Alberta Health Services

Cancer Care

Cancer Surveillance

Childhood Cancer

December 2012

2010 Report on Cancer Statistics in Alberta

Acknowledgements

This report was made possible through Alberta Health Services, Cancer Care, Cancer Surveillance and the many contributions of staff and management across Alberta Health Services as well as external agencies and individuals.

The authors wish to thank individuals working in the following AHS departments and partner agencies for their contributions to this report: Alberta Cancer Registry, Surveillance and Health Status Assessment, Alberta Health and Statistics Canada. Contributions included provision of information, analysis and interpretation, and assistance with consultation sessions and communication of the report.

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Suggested Citation:
Cancer Surveillance: *2010 Report on Cancer Statistics in Alberta.* Edmonton: Cancer Care, Alberta Health Services, 2012.

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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 childhood 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 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.

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

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

Summary

- In 2010, **103** children aged 0 to 14 years old were diagnosed with cancer in Alberta.
- Between 2006 and 2010, the most common childhood cancers were **leukemias** (31%), **central nervous system tumors** (20%), **lymphomas** (12%), **neuroblastomas** (7%), and **renal tumors** (7%).
- In 2010, **14** children aged 0 to 14 years old died from childhood cancer in Alberta.
- Between 2006 and 2010, the most common cancer causes of death in children were **central nervous system tumors** (37%), **leukemias** (31%), and **neuroblastomas** (8%).
- As of December 31, 2010, approximately 680 children aged 0 to 14 years were alive who had previously been diagnosed with cancer in Alberta and about 2400 Albertans aged 0 to 99 were survivors of childhood cancer.
- Since 1990, childhood cancer **incidence rates have increased** for children aged 0 to 14 years old.
- Since 1990, childhood cancer **mortality rates have been stable** for children aged 0 to 14 years old.
- Five-year observed survival rate for all childhood cancers diagnosed between 2001 and 2005 in Alberta is **83%**.

In 2010, 103 children aged 0 to 14 years old were diagnosed with cancer in Alberta.

Between 2006 and 2010, the most common childhood cancers were leukemias, central nervous system tumors, lymphomas, neuroblastomas, and renal tumors.

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

Childhood Cancer in Alberta

Childhood cancers are relatively rare in Alberta. In this report, childhood cancers are defined as invasive cancers that are diagnosed in children up to and including the age of 14. Childhood cancers accounted for 0.7% of all new cancer cases diagnosed in Alberta in 2010. Although childhood cancers are rare, they have a profound impact on families and communities. In addition, childhood cancer survivors are more likely to develop additional cancers as they grow older.[1]

Childhood cancers are classified differently than adult cancers. As with adults, the classification of childhood cancer is based on both tumor morphology and cancer site. However, greater emphasis is placed on morphology rather than site, as compared to adults where greater emphasis is placed on site. In this report, childhood cancers are classified according to the International Classification of Childhood Cancer, Third Edition[2].

The following table (***Table 14-1***) provides an overview of childhood cancer incidence and mortality in Alberta. Explanations and further details on New Cases, Five-Year Average Age-Standardized Incidence Rates, Deaths, Five-Year Average Age-Standardized Mortality Rates and Five-Year Observed Survival Rate can be found in the relevant sections of this report.

Table 14-1: **New Cases and Deaths and Five-Year Average Age-Standardized Incidence Rates (ASIRs)[†] and Mortality Rates (ASMRs)[†‡], Ages 0-14, Alberta, 2006-2010**

Diagnostic Group	New Cases	ASIRs	Deaths	ASMRs
Total Childhood Cancers*	**527**	**155.8**	**91**	**27.1**
I. Leukemia	162	48.0	28	8.3
a. Lymphoid	129	38.3	16	4.8
b. Acute Myeloid	21	6.1	6	1.8
II. Central Nervous System	104	31.0	34	10.1
a. Ependymoma	16	4.7	2	0.6
b. Astrocytoma	48	14.4	14	4.2
c. Intracranial & Intraspinal Embryonal	25	7.4	10	2.9
III. Lymphoma	64	18.9	3	0.9
a. Hodgkin Lymphoma	25	7.3	0	0.0
b. Burkitt Lymphoma	6	1.8	2	0.6
c. Non-Hodgkin Lymphoma	24	7.1	1	0.3
IV. Neuroblastoma & Other PNC	36	10.5	7	2.2
a. Neuroblastoma & Ganglioneuroblastoma	34	9.9	7	2.2
V. Soft Tissue	26	7.7	4	1.2
a. Rhabdomyosarcoma	16	4.8	2	0.6
VI. Renal Tumours	37	11	3	0.9
a. Nephroblastoma	36	10.6	3	0.9
VII. Malignant Bone	22	6.5	3	0.9
VIII. Other Malignant Epithelial	20	5.9	3	0.9
IX. Germ Cell Tumours and Other Gonadal	21	6.2	2	0.6

[†] Standardized to 1991 Canadian Population

[‡] ASIR and ASMRs are rates per 1,000,000

[*] New cases and deaths from aggregated sites may not add up to the total number of childhood cancers because hepatic tumors, retinoblastoma, other and unspecified malignant neoplasms, and not classified cancers were omitted from the table

Data Sources: Alberta Cancer Registry, Alberta Health

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. In this section of the report, the cancer prevalence is presented in two ways: the number of children (0-14 years old) alive as of December 31, 2010 who had ever been diagnosed with cancer, and the number of people aged 0-99 years who had ever been diagnosed with cancer in childhood (aged 0-14 years).

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.

In 2010, the total number of children living in Alberta is approximately 707,700[3] or about one fifth of the Alberta population. As of December 31, 2010, approximately **680** children (0-14 years old) were alive who had previously been diagnosed with cancer. Also about **2,400** Albertans aged 0 to 99 had survived a childhood cancer.

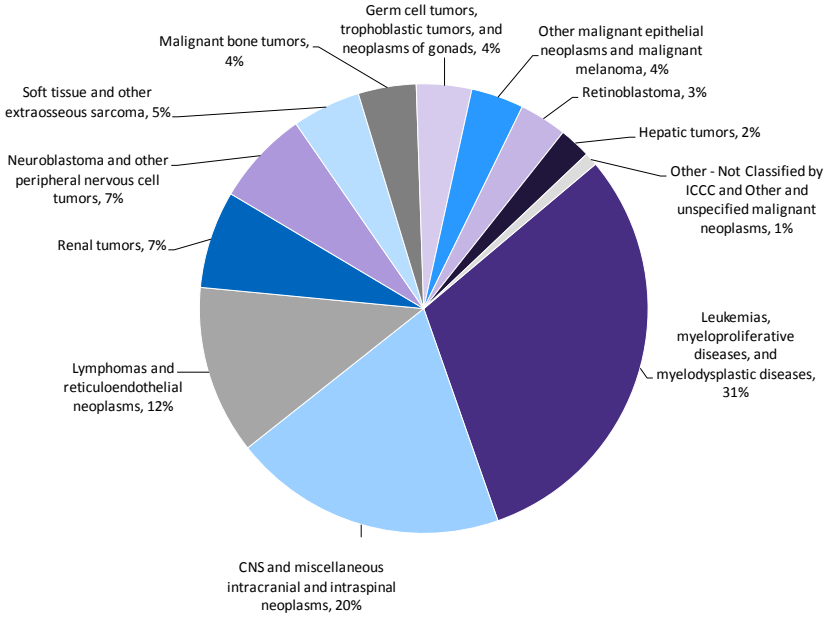
Incidence and Mortality Counts

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 childhood cancers (children aged 0-14) diagnosed in Albertan residents between 2006 and 2010.

Mortality counts describe the number of deaths attributed to childhood cancer during a specified period of time in a specific population. In this section of the report, mortality counts refer to the number of deaths due to childhood cancer (children aged 0-14) in Albertan residents between 2006 and 2010, regardless of the date of diagnosis.

The following two figures illustrate the proportion of new cancer cases and cancer deaths by cancer type.

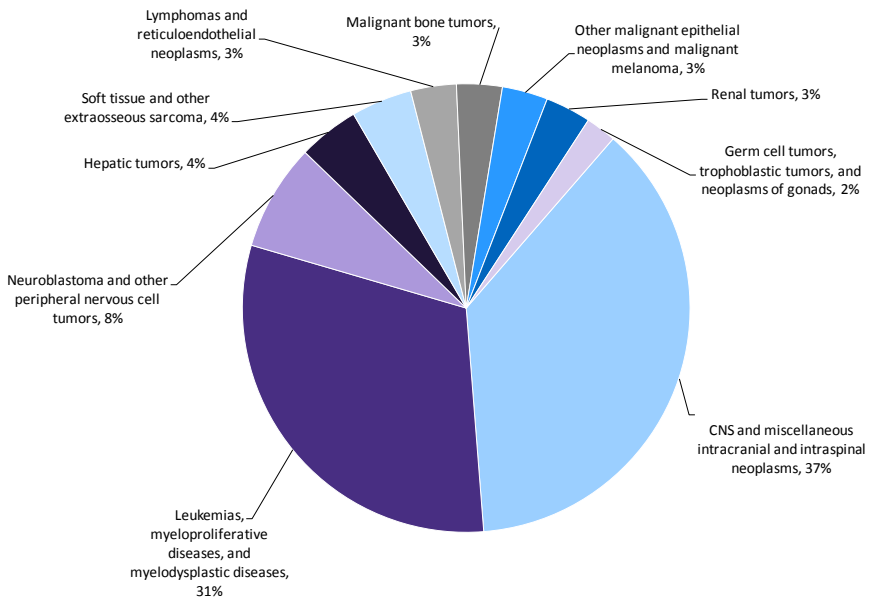
Figure 14-1: **New Cancer Cases, Ages 0-14, Alberta, 2006-2010**



Data Source: Alberta Cancer Registry

Between 2006 and 2010, a total of 527 childhood cancer cases were diagnosed among Albertan residents. The most commonly diagnosed childhood cancers were leukemia (31%), central nervous system cancers (20%), and lymphoma (12%); these cancers accounted for 63% of all childhood cancers (***Figure 14-1***). Of the 162 childhood leukemia diagnoses, 129 cases (80%) were lymphoid leukemia and 21 cases (13%) were acute myeloid leukemia. Of the 64 children diagnosed with lymphoma, 25 cases (39%) were Hodgkin lymphoma, 6 cases (9%) were Burkitt lymphoma, and 24 cases (38%) were non-Hodgkin lymphoma.

Figure 14-2: **Childhood Cancer Deaths, Ages 0-14, Alberta, 2006-2010**



Data Source: Alberta Cancer Registry

Of the 91 childhood cancer deaths between 2006 and 2010, 37% were attributable to central nervous system cancers, 31% to leukemia and 8% to neuroblastoma (***Figure 14-2***). These three cancers account for 76% of all childhood cancer deaths.

Incidence and Mortality Rates

Incidence rates for childhood cancers are the number of new cancer cases diagnosed per 1,000,000 population in a specific time period. ***Mortality rates*** for childhood cancers are the number of deaths per 1,000,000 population in a specific time period.

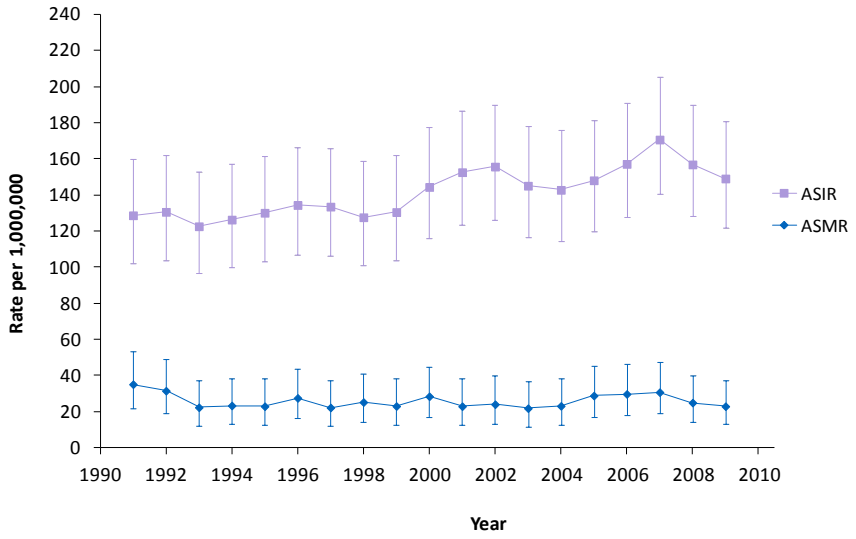
In order to compare cancer incidence or cancer mortality over time or between populations, ***age-standardized incidence rates (ASIRs)*** or ***age-standardized mortality rates (ASMRs)*** are presented. These are weighted averages of ***age-specific rates*** using a standard population to determine weights. 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 childhood population of Alberta had been the same as the childhood 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 childhood cancers (children aged 0-14) 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[4] method and is described in the text accompanying each graph. Joinpoint models are based on yearly age-standardized 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 14-3: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Mortality Rates (ASMRs)[*†‡] and 95% Confidence Intervals (CI) for Childhood Cancer, Ages 0-14, Both Sexes Combined, Alberta, 1990-2010**



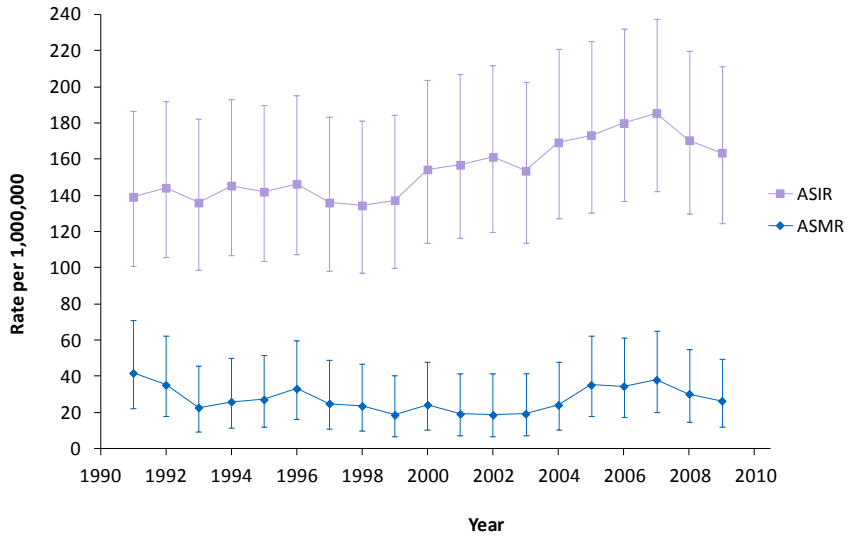
* Three year moving averages
† Standardized to 1991 Canadian Population;
‡ ASIRs and ASMRs are rates per 1,000,000

Data Sources: Alberta Cancer Registry, Alberta Health

Childhood cancer ASIRs have increased significantly since 1990 (***Figure 14-3***). From 1990 to 2010, childhood cancers ASIRs in both sexes combined have increased significantly by 1.2% annually. In 2009, the three-year average ASIR for childhood cancer in both sexes combined was 149 per 1,000,000 childhood population.

Childhood cancer ASMRs in both sexes combined have not changed significantly since 1990 (***Figure 14-3***). In 2009, the three-year average ASMR for childhood cancer in both sexes combined was 23 per 1,000,000 childhood population.

Figure 14-4: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Mortality Rates (ASMRs)[*†‡] and 95% Confidence Intervals (CI) for Childhood Cancer, Ages 0-14, Males, Alberta, 1990-2010**



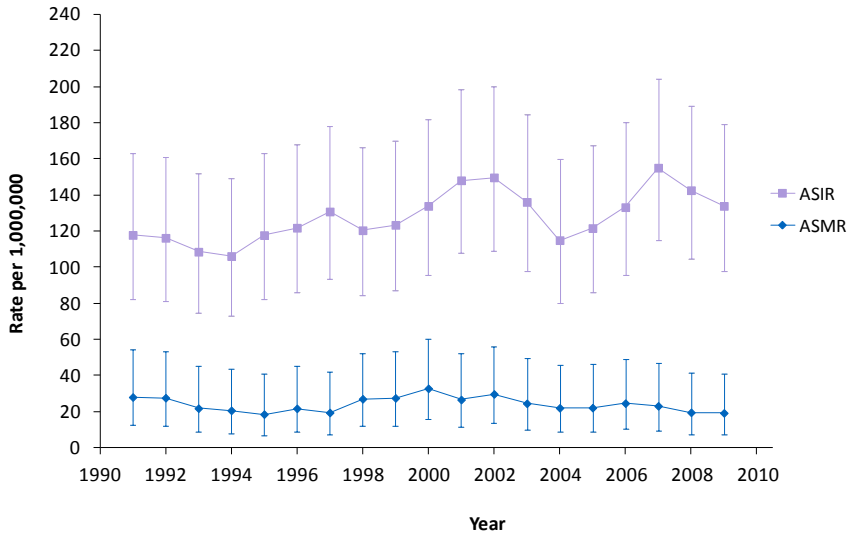
* Three year moving averages
† Standardized to 1991 Canadian Population;
‡ ASIRs and ASMRs are rates per 1,000,000

Data Sources: Alberta Cancer Registry, Alberta Health

Childhood cancer ASIRs for males have increased significantly since 1990 (***Figure 14-4***). From 1990 to 2010, childhood cancer ASIRs in males have increased significantly by 1.2% annually. In 2009, the three-year average ASIR for childhood cancer in males was 164 per 1,000,000 male childhood population.

Childhood cancer ASMRs in males have not significantly changed since 1990 (***Figure 14-4***). In 2009, the three-year average ASMR for childhood cancer in males was 26 per 1,000,000 male childhood population.

Figure 14-5: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Mortality Rates (ASMRs)[*†‡] and 95% Confidence Intervals (CI) for Childhood Cancer, Ages 0-14, Females, Alberta, 1990-2010**



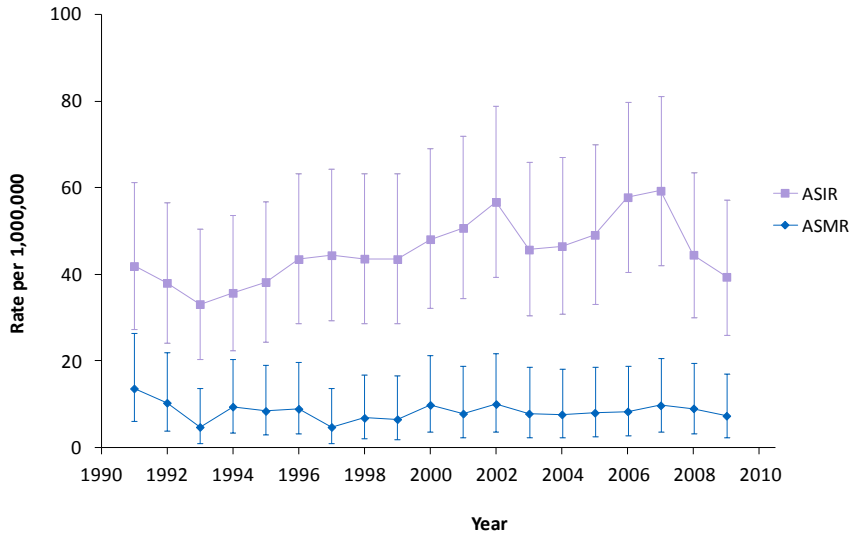
[*] Three year moving averages
[†] Standardized to 1991 Canadian Population;
[‡] ASIRs and ASMRs are rates per 1,000,000

Data Sources: Alberta Cancer Registry, Alberta Health

Childhood cancer ASIRs for females have not significantly changed since 1990 (***Figure 14-5***). In 2009, the three-year average ASIR for childhood cancer in females was 134 per 1,000,000 female childhood population.

Childhood cancer ASMRs for females have not significantly changed since 1990 (***Figure 14-5***). In 2009, the three-year average ASMR for childhood cancer in females was 19 per 1,000,000 female childhood population.

Figure 14-6: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Mortality Rates (ASMRs)[*†‡] and 95% Confidence Intervals (CI) for Childhood Leukemia, Ages 0-14, Both Sexes Combined, Alberta, 1990-2010**



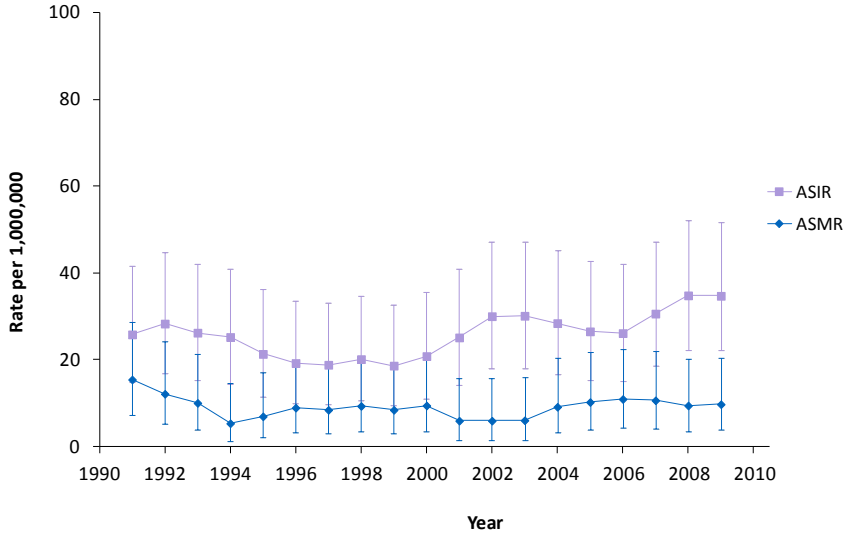
[*] Three year moving averages
[†] Standardized to 1991 Canadian Population;
[‡] ASIRs and ASMRs are rates per 1,000,000

Data Sources: Alberta Cancer Registry, Alberta Health

Childhood leukemia ASIRs in both sexes combined have not significantly changed since 1990 (***Figure 14-6***). In 2009, the three-year average ASIR for childhood leukemia in both sexes combined was 39 per 1,000,000 childhood population.

Childhood leukemia ASMRs in both sexes combined have not significantly changed since 1990 (***Figure 14-6***). In 2009, the three-year average ASMR for childhood leukemia in both sexes combined was 7 per 1,000,000 childhood population.

Figure 14-7: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Mortality Rates (ASMRs)[*†‡] and 95% Confidence Intervals (CI) for Childhood Cancers of the Central Nervous System, Ages 0-14, Both Sexes Combined, Alberta, 1990-2010**



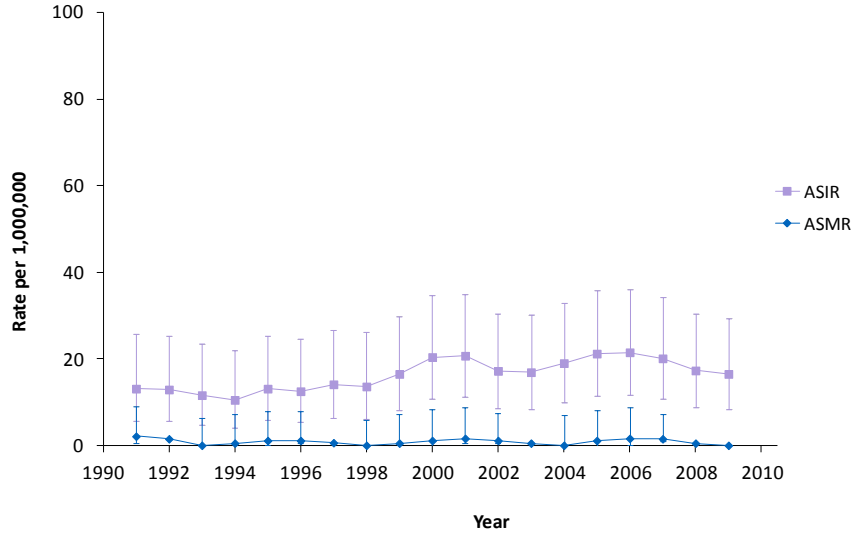
* Three year moving averages
† Standardized to 1991 Canadian Population;
‡ ASIRs and ASMRs are rates per 1,000,000

Data Sources: Alberta Cancer Registry, Alberta Health

Childhood CNS cancers ASIRs have increased significantly since 1990 (***Figure 14-7***). From 1990 to 2010, childhood CNS cancer ASIRs in both sexes combined have increased by 1.8% annually. In 2009, the three-year average ASIR for childhood cancers of the central nervous system (CNS) in both sexes combined was 35 per 1,000,000 childhood population.

Childhood CNS cancers ASMRs in both sexes combined have not significantly changed since 1990 (***Figure 14-7***). In 2009, the three-year average ASMR for childhood cancers of the CNS in both sexes combined was 10 per 1,000,000 childhood population.

Figure 14-8: **Age-Standardized Incidence Rates (ASIRs)[*†‡] and Age-Standardized Mortality Rates (ASMRs)[*†‡] and 95% Confidence Intervals (CI) for Childhood Lymphoma, Ages 0-14, Both Sexes Combined, Alberta, 1990-2010**



* Three year moving averages
† Standardized to 1991 Canadian Population;
‡ ASIRs and ASMRs are rates per 1,000,000

Data Sources: Alberta Cancer Registry, Alberta Health

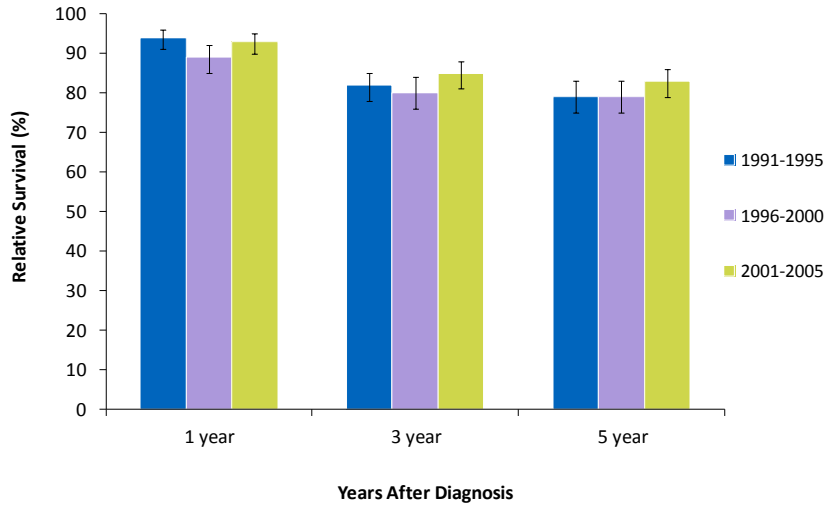
Childhood lymphoma ASIRs in both sexes combined have not significantly changed since 1990 (***Figure 14-8***). In 2009, the three-year average ASIR for childhood lymphoma in both sexes combined was 17 per 1,000,000 childhood population.

Childhood lymphoma ASMRs trends in both sexes combined have not significantly changed since 1990 (***Figure 14-8***). There were no deaths due to childhood lymphoma between 2008 and 2010. Therefore, the three-year average ASMR for childhood lymphoma in both sexes combined was 0 per 1,000,000 childhood population.

Childhood Cancer Survival

The ***observed survival*** proportion (OSP) describes the proportion of children diagnosed with a specific cancer who survived through the specified time period. Observed Survival Proportions 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. Children whose cancer was only identified through death certificate were excluded from the calculation. 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.

Figure 14-9: **Observed Survival Proportions* and 95% Confidence Intervals (CI) for Childhood Cancer, Both Sexes Combined, Ages 0-14, Alberta, 1991-1995, 1996-2000, 2001-2005**

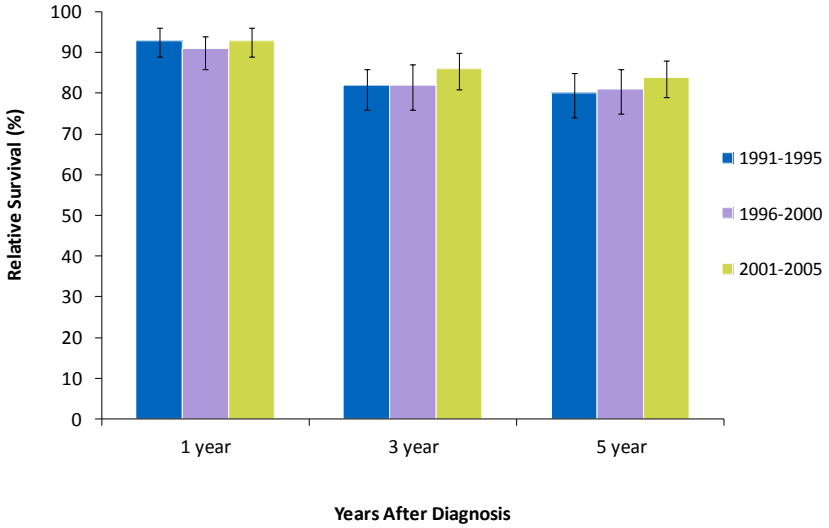


* Ratios calculated by cohort method, where complete follow-up data are available.

Data Sources: Alberta Cancer Registry, Statistics Canada

Five-year observed survival proportions for Alberta children diagnosed with cancer in both sexes combined have not changed since 1991-1995. In 2001-2005, five year observed survival was 83% (***Figure 14-9***).

Figure 14-10: **Observed Survival Proportions* and 95% Confidence Intervals (CI) for Childhood Cancer, Males, Ages 0-14, Alberta, 1991-1995, 1996-2000, 2001-2005**

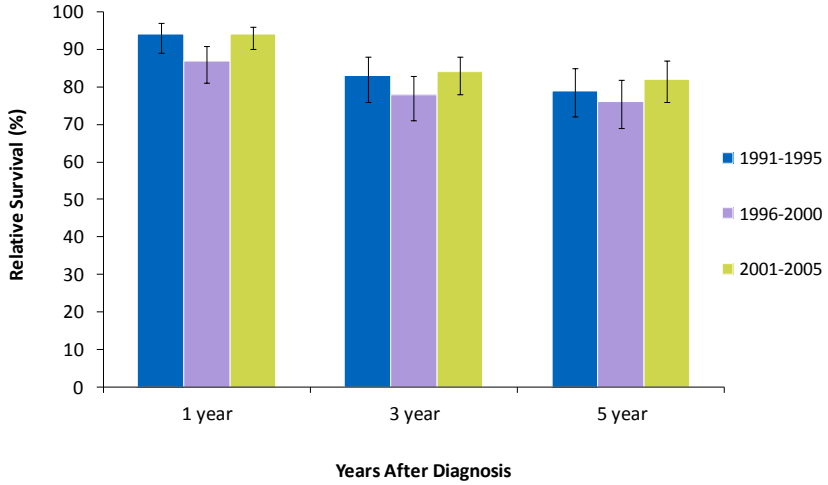


* Ratios calculated by cohort method, where complete follow-up data are available.

Data Sources: Alberta Cancer Registry, Statistics Canada

Five-year observed survival proportions for males diagnosed with childhood cancer have not changed since 1991-1995. In 2001-2005, five year observed survival for males diagnosed with childhood cancer was 84% (***Figure 14-10***).

Figure 14-11: **Observed Survival Proportions* and 95% Confidence Intervals (CI) for Childhood Cancer, Females, Ages 0-14, Alberta, 1991-1995, 1996-2000, 2001-2005**



* Ratios calculated by cohort method, where complete follow-up data are available.

Data Sources: Alberta Cancer Registry, Statistics Canada

Five-year observed survival proportions for females diagnosed with childhood cancer have not changed since 1991-1995. In 2001-2005, five-year observed survival for females diagnosed with childhood cancer was 82% (***Figure 14-11***).

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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