Alberta Health Services

Cancer Care

Cancer Surveillance

Colorectal Cancer

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2010 Report on Cancer Statistics in Alberta

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Purpose of the Report

Cancer Surveillance is a specialized team within Alberta Health Services, Cancer Care, that actively contributes to Alberta Health Service's goal of creating 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 colorectal cancer statistics in Alberta. Details about other individual cancer types are available within separate documents. The words highlighted in ***dark blue*** are terms described in detail in the Glossary within the **Appendix** document.

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 July 31, 2012.

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 July 31, 2012.

For detailed descriptions about data sources and how they affect data presented in this report, please see the **Appendix** document.

Summary

- Approximately **1 in 13** men and **1 in 16** women will develop invasive colorectal cancer within their lifetime.
- In 2010, **9,957** potential years of life were lost due to colorectal cancer.
- As of December 31, 2010, approximately **13,450** Albertans were alive who had previously been diagnosed with colorectal cancer.
- From 1990 to 2000*, **male** colorectal cancer **incidence rates have increased** and then **decreased** between 2000 and 2010 while **female** rates **have increased** over the period 1990-2010*.
- From 1990 to 2010*, **male** colorectal cancer **mortality rates have decreased**. Similarly, **female** colorectal cancer **mortality rates have decreased** over the period 1990 to 2010*.
- In 2010, there were **1,902** new cases of colorectal cancer in Alberta and **695** deaths due to the disease.
- Approximately **2,350** cases of colorectal cancer are expected to be diagnosed in 2015.
- The five-year relative survival ratio for colorectal cancer in Alberta is approximately **66%** for those diagnosed between 2008 and 2010.

In 2010, there were 1,902 new cases of colorectal cancer in Alberta and 695 deaths due to the disease.

The five-year relative survival ratio for colorectal cancer in Alberta is approximately 66% for those diagnosed between 2008 and 2010.

*Year range represents the period over which the most recent significant trend was observed.

Demography

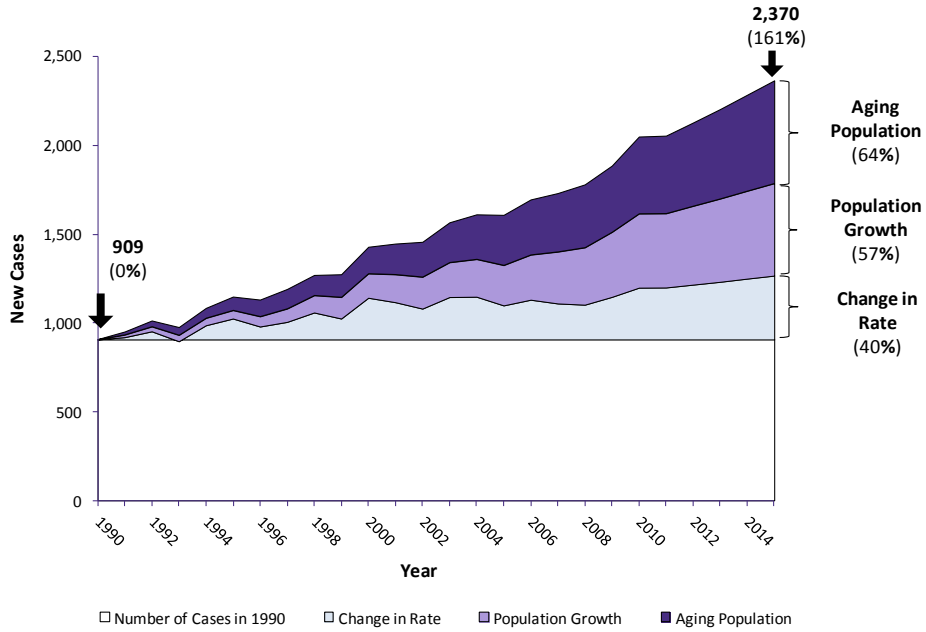
The increase in the number of new cases of colorectal cancer over the last two decades is mainly attributable to changes in demography (aging of the population and population growth), and the increase in the colorectal cancer incidence rate (***Figure 3-1***). The horizontal black line indicating 909 new cases in ***Figure 6-1*** represents the number of colorectal cancer cases that occurred in 1990. In 2015, approximately 2,370 new colorectal cancer cases are projected to occur, accounting for a 161% increase in cases from 1990. The line at the top of the dark purple-shaded area of the graph represents the number of new cases that actually occurred between 1990 and 2009, projected to 2015. Between these two lines, the three colored areas reflect the increase in colorectal cancer 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 colorectal cancer cases that would have occurred each year if colorectal cancer incidence rates alone had changed but the population size and age structure had remained the same as in 1990. This will account for an approximately 40% in the total new colorectal cancer cases in 2015.

The light purple shaded area (middle) represents the number of new colorectal cancer cases that would have occurred each year if the population alone had grown larger, assuming the age distribution and colorectal cancer incidence rates had remained the same as in 1990. This will account for an approximately 57% in the total new colorectal cancer cases in 2015.

The dark purple shaded area (top) represents the number of new colorectal cancer cases attributed to increases in the older adult population - the aging population, assuming the population size and colorectal cancer incidence rate had remained the same as in 1990. This will account for an approximately 64% in the total new colorectal cancer cases in 2015.

Figure 6-1: **Trends in New Cases of Colorectal Cancer Attributed to Aging Population, Population Growth and Change in Colorectal Cancer Rate, Both Sexes Combined, Alberta, 1990-2015**



Data Sources: Alberta Cancer Registry, Alberta Health

The patterns of new colorectal cancer cases are different between males and females.

In 1990, there were 438 new cases in females and 471 new cases in males. In 2015, approximately 980 new cases are projected in females, accounting for 124% increase from 1990, where 7% will be due to the change in female colorectal cancer rate, 46% due to the population growth, and 47% due to aging population; while approximately 1,400 new cases are estimated in males, accounting for 194% increase from 1990, where 34% will be due to the change in male colorectal cancer rate, 30% due to the population growth, and 36% due to aging population.

Probability of Developing and Dying from Colorectal 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 colorectal 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.[1]

The probability of developing colorectal cancer increases with age and varies by sex (***Table 6-1***). Approximately 1 in 13 males and 1 in 16 females will develop invasive colorectal cancer in their lifetime. Males have a higher chance of developing colorectal cancer than females. On a population basis the probability of developing colorectal cancer by the end of the age range for a colorectal cancer-free individual at the beginning of the age range are shown in the bottom eight rows of ***Table 6-1***. For instance, a colorectal cancer-free female representative of the general population at age 40 has a 1 in 410 chance of developing colorectal cancer by the time she is 50.

The probability of dying from colorectal cancer increases with age and varies by sex (***Table 6-2***). Approximately 1 in 32 males and 1 in 36 females will die of invasive colorectal cancer. Males have a higher chance of dying from colorectal cancer than females. On a population basis the probability of a cancer-free individual at the beginning of the age range dying from colorectal cancer by the end of the age range are shown in the bottom eight rows of ***Table 6-2***. For example, a cancer-free female representative of the general population at age 40 has a 1 in 2,092 chance of dying from colorectal cancer by the time she is 50.

Table 6-1: **Probability of Developing Colorectal Cancer by Age and Sex, Alberta, 2006-2010**

Age Group (Years)	Males	Females
Lifetime Risk (all ages)	1 in 13	1 in 16
0 - 20	Less than 1 in 10,000	Less than 1 in 10,000
20 - 30	1 in 5,428	1 in 4,506
30 - 40	1 in 1,613	1 in 1,355
40 - 50	1 in 450	1 in 410
50 - 60	1 in 161	1 in 158
60 - 70	1 in 77	1 in 77
70 - 80	1 in 45	1 in 46
80+	1 in 28	1 in 25

Data Sources: Alberta Cancer Registry, Alberta Health

Table 6-2: **Probability of Dying from Colorectal Cancer by Age and Sex, Alberta, 2006-2010**

Age Group (Years)	Males	Females
Lifetime Risk (all ages)	1 in 32	1 in 36
0 - 20	Less than 1 in 10,000	Less than 1 in 10,000
20 - 30	Less than 1 in 10,000	Less than 1 in 10,000
30 - 40	1 in 6,933	1 in 6,975
40 - 50	1 in 1,879	1 in 2,092
50 - 60	1 in 443	1 in 602
60 - 70	1 in 164	1 in 260
70 - 80	1 in 80	1 in 130
80+	1 in 43	1 in 45

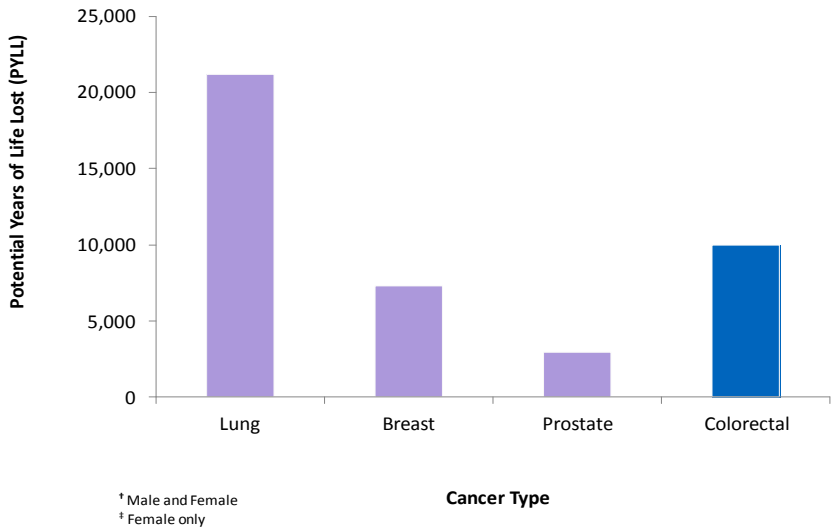
Data Sources: Alberta Cancer Registry, Alberta Health

Potential Years of Life Lost

One frequently used measure of premature death is ***potential years of life lost (PYLL)***. PYLL due to cancer is an estimate of the number of years that people would have lived had they not died from cancer. PYLL due to cancer has been calculated 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. PYLL is one way to measure the impact, or burden, of a disease on a population.

In 2010, **9,957** potential years of life were lost due to colorectal cancer, which constitutes about 12% of PYLL for all cancers (***Figure 6-2***).

Figure 6-2: **Potential Years of Life Lost (PYLL) from Colorectal Cancer† Compared with Lung†, Breast‡ and Prostate Cancers, Alberta, 2010**



Data Source: Alberta Cancer Registry

Prevalence

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

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

In this section of the report, both limited-duration and complete colorectal cancer prevalence are presented; the latter describing the number of people alive as of December 31, 2010 who had ever been diagnosed with colorectal 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.

Table 6-3: **Limited-Duration and Complete Prevalence for Colorectal Cancer, Both Sexes Combined, Alberta, 2010**

Duration	Prevalence
2-Year	2,931
5-Year	5,912
10-Year	9,111
20-Year	11,908
Complete	13,447

Data Source: Alberta Cancer Registry

As of December 31, 2010, approximately **13,450** Albertans were alive who had previously been diagnosed with colorectal cancer (***Table 6-3***) out of which approximately **2,950** Albertans were alive on the same date who had been diagnosed with colorectal cancer in the previous two years, the period during which cases are more likely to receive definitive treatments.

Colorectal Cancer 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 colorectal cancer diagnoses in Albertan residents in a calendar year. Incidence rates are the number of new colorectal 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 colorectal cancer in Albertan residents 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.

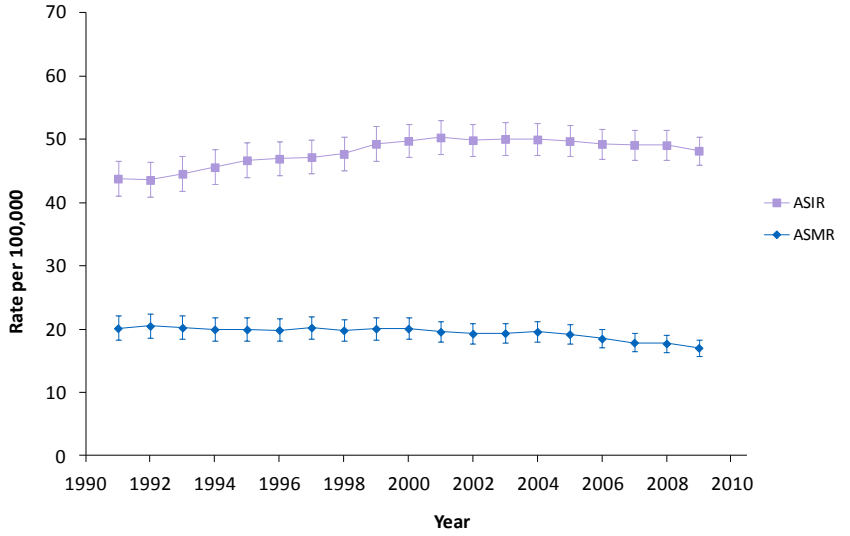
In order to compare cancer incidence or cancer mortality over time or between populations, ***age-standardized incidence rates (ASIRs)*** or ***age-standardized mortality rates (ASMRs)*** are presented. These are weighted averages of ***age-specific rates*** using a standard population to determine the weights. 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.

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 by age group. 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 a variety of factors; 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 for colorectal cancer 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[3] method 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).

Figure 6-3: **Age-Standardized Incidence Rates (ASIRs)*† and Mortality Rates (ASMRs)*† and 95% Confidence Intervals (CI) for Colorectal Cancer, Both Sexes Combined, Alberta, 1990-2010**



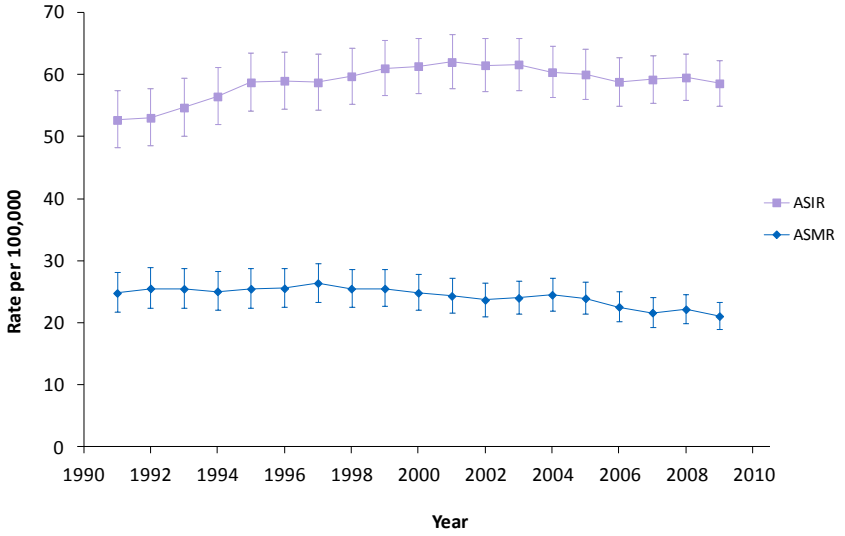
* Three-year moving average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health

Colorectal cancer ASIRs in both sexes combined increased significantly between 1990 and 2001 by 1.5% annually and remained stable from 2001 to 2010 (***Figure 6-3***). In 2010, the ASIR for colorectal cancer in both sexes combined was 47 per 100,000 population.

Colorectal cancer mortality rates are lower than incidence rates (***Figure 6-3***). ASMRs in both sexes combined decreased significantly since 1990 by 0.8% annually between 1990 and 2010. In 2010, the ASMR for colorectal cancer in both sexes combined was 17 per 100,000 population.

Figure 6-4: **Age-Standardized Incidence Rates (ASIRs)*† and Mortality Rates (ASMRs)*† and 95% Confidence Intervals (CI) for Colorectal Cancer, Males, Alberta, 1990-2010**



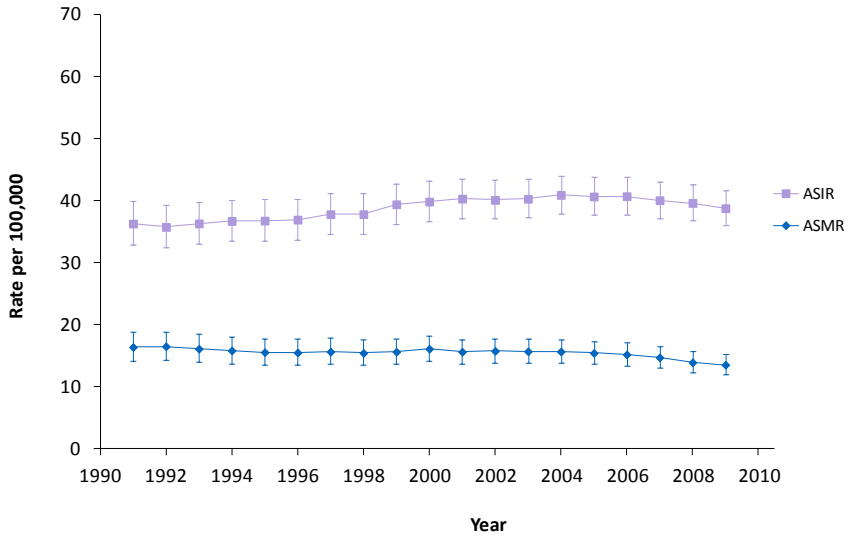
* Three-year moving average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health

Male colorectal cancer ASIRs changed significantly since 1990 (***Figure 6-4***). Between 1990 and 2000, male colorectal cancer ASIRs increased significantly by 2.0% annually and decreased significantly between 2000 and 2010 by 0.8% annually. In 2010, the ASIR for colorectal cancer in males was 56 per 100,000 male population.

Male colorectal mortality rates are lower than incidence rates (***Figure 6-4***). Over the period 1990 to 2010 male colorectal cancer ASMRs decreased significantly by 1.0% annually. In 2010, the ASMR for colorectal cancer in males was 19 per 100,000 male population.

Figure 6-5: **Age-Standardized Incidence Rates (ASIRs)[*†] and Mortality Rates (ASMRs)[*†] and 95% Confidence Intervals (CI) for Colorectal Cancer, Females, Alberta, 1990-2010**



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

Data Sources: Alberta Cancer Registry, Alberta Health

Female colorectal cancer ASIRs increased significantly since 1990 (***Figure 6-5***). Between 1990 and 2010, female colorectal cancer ASIRs increased by 0.5% annually. In 2010, the ASIR for colorectal cancer in females was 39 per 100,000 female population.

Female mortality rates are lower than incidence rates (***Figure 6-5***). Female colorectal cancer ASMRs decreased significantly since 1990. Between 1990 and 2010, female colorectal cancer ASMRs decreased significantly by 0.8% annually. In 2010, the ASMR for colorectal cancer in females was 15 per 100,000 female population.

Colorectal Cancer Incidence

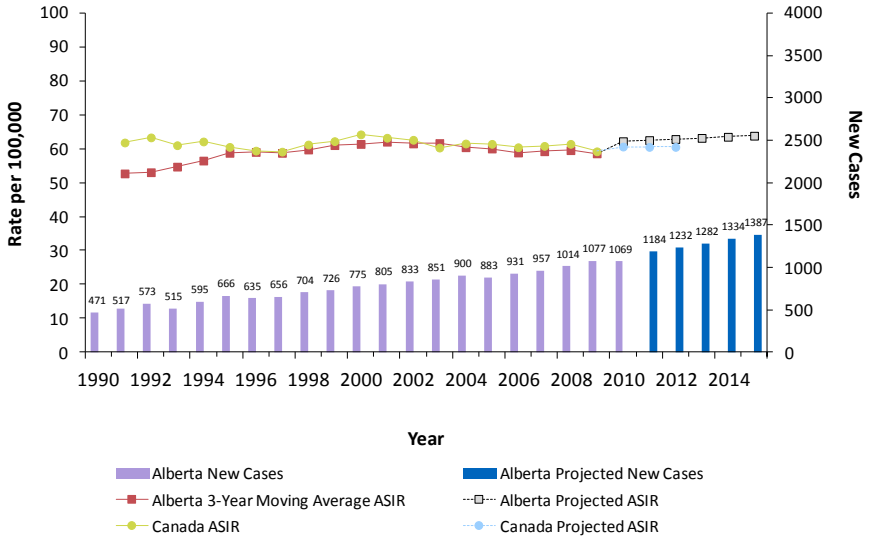
The following five figures (***Figures 6-6*** **to** ***6-10***) provide information on colorectal cancer incidence in Alberta. The number of new cancer cases in Alberta is affected not only by changes in the incidence rates, but also by the changes in the age structure and growth of the population. In order to compare trends over time, age-standardized incidence rates (ASIRs) are also provided.

In ***Figures 6-6*** and ***6-7*** observed age standardized incidence rates are shown for 1990-2009, and ***projected*** rates for 2010 -2015, and observed numbers of new colorectal cancer cases are shown for the years 1990-2010 and projected numbers for 2011-2015

The projected cancer numbers were calculated by applying the estimated age-specific cancer incidence rates to the projected age-specific population figures provided by Alberta Health[4]. These were observed up to 2009 and estimated for 2010-2015. Caution should be exercised when comparing Canada[5] and Alberta rates as Canadian rates are yearly rates while Alberta rates are three-year moving averages.

The estimated colorectal cancer incidence rates were calculated by extrapolating the historical trends in age-specific rate based on data for 1985-2009.

Figure 6-6: **Actual and Projected Number of New Cases and Age-Standardized Incidence Rates (ASIRs)*† for Colorectal Cancer, Males, Alberta, 1990-2015**



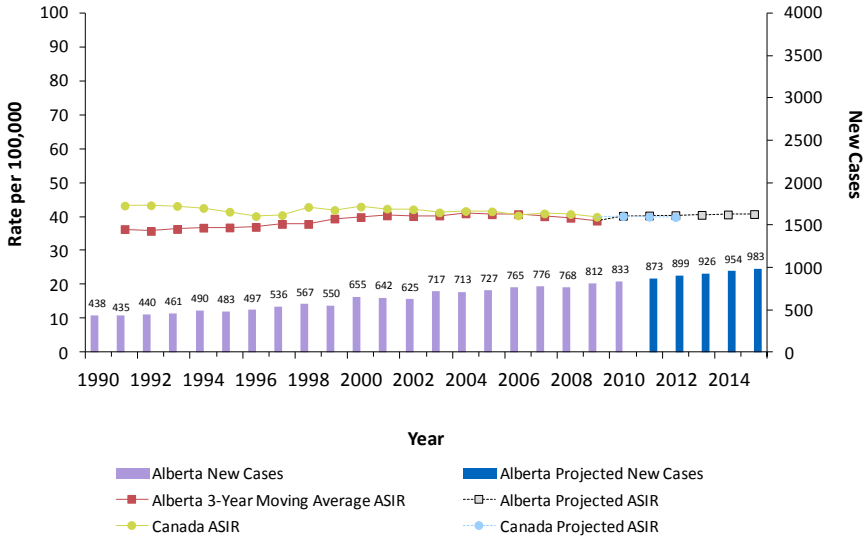
* Three-year moving average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health, Canadian Cancer Society

In 2010, 1,069 cases of male colorectal cancer were diagnosed in Alberta (***Figure 6-6***). Alberta ASIRs for male colorectal cancer were generally lower than those in Canada.

Approximately 1,400 cases of male colorectal cancer will be diagnosed in Alberta in 2015; however, with the new Alberta-wide colorectal screening program[6] these rates may change significantly.

Figure 6-7: **Actual and Projected Number of New Cases and Age-Standardized Incidence Rates (ASIRs)*† for Colorectal Cancer, Females, Alberta, 1990-2015**



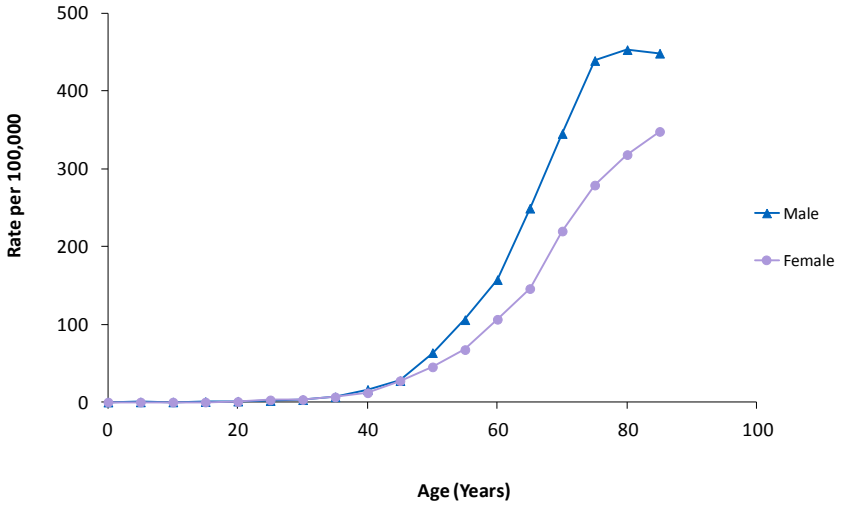
* Three-year moving average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health, Canadian Cancer Society

In 2010, 833 cases of female colorectal cancer were diagnosed in Alberta (***Figure 6-7***). Alberta ASIRs for female colorectal cancer were generally lower than those in Canada.

Approximately 980 cases of female colorectal cancer will be diagnosed in Alberta in 2015; however, with the new Alberta-wide Colorectal Cancer Screening Program[6] these rates may change significantly.

Figure 6-8: **Age-Specific Incidence Rates for Colorectal Cancer by Sex, Alberta, 2006-2010**

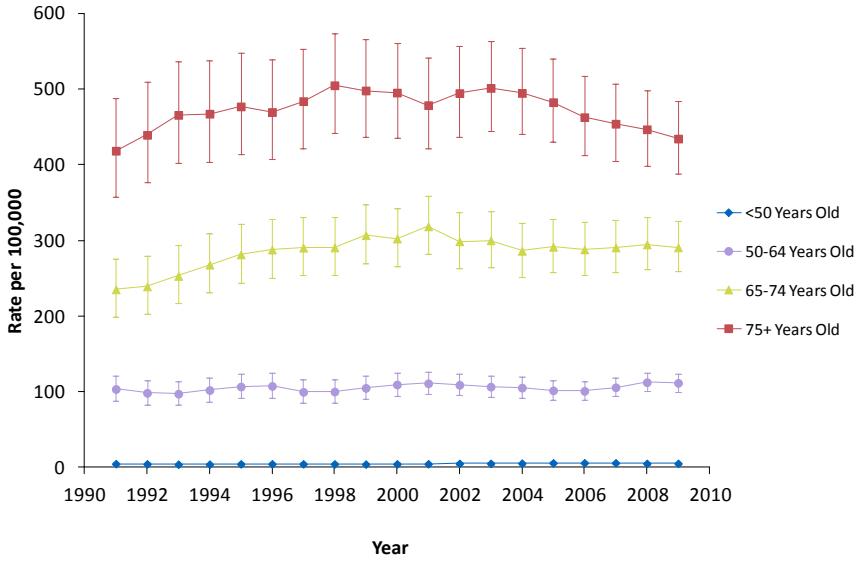


Data Sources: Alberta Cancer Registry, Alberta Health

Both males and females have low colorectal cancer rates until about the age of 40, at which point rates begin to increase (***Figure 6-8***). Males have higher colorectal cancer rates than females after the age of 45. The highest colorectal cancer incidence rates occur in the older age groups.

The trends in age-standardized colorectal cancer incidence rates in males differ across age groups (***Figure 6-9***).

Figure 6-9: **Age-Standardized Incidence Rates (ASIRs)[*†] and 95% Confidence Intervals (CI) for Colorectal Cancer, Ages <50, 50-64, 65-74, and 75+, Males, Alberta, 1990-2010**



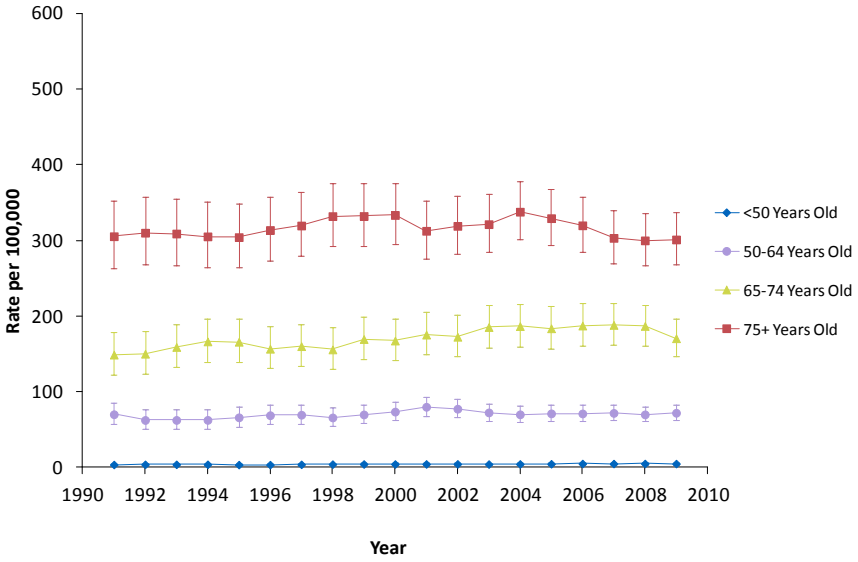
[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health

Male incidence rates for colorectal cancer in the <50 age group increased significantly between 1990 and 2010 by 1.4% annually.

Colorectal incidence rates for males in the age group 50-64 years did not significantly change over the period 1990 to 2010. The incidence rates for males in the age group 65-74 years increased significantly between 1990 and 1998 by 4.0% annually, but did not change significantly between 1998 and 2010. The incidence rates for males in the age group 75+ years increased significantly between 1990 and 1999 by 2.6% annually, and decreased significantly between 1999 and 2010 by 1.6% annually.

Figure 6-10: **Age-Standardized Incidence Rates (ASIRs)[*†] and 95% Confidence Intervals (CI) for Colorectal Cancer, Ages <50, 50-64, 65-74, and 75+, Females, Alberta, 1990-2010**



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

Data Sources: Alberta Cancer Registry, Alberta Health

The trends in age-standardized colorectal cancer incidence rates in females differ across age groups (***Figure 6-10***).

Between 1990 and 2010, colorectal cancer incidence rates for females increased significantly in the age groups <50 years and 65-74 years by 1.8% and 0.9% annually, respectively; but did not change significantly in the age groups 50-64 years and 75+ years over the same period.

The older the age groups, the higher the colorectal cancer incidence rates (***Figure 6-10***).

Colorectal Cancer Mortality

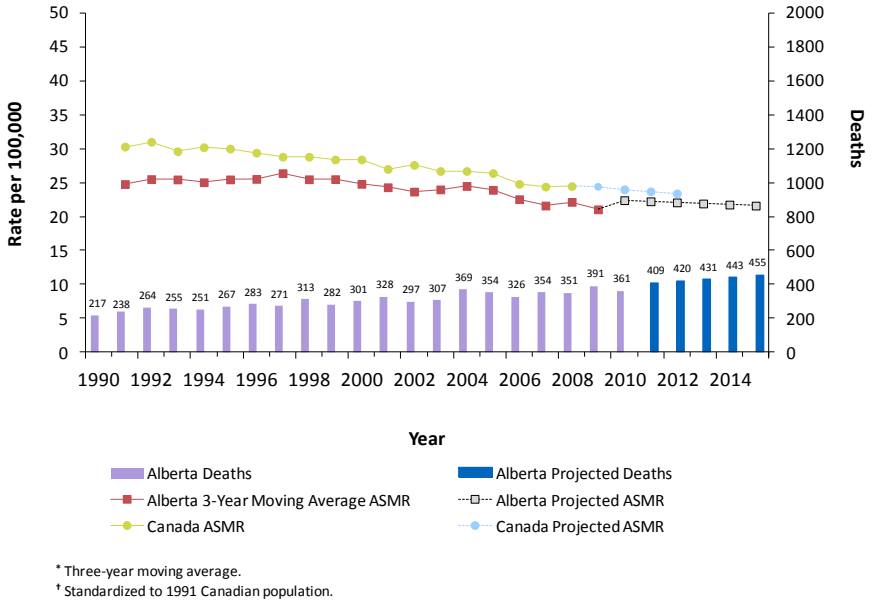
The following five figures (**Figures 6-11 to 6-15**) provide information on colorectal cancer mortality in Alberta. The number of deaths in Alberta is affected not only by changes in the mortality rates, but also by the changes in the age structure and growth of the population. In order to compare trends over time, age-standardized mortality rates (ASMRs) are also provided.

In **Figures 6-11** and **6-12** observed age standardized mortality rates are shown for 1990-2009, and ***projected*** rates for 2010 -2015, and observed numbers of cancer deaths are shown for the years 1990-2010 and projected numbers for 2011-2015.

The projected numbers of cancer deaths were calculated by applying the estimated age-specific cancer mortality rates to the age-specific population figures provided by Alberta Health[4]. These were observed up to 2009 and estimated for 2010-2015. Caution should be exercised when comparing Canada[5] and Alberta rates as Canadian rates are yearly rates while Alberta rates are three-year moving averages.

The estimated colorectal cancer mortality rates were calculated by extrapolating the historical trends in age-specific rate based on data in 1985-2009.

Figure 6-11: **Actual and Projected Number of Deaths and Age-Standardized Mortality Rates (ASMRs)*† for Colorectal Cancer, Males, Alberta, 1990-2015**



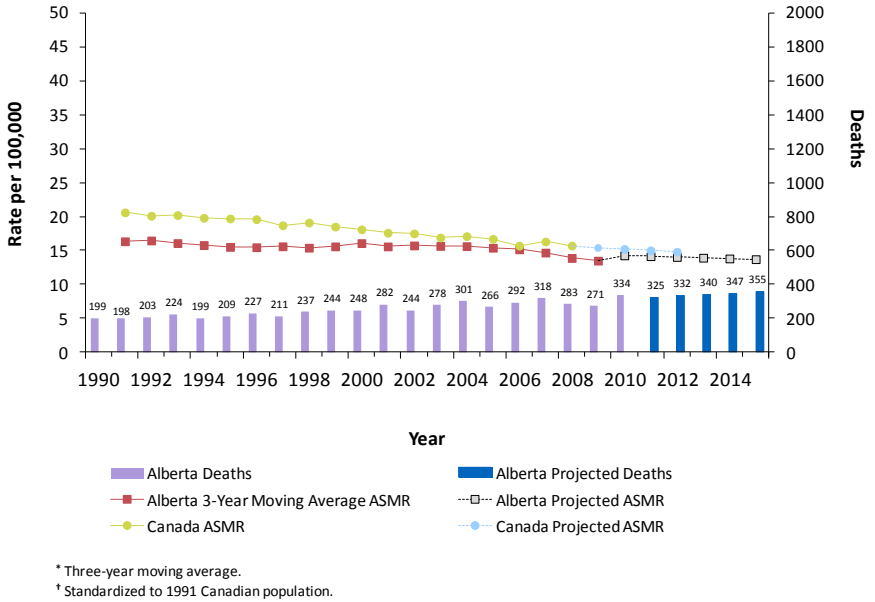
* Three-year moving average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health, Canadian Cancer Society

In 2010, 361 males died of colorectal cancer in Alberta (***Figure 6-11***). Alberta ASMRs for male colorectal cancer were generally lower than those in Canada.

Approximately 450 males are expected to die from colorectal cancer in Alberta in 2015.

Figure 6-12: **Actual and Projected Number of Deaths and Age-Standardized Mortality Rates (ASMRs)*† for Colorectal Cancer, Females, Alberta, 1990-2015**



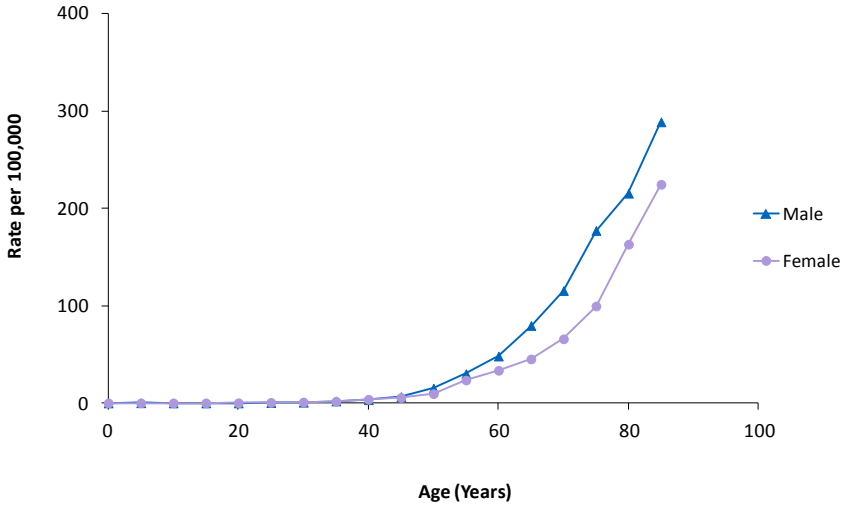
* Three-year moving average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health, Canadian Cancer Society

In 2010, 334 females died of colorectal cancer in Alberta (***Figure 6-12***). Alberta ASMRs for female colorectal cancer were generally lower than those in Canada.

Approximately 350 females are expected to die from colorectal cancer in Alberta in 2015.

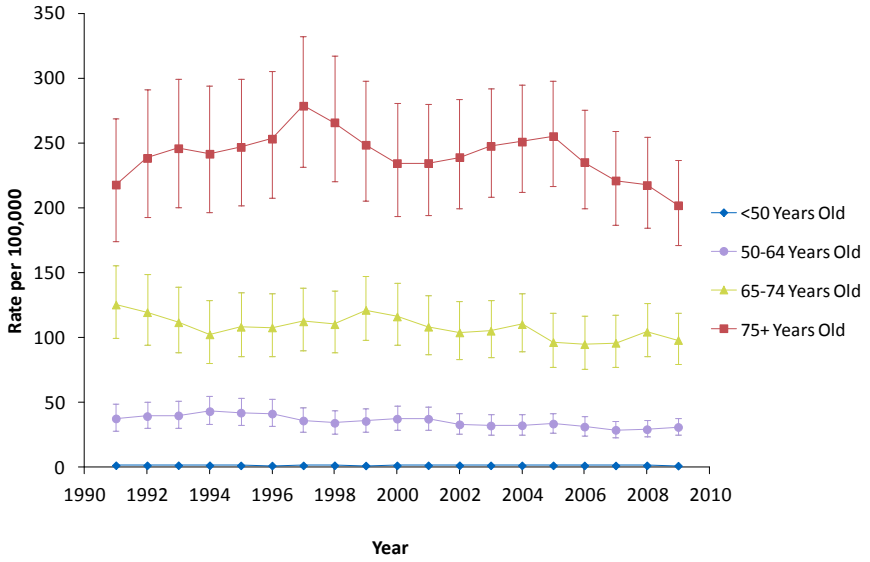
Figure 6-13: **Age-Specific Mortality Rates for Colorectal Cancer by Sex, Alberta, 2006-2010**



Data Sources: Alberta Cancer Registry, Alberta Health

Male and female colorectal cancer mortality rates remain low until about the age of 40, but begin rising thereafter. Males have higher mortality rates than women after the age of 45 (***Figure 6-13***). The highest colorectal cancer mortality rates occur in the older age groups.

Figure 6-14: **Age-Standardized Mortality Rates (ASMRs)[*†] and 95% Confidence Intervals (CI) for Colorectal Cancer, Ages <50, 50-64, 65-74, and 75+, Males, Alberta, 1990-2010**



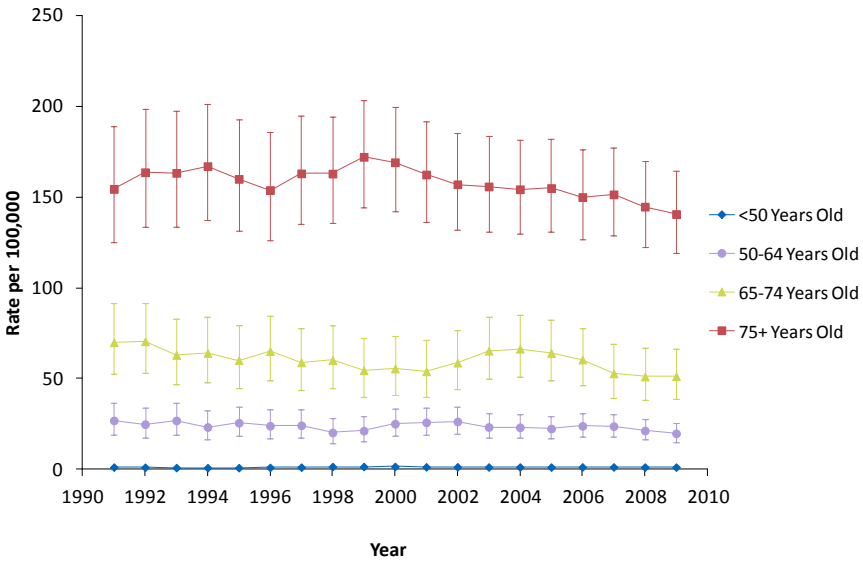
[*] Three-year moving average.
[†] Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health

The trends in age-standardized colorectal cancer mortality rates in males vary over time and with age (***Figure 6-14***).

Between 1990 and 2010, male mortality rates for colorectal cancer did not significantly change in the <50 and 75+ age groups; but decreased significantly over the same period in the 50-64 and 65-74 age groups by 1.6% and 1.1% annually respectively.

Figure 6-15: **Age-Standardized Mortality Rates (ASMRs)[*†] and 95% Confidence Intervals (CI) for Colorectal Cancer, Ages <50, 50-64, 65-74, and 75+, Females, Alberta, 1990-2010**



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

Data Sources: Alberta Cancer Registry, Alberta Health

The trends in age-standardized colorectal cancer mortality rates in females vary over time and with age (***Figure 6-15***).

Between 1990 and 2010, female mortality rates for colorectal cancer did not significantly change in the <50 and 50-64 age groups; but decreased significantly over the same period in the 65-74 and 75+ age groups by 1.1% and 0.7% annually respectively.

Colorectal Cancer Survival

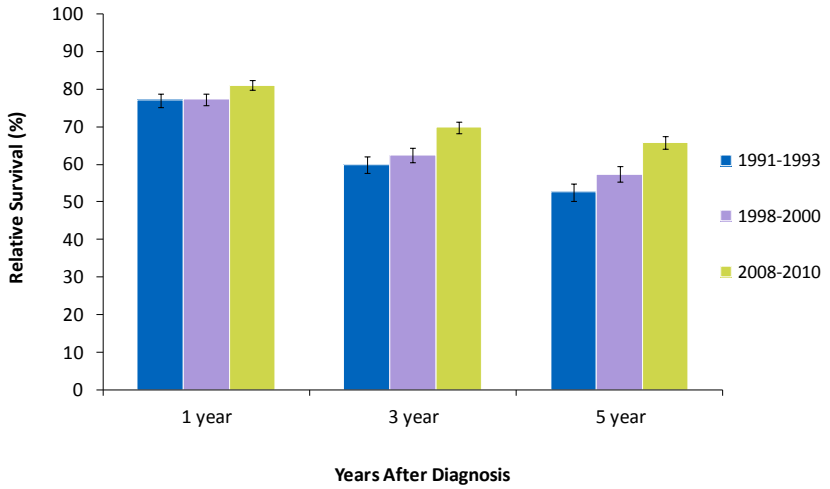
Cancer survival ratios indicate the proportion of people who will be alive at a given time after they have been diagnosed with cancer. Survival is an important outcome measure and is used for evaluating the effectiveness of cancer control programs. Survival depends on several factors including the cancer type (most importantly site, morphology and stage 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 cancer patient 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***[7] 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***.[8] 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.

Figure 6-16: **Age-Standardized One, Three and Five-Year Relative Survival Ratios and 95% Confidence Intervals (CI) for Colorectal Cancer, Both Sexes Combined, Alberta, 1991-1993*, 1998-2000* and 2008-2010†**



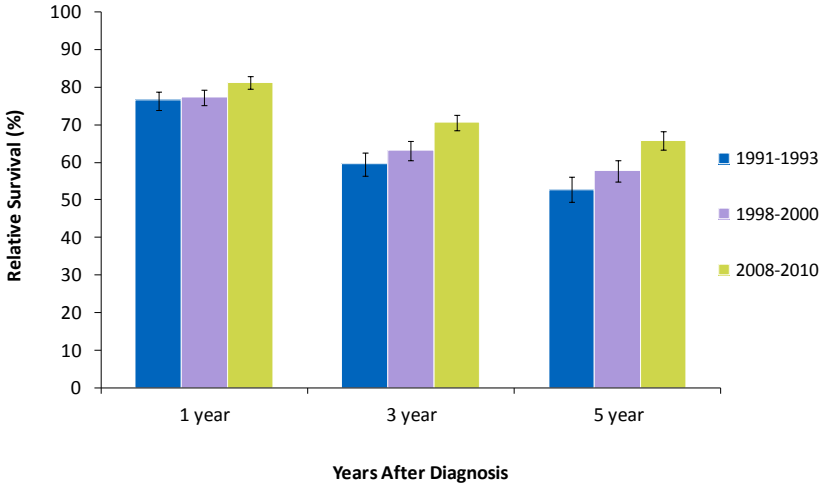
* Ratios calculated by cohort method, where complete follow-up data are available.
† Ratios calculated by period method, where complete follow-up data are not available.

Data Sources: Alberta Cancer Registry, Statistics Canada

The five-year relative survival ratio for individuals diagnosed with colorectal cancer in the period 2008-2010 is an estimated 66% indicating that out of individuals diagnosed with this cancer between 2008 and 2010, around 66% are as likely to be alive five years after diagnosis as individuals from the general population of the same age.

The five-year relative survival ratio for individuals diagnosed with colorectal cancer in Alberta has improved in 2008-2010 compared to those diagnosed in 1991-1993 (***Figure 6-16***).

Figure 6-17: **Age-Standardized One, Three and Five-Year Relative Survival Ratios and 95% Confidence Intervals (CI) for Colorectal Cancer, Males, Alberta, 1991-1993*, 1998-2000* and 2008-2010†**



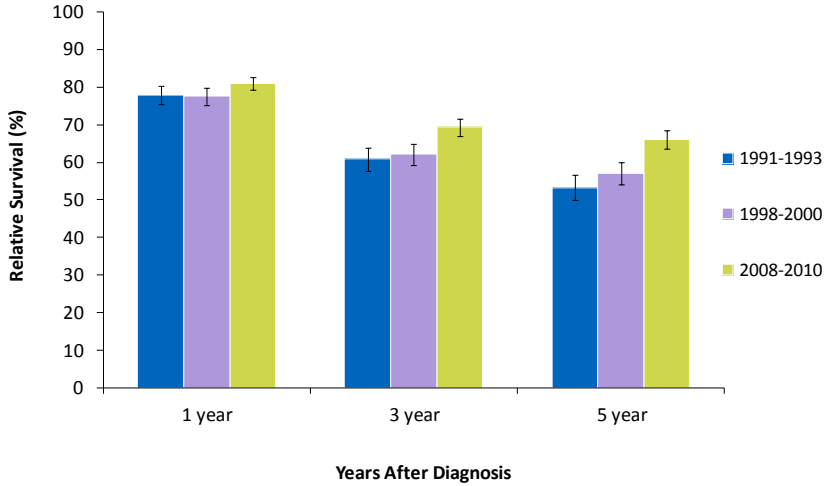
* Ratios calculated by cohort method, where complete follow-up data are available.
† Ratios calculated by period method, where complete follow-up data are not available.

Data Sources: Alberta Cancer Registry, Statistics Canada

The five-year relative survival ratio for males diagnosed with colorectal cancer in the period 2008-2010 is an estimated 66% indicating that out of males diagnosed with this cancer between 2008 and 2010, around 66% are as likely to be alive five years after diagnosis as males from the general population of the same age.

The five-year relative survival ratio for males diagnosed with colorectal cancer in Alberta has improved in 2008-2010 compared to those diagnosed in 1991-1993 (***Figure 6-17***).

Figure 6-18: **Age-Standardized One, Three and Five-Year Relative Survival Ratios and 95% Confidence Intervals (CI) for Colorectal Cancer, Females, Alberta, 1991-1993*, 1998-2000* and 2008-2010†**



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

Data Sources: Alberta Cancer Registry, Statistics Canada

The five-year relative survival ratio for females diagnosed with colorectal cancer in the period 2008-2010 is an estimated 66% indicating that out of females diagnosed with this cancer between 2008 and 2010, around 66% are as likely to be alive five years after diagnosis as females from the general population of the same age.

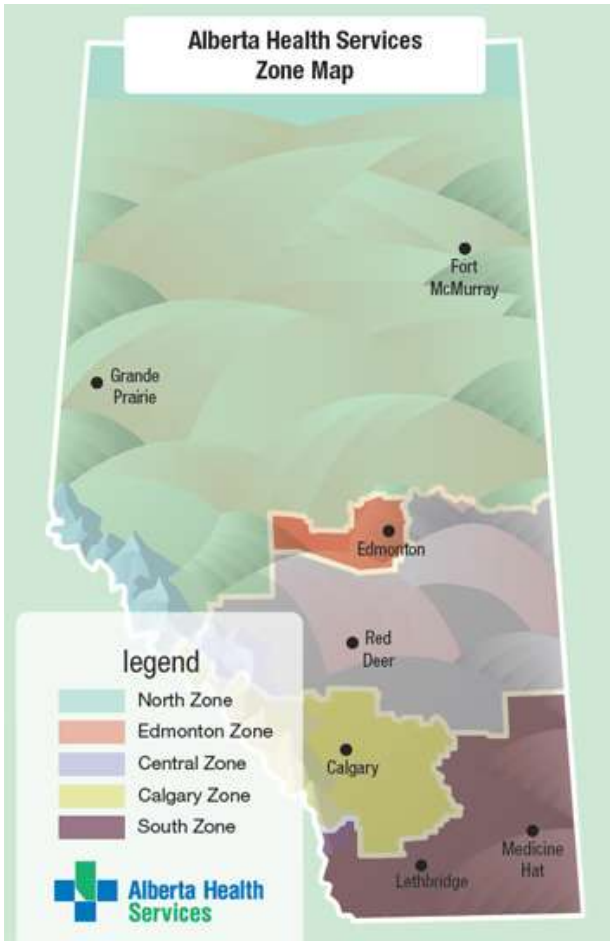
The five-year relative survival ratio for females diagnosed with colorectal cancer in Alberta has improved in 2008-2010 compared to those diagnosed in 1991-1993 (***Figure 6-18***).

Geographic Variation

The geographic variation section illustrates how the observed colorectal cancer rates in each health zone compare with the provincial average. These rates are three-year averages. The age standardized incidence and mortality colorectal cancer rates for each zone and the province are presented with their corresponding 95% ***confidence intervals***.[9] Any observed differences in rates may be due to several factors such as regional differences in:

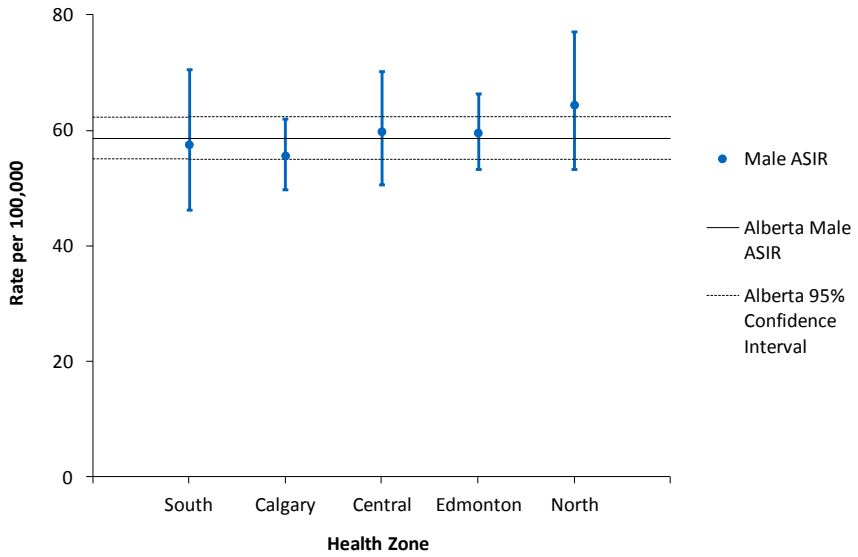
- risk factors such as smoking and obesity rates
- prevention efforts
- cancer screening
- diagnostic activity
- access to cancer care.[10]

Figure 6-19: Five Health Zones in Alberta, 2010



Source: Alberta Health Services

Figure 6-20: **Age-Standardized Incidence Rates (ASIRs)*† and 95% Confidence Intervals (CI) for Colorectal Cancer by Zones, Males, Alberta, 2008-2010**

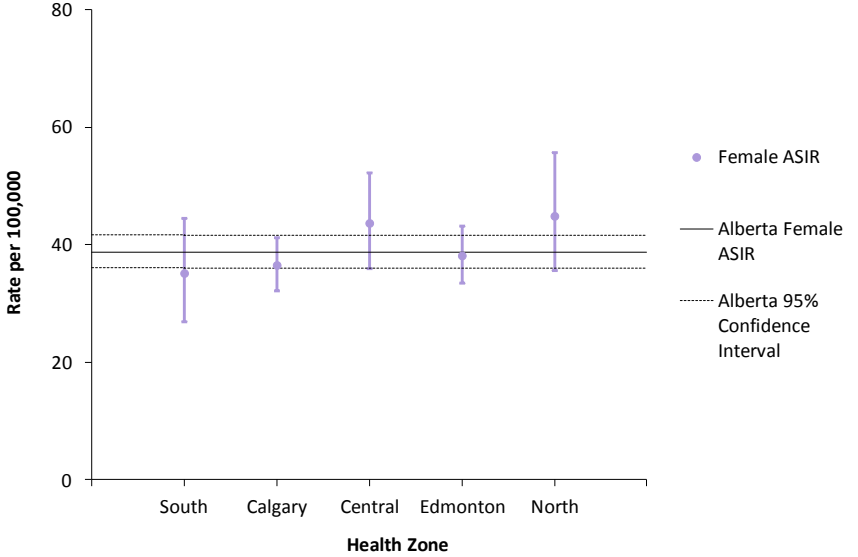


* Three-year average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health

There is no evidence that male colorectal cancer ASIRs in each zone is significantly higher or lower than the provincial average (***Figure 6-20***).

Figure 6-21: **Age-Standardized Incidence Rates (ASIRs)*† and 95% Confidence Intervals (CI) for Colorectal Cancer by Zones, Females, Alberta, 2008-2010**

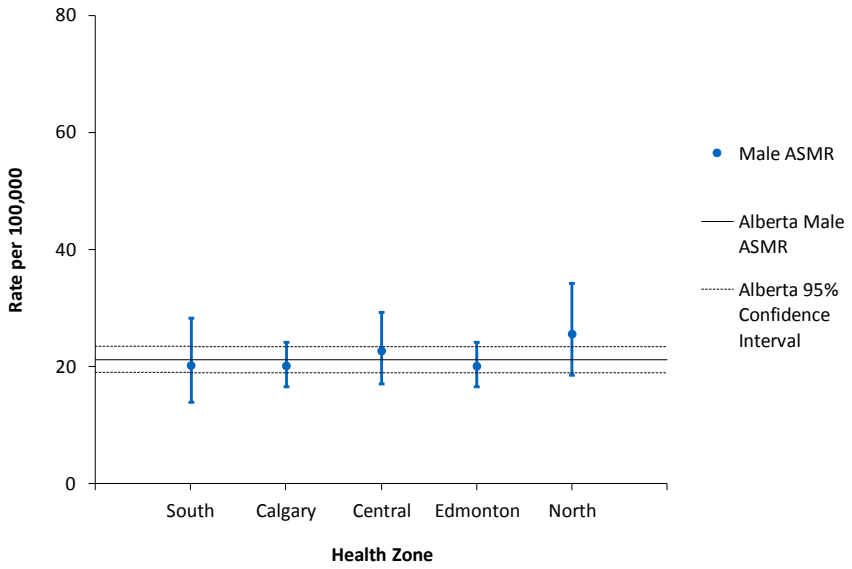


* Three-year average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health

There is no evidence that female colorectal cancer ASIRs in each zone is significantly higher or lower than the provincial average (***Figure 6-21***).

Figure 6-22: **Age-Standardized Mortality Rates (ASMRs)*† and 95% Confidence Intervals (CI) for Colorectal Cancer by Zones, Males, Alberta, 2008-2010**

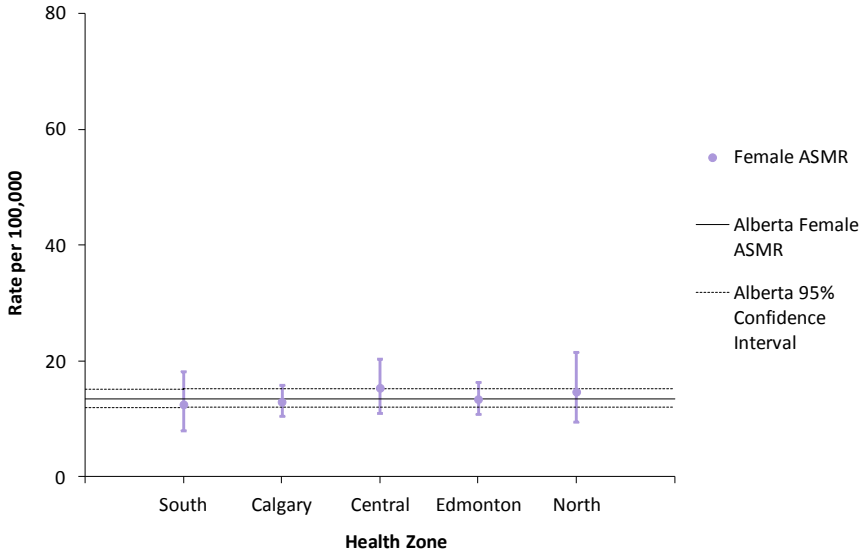


* Three-year average.
† Standardized to 1991 Canadian population.

Data Sources: Alberta Cancer Registry, Alberta Health

There is no evidence that male colorectal cancer ASMRs in each zone is significantly higher or lower than the provincial average (***Figure 6-22***).

Figure 6-23: **Age-Standardized Mortality Rates (ASMRs)*† and 95% Confidence Intervals (CI) for Colorectal Cancer by Zones, Females, Alberta, 2008-2010**



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

Data Sources: Alberta Cancer Registry, Alberta Health

There is no evidence that female colorectal cancer ASMRs in each zone is significantly higher or lower than the provincial average (***Figure 6-23***).

Further Information

Further information is available on a separate document, the **Appendix**:

Appendix 1: Glossary

Appendix 2: Cancer Definitions

Appendix 3: Data Notes

References

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