, the more similar the survival pattern is to the general population.

The five-year relative survival ratios for males diagnosed with prostate, lung and colorectal cancers from 2006 to 2008 are 95%, 12% and 65%, respectively (*Figure 2-21*). This means that out of all males diagnosed with prostate cancer between 2006 and 2008, around 95% are as likely to be alive five years after diagnosis as males from the general Alberta population of the same age.

The five-year relative survival ratios for females diagnosed with breast, lung and colorectal cancers are 88%, 17% and 64% respectively (*Figure 2-22*). This means that females diagnosed with breast cancer in 2006-2008 are about 88% as likely to be alive for the following five years as women from the general population of the same age. Females have a better five-year relative survival ratio (17%) for lung cancer than males (12%). Survival in females diagnosed with lung cancer is still very low.

Survival ratios vary by type of cancers and sex (*Table 2-7*). Pancreatic cancer patients have the lowest survival ratio whereas those diagnosed with prostate and breast cancers have very high survival ratios. Survival is slightly greater in males than females for colorectal cancer. Survival is greater in females than males for lung, melanoma of the skin, non-Hodgkin lymphoma and leukemias.

Figure 2-22: **Age-Standardized One, Three and Five-Year Relative Survival Ratios for Breast, Lung and Colorectal Cancers, Females, Alberta, 2006-2008***
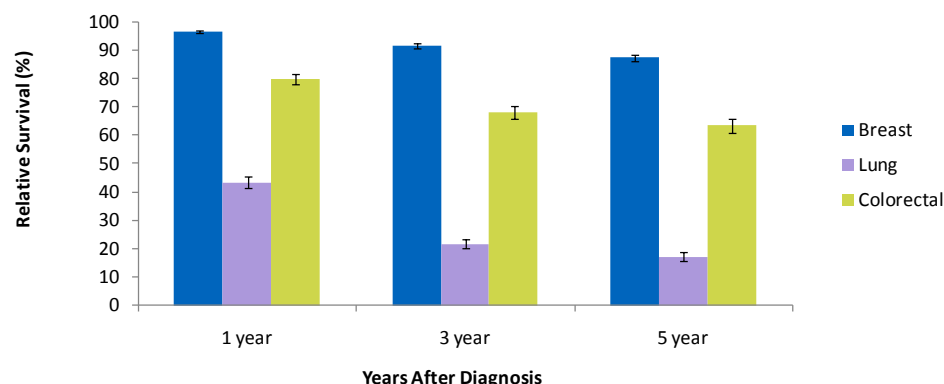
* Ratios calculated by period method, where complete follow-up data are not available

Data Source: Alberta Cancer Registry, Statistics Canada

Table 2-7: **One-, Three- and Five-Year Relative Survival Ratios (%) and 95% Confidence Intervals (CIs) for Selected Cancers Diagnosed Between 2006 and 2008 by Sex, Alberta**

Cancer type	1-year Relative Survival Ratio (95% CI)		3-year Relative Survival Ratio (95% CI)		5-year Relative Survival Ratio (95% CI)	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*
Prostate Gland	**98** (98, 99)	---	**96** (95, 97)	---	**95** (94, 96)	---
Breast	---	**97** (96, 97)	---	**92** (91, 93)	---	**88** (87, 89)
Lung	**35** (33, 37)	**44** (42, 46)	**17** (15, 18)	**22** (20, 24)	**12** (11, 13)	**17** (16, 19)
Colorectal	**81** (79, 82)	**80** (78, 82)	**70** (68, 72)	**68** (66, 70)	**65** (62, 67)	**64** (61, 66)
Non-Hodgkin Lymphoma	**82** (79, 85)	**81** (78, 84)	**73** (70, 76)	**74** (70, 77)	**68** (64, 72)	**69** (65, 73)
Melanoma of Skin	**95** (93, 97)	**97** (95, 98)	**90** (86, 92)	**94** (91, 96)	**86** (82, 90)	**92** (89, 94)
Leukemias	**82** (78, 85)	**80** (76, 84)	**75** (71, 78)	**74** (69, 78)	**68** (63, 72)	**71** (67, 76)
Kidney	**82** (79, 85)	**80** (76, 84)	**71** (67, 74)	**72** (67, 76)	**67** (62, 71)	**67** (62, 72)
Pancreas	**23** (19, 27)	**19** (16, 23)	**8** (6, 12)	**7** (5, 10)	**5** (3, 7)	**6** (4, 9)
Cervix	---	**91** (88, 94)	---	**83** (80, 87)	---	**80** (76, 84)

Data Source: Alberta Cancer Registry, Statistics Canada

Table 2-8: One-, Two- and Three-Year Relative Survival Ratios[†] (%) for Prostate, Breast, Lung and Colorectal Cancers by Stage and Sex, Alberta, 2005-2008.

Cancer Type*	Stage	Number of Cases		One-year Survival Rate (95% CI)		Two-year Survival Rate (95% CI)		Three-year Survival Rate (95% CI)	
		Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
Prostate	I	**9**	---	---	---	---	---	---	---
	II	**5803**	---	**100** (100, 100)	---	**100** (100, 100)	---	**100** (100, 100)	---
	III	**608**	---	**100** (99, 100)	---	**100** (100, 100)	---	**100** (99, 100)	---
	IV	**701**	---	**83** (79, 86)	---	**65** (60, 69)	---	**50** (44, 56)	---
Breast	I	---	**2872**	---	**100** (100, 100)	---	**100** (100, 100)	---	**100** (100, 100)
	II	---	**2324**	---	**100** (99, 100)	---	**98** (97, 99)	---	**96** (95, 98)
	III	---	**920**	---	**96** (94, 97)	---	**89** (86, 91)	---	**83** (79, 86)
	IV	---	**325**	---	**62** (57, 67)	---	**49** (44, 55)	---	**36** (30, 42)
Lung	I	**386**	**448**	**83** (79, 87)	**93** (91, 96)	**72** (66, 77)	**80** (76, 84)	**61** (54, 67)	**70** (64, 75)
	II	**116**	**102**	**79** (70, 86)	**81** (72, 87)	**59** (49, 69)	**65** (54, 74)	**47** (35, 58)	**48** (36, 59)
	III	**786**	**693**	**45** (41, 48)	**50** (46, 54)	**20** (17, 23)	**27** (23, 30)	**13** (10, 16)	**18** (15, 21)
	IV	**1499**	**1392**	**14** (13, 16)	**21** (19, 23)	**5** (4, 6)	**8** (6, 9)	**3** (2, 4)	**4** (3, 6)
Colorectal	I	**625**	**466**	**98** (96, 100)	**99** (97, 100)	**99** (96, 100)	**100** (97, 100)	**100** (97, 100)	**100** (97, 100)
	II	**746**	**612**	**95** (93, 97)	**96** (94, 98)	**95** (92, 97)	**93** (90, 96)	**92** (89, 95)	**94** (91, 97)
	III	**787**	**628**	**93** (90, 95)	**89** (86, 91)	**86** (82, 89)	**80** (76, 84)	**77** (73, 81)	**73** (68, 77)
	IV	**726**	**567**	**50** (46, 53)	**43** (39, 47)	**30** (26, 33)	**23** (20, 27)	**17** (14, 21)	**16** (13, 20)

[*] First-primary invasive and age of 15-99 years at diagnosis.
[†] Ratios calculated by period method, where complete follow-up data are not available

Data Source: Alberta Cancer Registry, Statistics Canada

Cancer *stage* (extent or severity of cancer) at diagnosis affects survival. Those diagnosed at an earlier stage have better survival than those diagnosed at a later stage

For those diagnosed between 2005 and 2008, there was little difference in the proportion of cases in each stage. The three-year relative survival ratios for colorectal cancer at stage I and II are estimated above 90%, which are significantly higher than those diagnosed with colorectal cancer at stage IV (male 17% and female 16%) (*Table 2-8*). There is little difference between males and females.

Most lung cancer cases in Alberta for the same time period were diagnosed at the later stages (III & IV). The estimated relative survival ratios, compared to the earlier stages (I & II), are low. Survival ratios are lower among males than females at all stages of diagnosis.

The majority of females were diagnosed with early stage breast cancer (Stage I or II) and have a similar survival pattern as the general population for the first three years. The three-year relative survival ratio for those diagnosed at stage IV is much lower (36%) than that for those at stage I and II (*Table 2-8*).

In 2005-2008, the majority of prostate cancer cases were diagnosed at stage II and all males who were diagnosed at stage I were alive three years after diagnosis. Similar to female breast cancer, one-, two and three-year relative survival ratios are very close to the general population for those diagnosed at stage II and III. Even though the three-year relative survival ratio for males diagnosed with prostate cancer at stage IV (50%) is lower than that for those

Figure 2-23: Five Health Zones in Alberta, 2010
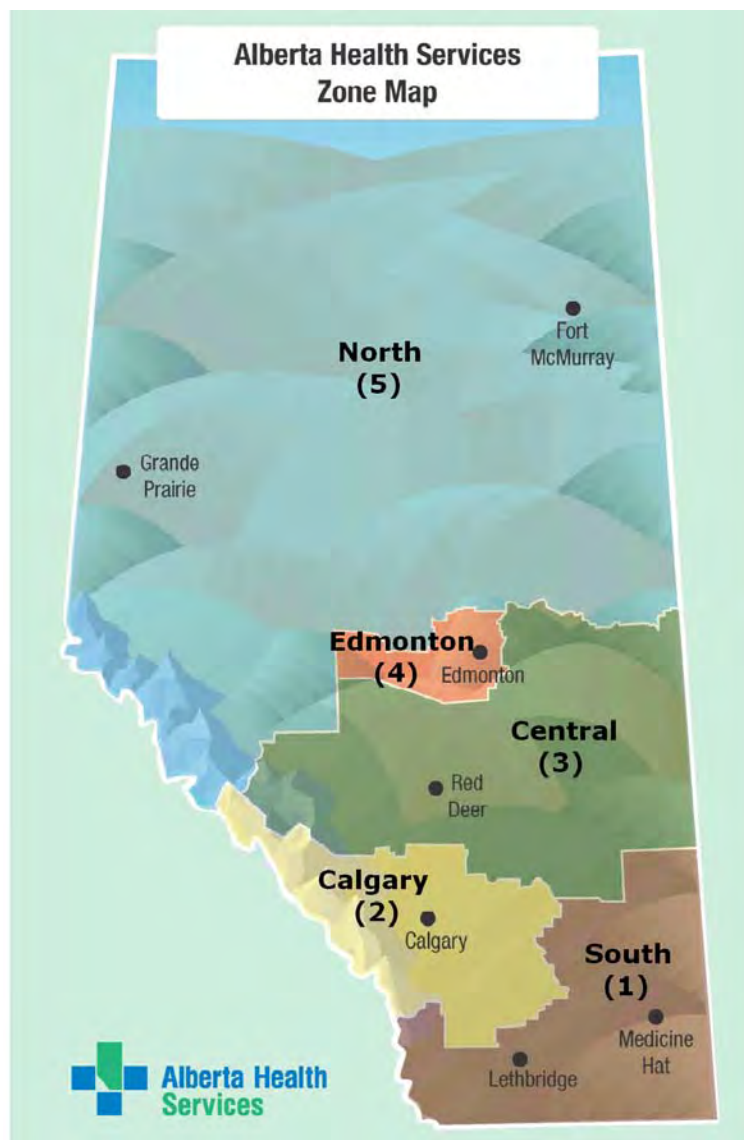
Data Source: Alberta Health Services

Geographic Variation

The geographic variation section illustrates how the observed rates in each health zone compare with the provincial average. These rates are three-year averages. The age standardized incidence and mortality rates for each zone are presented with their corresponding 95% *confidence intervals*. Any observed differences in rates may be due to several factors such as regional differences in:

- risk factors such as smoking and obesity rates
- prevention efforts
- cancer screening
- diagnostic activity
- access to cancer care.[6]

There is no evidence that male ASIRs in the zones are higher or lower than the provincial average (*Figure 2-24*).

There is no evidence that female ASIRs in the zones are higher or lower than the provincial average (*Figure 2-25*).

There is no evidence that male ASMRs in the zones are higher or lower than the provincial average (*Figure 2-26*).

There is no evidence that female ASMRs in the zones are higher or lower than the provincial average (*Figure 2-27*).

Figure 2-24: Age-Standardized Incidence Rates (ASIRs)[*†] for All Cancers by Zones, Males, Alberta, 2006-2008[‡я]
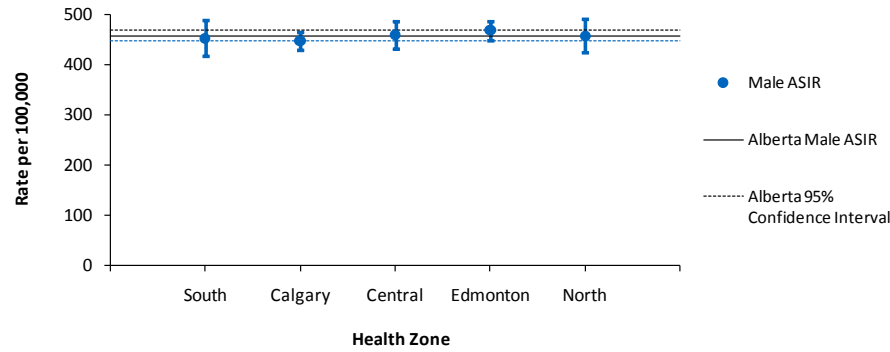
* Three-year average.
‡ Standardized to 1991 Canadian population.
‡ Error bars represent 95% *confidence intervals*.
я Non-melanoma skin cancer is excluded.

Data Source: Alberta Cancer Registry, Alberta Health and Wellness
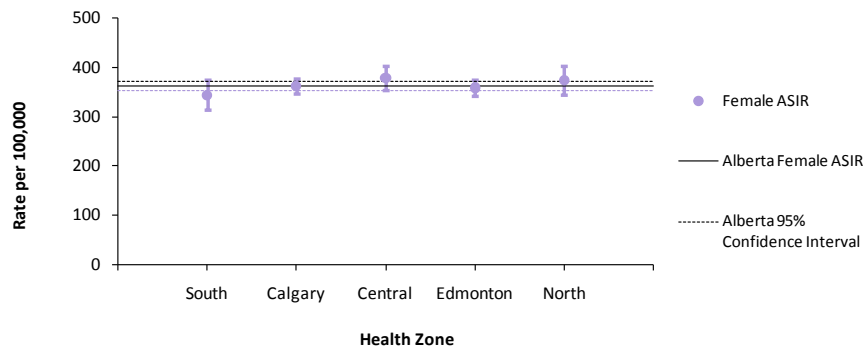
Figure 2-26: Age-Standardized Mortality Rates (ASMRs)[*†] for All Cancers by Zones, Males, Alberta, 2006-2008[‡]
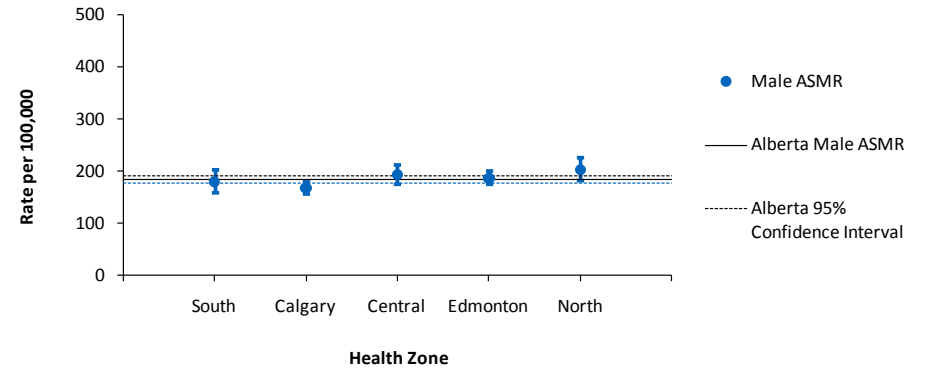
* Three-year average.
† Standardized to 1991 Canadian population.
‡ Error bars represent 95% *confidence intervals*.

Data Source: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-25: Age-Standardized Incidence Rates (ASIRs)[*†] for All Cancers by Zones, Females, Alberta, 2006-2008[‡я]

* Three-year average.
† Standardized to 1991 Canadian population.
‡ Error bars represent 95% *confidence intervals*.
я Non-melanoma skin cancer is excluded.

Data Source: Alberta Cancer Registry, Alberta Health and Wellness

Figure 2-27: Age-Standardized Mortality Rates (ASMRs)[*†] for All Cancers by Zones, Females, Alberta, 2006-2008[‡]

* Three-year average.
† Standardized to 1991 Canadian population.
‡ Error bars represent 95% *confidence intervals*.

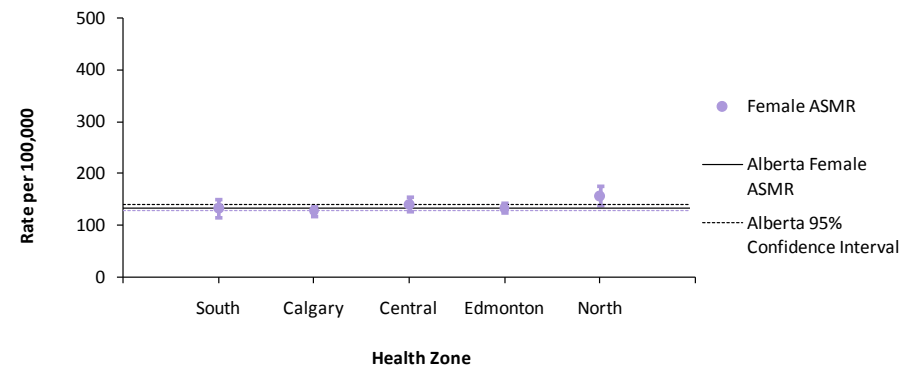**Data Source**: Alberta Cancer Registry, Alberta Health and Wellness

Surveillance and Health Status Assessment
Cancer Surveillance

Further Information

Data Sources and Quality

Most of the data presented within this report are derived from the Alberta Cancer Registry (ACR). The ACR is responsible for recording and maintaining data on all new *primary cancers*, as well as all cancer deaths occurring within the province of Alberta, as mandated by the Regional Health Authorities (RHA) Act of Alberta.[9]

The quality of data collected by any registry is dependent on three factors: comparability, completeness and validity. Firstly, comparability is accomplished by applying standard practices regarding classification and coding of new cases and by using consistent definitions, such as the coding of multiple primaries. To achieve comparability, the ACR employs the International Classification for Oncology (ICD-O-2 for 1988-2000 data and ICD-O-3 for 2001 onwards) to classify all cancers by site and morphology. Cancer deaths are coded using the International Statistical Classification of Diseases and Related Health Problems (ICD-9 for 1988-2000 data and ICD-10 for 2001 onwards).

Secondly, completeness refers to the extent to which all the newly diagnosed cancers among Alberta residents are accurately captured by the ACR. The ACR is notified of new cancers by doctors and laboratories throughout the province, who are mandated to report such information. Cancer-related deaths are recorded and validated by the ACR using registry and Alberta Vital Statistics information. Over the years, the ACR has achieved a completeness of over 95%.

Lastly, validity depends on the documentation available and the level of expertise in the abstracting, coding and recording of data within a registry. The ACR has numerous data edits to ensure all information is input as accurately as possible. For example, date of diagnosis of cancer must be after the date of birth. There are additional data quality reviews performed on ACR data by the Canadian Cancer Registry and the North American Association of Central Cancer Registries (NAACCR).

Confidentiality and security of personal information are protected by the RHA Act and the Health Information Act (HIA). The Alberta Cancer Registry maintains the trust of the public, the government, the data provider, and the general public by requiring rigorous confidentiality and security practices, in accordance with the RHA Act and HIA, to access the Registry database. Formal policies on information disclosure are available on request from the Alberta Cancer Registry.

By recording information on cancer cases and cancer-related deaths over the past few decades, the Alberta Cancer Registry has been able to compare cancer statistics in Alberta with other provinces and countries. The Registry also provides information to health care stakeholders throughout the province so that they can plan effective prevention, treatment and research programs.

For many years, the Alberta Cancer Registry has been certified by NAACCR and has achieved a Gold Standard for completeness of the data, timely reporting and other measures that judge data quality.

Glossary of Terms

Age-specific rates:

The number of new cancer cases or cancer deaths per 100,000 people per year within a given age group.

Age-standardized (incidence/mortality) rates:

A weighted average of age-specific rates using a standard population distribution. They reflect the overall rates that would be expected if the population of interest had an age structure identical to the standard population used to compare cancer rates among populations or identify trends over time.

Benign:

A tumour that is not malignant (i.e. does not spread).

Carcinoma:

A tumour that begins in the skin or in tissues that line or cover body organs.

Childhood cancer:

Cancers diagnosed and cancer deaths in 0-14 year olds.

Confidence intervals:

An indication of the reliability of an estimate. A wide confidence interval indicates less precision and occurs when a population size is small.

Count:

Count refers to the number of cases (primaries) or deaths in a given time period. One patient may have multiple primary sites.

Incidence count:

The frequency of new cancer cases during a period of time; often the number of new invasive cases diagnosed in a year.

Invasive cancer:

Cancer with the ability to spread beyond its point of origin.

Life table:

A life table estimates, for people at a certain age, what the probability is that they die before their next birthday. From this starting point, a number of statistics can be derived and thus also included in the table: *a)* the probability of surviving any particular year of age; *b)* remaining life expectancy for people at different ages; and *c)* the proportion of the original birth cohort still alive. They are usually constructed separately for males and females because of their substantially different mortality rates.

Lymphatic system:

A system of vessels that carry lymph between lymph nodes located throughout the body.

Malignant:

Refers to a tumour that invades and destroys surrounding tissues, may spread elsewhere in the body, and is likely to recur after removal; a cancerous tumour.

Median Age:

The age at which half of the population is older and half is younger.[10]

Metastasis:

Refers to the spread of the original tumour to other parts of the body.

Mortality count:

The number of deaths due to cancer during a period of time.

Potential years of life lost (PYLL):

PYLL is the total number of years of life lost and is obtained by multiplying, for each age group, the number of deaths by the life expectancy of survivors. The indicator was calculated by obtaining the number of deaths and mean life expectancy for each age group.[7] PYLL provided by Alberta Health and Wellness[13] was calculated by taking the mid-point in each age group and subtracting from 75 (the overall Canadian life expectancy), and multiplying by the number of deaths in that age group.

Prevalence:

The number of people alive at a specific point in time with cancer. Complete prevalence is the number of people alive today who have *ever* been diagnosed with cancer. Limited-duration prevalence represents the number of people alive on a certain day who had previously been diagnosed with lung cancer within a specified number of years (e.g. 2, 5, 10 or 20 years) In this document, we report both complete and limited-duration prevalence.

Primary Site of Cancer:

The tissue or organ in which the cancer originates.[11]

Probability of developing/dying of cancer:

The risk of an individual in a given age range developing/dying of cancer in a given time period, and is conditional on the person being cancer-free prior to the beginning of that age range.

Prognosis:

A prediction about the outcome or likelihood of recovering from a given cancer.

Projection:

An estimate of cancer incidence or mortality in the future, based on recent historical trends.

Rate:

The number of cancer cases or deaths occurring in a specified time period.

Relative survival:

The survival of cancer patients relative to that of the general population. It is the ratio of observed survival in a group of cancer patients relative to the expected survival of a similar group of people in the general public, matched by age and sex in Alberta.

Stage of cancer:

Refers to the degree of cancer progression and the size of tumor at the time of diagnosis. If the cancer has spread, the stage describes how far it has spread from the original site to other parts of the body.[10]

Surveillance:

Cancer surveillance includes the collection of data, and the review, analysis and dissemination of findings on incidence (new cases), prevalence, morbidity, survival and mortality. Surveillance also serves to collect information on the knowledge, attitudes and behaviours of the public with respect to practices that prevent cancer, facilitate screening, extend survival and improve quality of life.[12]

Survival - Cohort method:

The cohort method provides survival estimates of cases having complete follow-up for the number of years of survival of interest. For example, cases diagnosed in 2001, for which vital status data are available to the end of year 2006, the cohort method may be used to obtain an estimate of five-year survival. The cohort survival represents the actual survival experience of individuals.

Survival - Period analysis:

The period method provides up-to-date survival estimates of recently diagnosed cases considering the survival experience of those cases within the most recent calendar period that allows for the estimation of a given period of survival. For example, to estimate the five year survival for cases diagnosed in 2004-2006, this method considers zero to one year survival experience for cases diagnosed in 2004-2006, one to two year survival experience for cases diagnosed in 2003-2005 who survived at least one year, and so on up to four to five year survival experience for cases diagnosed in 2000-2002 who survived at least four years.

Three-year moving average:

Three-year moving averages are used to smooth out year-to-year fluctuations in age-standardized rates so that the underlying trend may be more easily observed. They are calculated based on aggregating three years of data.

Tumour:

An abnormal mass of tissue that is not inflammatory, arises without obvious cause from cells of pre-existent tissue, and possesses no physiologic function.

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Contact Information

If further information is required, please contact Cancer Surveillance, Alberta Health Services as follows:

Mailing Address:	Alberta Health Services Surveillance and Health Status Assessment Cancer Surveillance 1400 - 10123-99 Street Edmonton, AB, Canada T5J 3H1
Phone:	780-643-4496
Fax:	780-643-4380
Email:	ACB.surveillance@albertahealthservices.ca