Prince Edward Island
CANADA
Department of Health

Cancer Trends in PEI

1980 to 2006

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CANCER TRENDS
in
Prince Edward Island
1980 to 2006

Department of
Health

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Acknowlegements:

This book is dedicated to all Islanders who have been touched by cancer.

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Executive Summary

Cancer is not a single disease; it is a process of uncontrolled cell growth that can occur in many different tissues and organs. Cancers of different sites can vary considerably in their behaviour, treatment, and underlying causes. Of the diverse group of cancers, the most common sites are prostate, breast, lung, and colon/rectum.

Cancer is primarily a disease of people over 60. About two out of every five Canadians are expected to develop cancer during their lifetime.

The risk of cancer can be reduced by not smoking tobacco, eating healthy diets high in fruits and vegetables, increasing physical activity, and reducing obesity.

Overall, cancer incidence in PEI has increased, while remaining stable in Canada. Cancer mortality has decreased both in PEI and Canada.

In men, PEI's cancer incidence was 10% higher than in Canada over the past ten years. This is explained by PEI's higher incidence of prostate cancer. However, PEI's mortality rate of prostate cancer is similar to Canada's decreasing rate. This suggests screening may be finding more new cases in PEI than in Canada.

In women, PEI's cancer incidence was 8% higher than in Canada over the past ten years. This is explained by PEI's higher incidence of colorectal and lung cancers. Colorectal cancer incidence has been decreasing in Canadian women, but increasing among PEI women. Mortality for colorectal cancer has been decreasing in Canadian women, but remained stable in PEI. The combination of rising incidence and stable mortality (in the face of declining Canadian mortality) suggests PEI women are at increased risk for colorectal cancer. In women, lung cancer incidence and mortality are increasing, in both PEI and Canada.

In Canada and PEI, the incidence of melanoma is increasing, while mortality is stable. In PEI men and women, incidence is higher than in Canada; this may be due to PEI's predominantly fair-skinned population.

Canada and PEI have similar trends in breast cancer, with incidence increasing while mortality is decreasing. This suggests improved survival due to mammographic screening and treatment. For the first time, information on the stage of cancer at the time of diagnosis has been included.

In PEI and Canada, the incidence of childhood cancer has been stable.

Within PEI, cancer incidence was examined by dividing the province into five communities. The overall increase in PEI's cancer incidence occurred in Summerside, Charlottetown, and Eastern PEI; Western and Central PEI did not contribute to this increase. This does not demonstrate an urban/rural pattern of cancer incidence.

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Introduction

Prince Edward Island is Canada's smallest province: it is 280 kilometres from one end to the other. As one of the maritime provinces, it is located in the Gulf of St. Lawrence on the Atlantic coast. About 55% of the population is rural, and 45% live in the urban areas of Charlottetown and Summerside.[1] PEI has a relatively stable and homogenous population with low migration rates (less than 3%) and about 95% of Western European origin. The major primary industries are agriculture, tourism, and fishing; the economy also includes food processing, construction, manufacturing, and the service sector.

There are many different types of cancers. All of them are characterized by uncontrolled growth of abnormal cells in the body. Groups of abnormal cells can form lumps or tumours, or can spread to other parts of the body. Benign tumour cells stay in one place in the body and are not usually life-threatening. Malignant tumour cells are able to invade the tissues around them and spread to other parts of the body (metastasize). Cancers are named after the part of the body where they start. It is important to consider that cancers of different sites can vary considerably in their behaviour, treatment, and underlying causes.

The data presented in this report describe trends in cancer incidence and mortality in Prince Edward Island over the period 1980 to 2006. All rates are age standardized to the 1991 Canadian population, to allow comparison. Trends are compared over time, and PEI trends are compared to Canadian trends. Comparisons need to take into account several factors:

- the small number of cancer cases in PEI produces rates that may vary considerably from one year to the next
- reporting procedures used in cancer registration vary across provinces; prostate and melanoma are under-reported in some provinces; breast, melanoma and colorectal cancer rates are lower in Canada since some provinces use more restrictive multiple primary rules
- the prevalence of risk factors varies across provinces
- screening behaviours differ among provinces.

This report does not provide proof for any cause of cancer, since this requires detailed data on individuals, including exposure history that is not available in the cancer registry.

Data Sources

PEI Cancer Registry
In PEI, cancer is a reportable disease named in the Public Health Act. All cancers are recorded in the PEI Cancer Registry, situated in the PEI Cancer Treatment Centre at the Queen Elizabeth Hospital in Charlottetown. The major sources of data are histology and cytology reports, autopsies and death certificates that mention cancer, and oncology clinic reports.

All new incident cases of cancer are registered. Different cancers in the same person are registered; multiple primaries within one major site, such as breast, melanoma, or colon are also registered following the Canadian Cancer Registry rules. Duplicates are avoided since each case includes the unique personal health number. Each cancer is coded according to the International Classification of Diseases for Oncology (World Health Organization). Appendix 1 describes the sites used in this report.

Microscopic confirmation of the diagnosis provides the highest assurance of a correct diagnosis; this was available for 89.5% of the records over the period 1980 to 2004. The records with the most limited details have a death certificate as the only source. In the PEI Cancer Registry, cancer death certificates are actively followed-up for additional confirmation; less than 0.2% of cases in the registry have been reported by death certificate only.

The North American Association of Central Cancer Registries have recognized the high quality of PEI's Cancer Registry by awarding PEI the gold or silver standard certification since 1998.

Mortality Data
The source of cancer mortality data is death certificates. If the underlying cause of death described by the certifying physician is cancer, the death is counted as a cancer death. The description of the type of cancer is less accurate than that obtained by the cancer registry. Also, cancer deaths occurring in a given year will usually be the result of cancers diagnosed (and reported as incidence) in previous years.

Population Data
Population counts by sex and five-year age groups are needed as the denominator to calculate incidence and mortality rates. The source of these population counts is the Canadian census. The census is done every five years by Statistics Canada, and mid-year population estimates are produced for the intercensal years.

Cancer Treatment

The first step in the management of cancer is diagnosis - usually by removing abnormal tissue and examining it under a microscope (biopsy). After diagnosis, the cancer is staged. The stage depends on the size of the tumour, depth of invasion, and the extent to which it has spread to other parts of the body. The stage helps to determine how it will be treated. A treatment plan is then developed for the individual patient. There are three main forms of cancer therapy:

- Surgery - removal of a solid tumour. This is the primary form of therapy in over half of all cancers
- Systemic therapy - the administration of chemotherapy drugs, hormonal modifiers, antibodies, vaccines and other agents that can travel through the body to attack cancer
- Radiation therapy - the use of energy from x-rays, gamma rays, electrons and other sources to destroy cancer cells.

The aim of treatment is to improve survival and improve the quality of life.

Palliative care provides relief from pain and other symptoms of advanced disease, as well as support and bereavement for families. In 2004/05, less than half of terminal cancer patients were registered with palliative care services on PEI.

Improvements in treatment over the last two decades have come from the following[7]:

- the use of chemotherapy in advanced testicular cancer, leukemias, lymphomas and ovarian cancer, and as adjuvant therapy after surgery for breast, colorectal, and lung cancers, and in combination with radiation therapy in some cases, have contributed to decreased mortality rates
- the application of high-precision radiation therapy for prostate, head and neck cancer and other tumour sites
- the greater use of organ preserving approaches for breast, rectal and laryngeal cancers and for sarcomas of the extremities.

In addition, a greater focus on supportive care and the introduction of highly effective anti-nausea medications and long-acting analgesics have helped to improve the quality of life of the cancer patient.

Measuring Cancer

Many different indicators can be used to describe cancer in a population. Since good decisions are based on good information, the limitations of each measure should be understood before it is used. Types of measures used in cancer are described in Table 1, along with examples using the most recent Canadian statistics.

Table 1. Measures of Cancer

Measure	Influenced By	Canada, 2001[4]
count of new cases	population, age	73,758 males 65,799 females
incidence	risk of developing cancer, screening rate	475 per 100,000 males 347 per 100,000 females
prevalence	incidence, survival	2.4% males 2.7% females
mortality	treatment, cure	220 per 100,000 males 149 per 100,000 females
5 year survival	stage at diagnosis, treatment	57% males 62% females
potential years of life lost due to cancer	early age of onset, lifespan	469,000 years for males 498,000 years for females
probability of developing cancer	incidence, lifespan	1 in 2.3 males 1 in 2.6 females
probability of dying with cancer	mortality, lifespan	1 in 3.5 males 1 in 4.3 females

The different measures have different uses. Of these measures, the only one that measures the risk of developing cancer is incidence. Increases in incidence over time may indicate increases in the risk of developing cancer, if there has been no change in the rate of screening or early detection.

Age standardization is used to minimize the effects of differences in age when comparing incidence rates in different populations such as PEI and Canada (see Appendix 3). The incidence graphs in this report include estimates for the most recent years (see Appendix 3), and the PEI rates are three year moving averages (see Appendix 3). Changes in rates and comparison of PEI/Canadian rates are reported if statistically significant ($p<0.05$) over the most recent 10 year period.

Causes of Cancer

Cancer is a chronic disease that results from long-term exposure to a stimulus. People are potentially exposed to many cancer-causing substances throughout their lifetime, making it difficult to determine the cause of any individual patient's cancer.

Research on populations provides evidence that cancer is caused by a complex mix of heredity, modifiable behaviours, and exposure to carcinogens. These include family history of cancer, tobacco, alcohol, unhealthy diet/physical inactivity/excess body weight, viruses, occupational exposure, environmental pollution, radiation, and prescription drugs.

Environmental exposure to carcinogens present varying degrees of risk to humans. The published scientific evidence for more than 860 environmental agents has been summarized by the International Agency for Research on Cancer.[2]

Hereditary forms of cancer may result in dramatic family histories that might identify high-risk patients. However, the known hereditary cancer genes are rare. They account for only a small proportion of cancers such as breast, ovarian, prostate, melanoma, kidney, lung, non-Hodgkin lymphoma, or stomach cancer.[5]

Many determinants of health such as age, biology and genetic make-up cannot be changed. However, behaviours can be modified to reduce the chances of developing many chronic diseases including cancer. Collaborative action on modifiable behaviours across many areas of Canadian society is needed to achieve better health outcomes for all Canadians.

Tobacco
Smoking is the most common known cause of cancer. About 30% of all cancer deaths in Canada could be prevented if smoking was eliminated. Smoking causes 80% of lung cancer deaths, 70% of upper airway, 60% of esophagus, 40% of bladder, 30% of kidney, 25% of pancreas, and 17% of stomach cancer deaths.[5]

Smoking rates have been declining in PEI and Canada from 50% in 1965 to 17% in 2005.[6]

Diet
Diet-related factors likely contribute to cancer, although the specific aspects of food that are preventative or causative are still under study. Diets high in fruits and vegetables reduce the risk of colorectal and stomach cancers as well as heart disease.[5]

Less than 33% of Islanders consumed the recommended daily amount of fruits and vegetables in 2005.[6]

Physical Activity
Physical activity reduces the risk of colon cancer by 30%, and breast cancer by 20%.[5]

Over half of Islanders were physically inactive in 2005.[6]

Obesity
High BMI (≥30) accounts for 30% of endometrial cancer, 20% of kidney, 10% of colon, and 8% of postmenopausal breast cancer.[5]

Over 20% of Islanders were obese in 2005.[6]

Alcohol consumption
Alcohol consumption increases the risk of cancers of the upper airway, esophagus, liver, breast, and large colon.[5]

25% of Islanders were heavy drinkers in 2005.[6]

Sun exposure
Excessive exposure to ultraviolet radiation (including the sun and tanning lamps) increases the risk of melanoma as well as non-lethal skin cancers.[5]

Up to 50% of Canadians experience sunburn in one summer.

This report does not provide proof for any cause of cancer. There are many criteria to prove causation, and one step toward this is the establishment of a statistical association, or risk factor. In each section of this report by site, risk factors that have consistently demonstrated an association are listed (in no particular order). Exposure to a risk factor does not automatically result in cancer.

Cancer Screening

Screening attempts to identify cancer or its precursors early in the disease process. Screening is only considered beneficial if early treatment options offer some advantage over later treatments. Canadian Task Force on Preventive Health Care[3] recommends cancer screening for:

- breast cancer - mammography for women 50 to 69 years
- cervical cancer - pap smears for women 18 to 69 years
- colorectal cancer - fecal occult blood test for men and women over 50 years

Although prostate-specific antigen (PSA) test is available to aid in the diagnosis of prostate cancer, PSA has not been proven to reduce mortality in asymptomatic men.[3]

Organized screening includes recruitment of the age population that can benefit from screening. In Canada, organized screening programs exist for screening breast and cervical cancer. Ad hoc screening for prostate and colorectal cancers is done at the physician's discretion.

Cancer Trends - All Sites

Cancer is a diverse group of many malignant diseases. From 1995 to 2004, three sites account for over half of all cancers in both sexes, as seen in Table 2.

Table 2. Most common cancer sites in PEI, 1995 to 2004

New Cancer Cases			
Men		Women	
Site	% of incident cancers	Site	% of incident cancers
Prostate	30%	Breast	28%
Lung	17%	Colorectal	16%
Colorectal	14%	Lung	14%
	61%		58%

Cancer Deaths			
Men		Women	
Site	% of cancer deaths	Site	% of cancer deaths
Lung	32%	Lung	25%
Prostate	14%	Breast	17%
Colorectal	10%	Colorectal	14%
	56%		56%

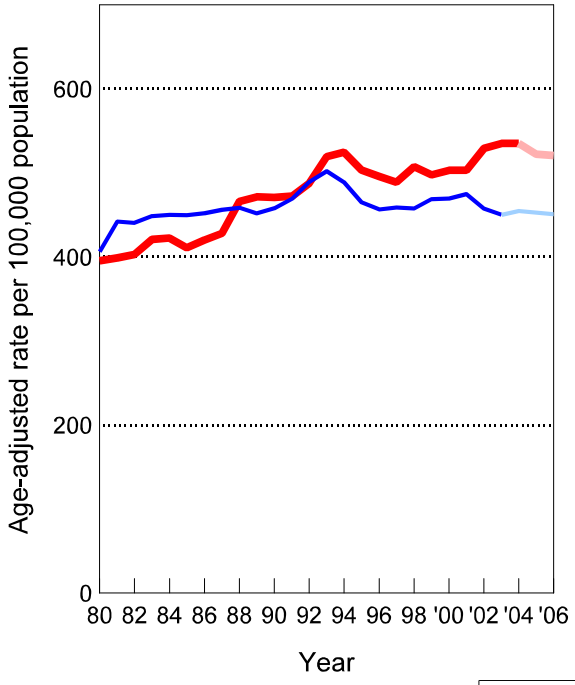
Cancer incidence is increasing in PEI, while it has remained stable in Canada. In contrast, cancer mortality rates are slowly decreasing in both PEI and Canada. Over the past ten years (1995 to 2004), PEI cancer incidence has been higher than in Canada: 10% higher in men and 8% higher in women.

In men, PEI's cancer incidence is higher for prostate, the most common site. This explains most of the excess incidence; a small amount is explained by higher lung and melanoma incidence rates.

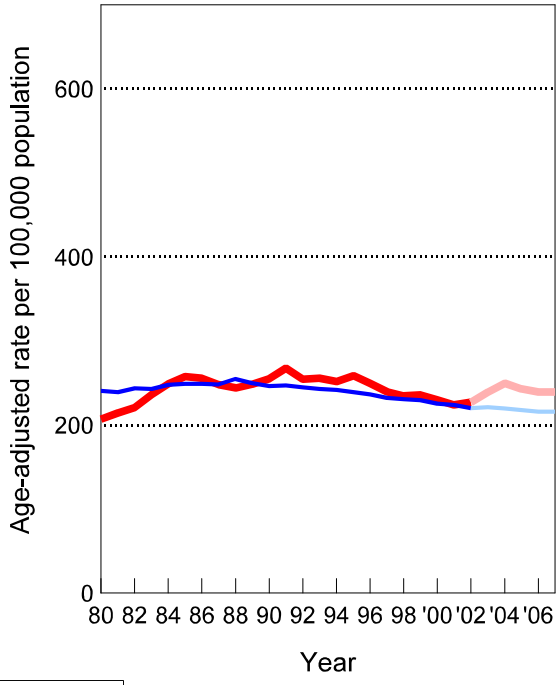
In women, PEI's cancer incidence is higher for colorectal cancer. This explains the majority of the excess incidence; the remainder is explained by higher lung and melanoma incidence rates.

All Sites

Trends in **Incidence** - Male

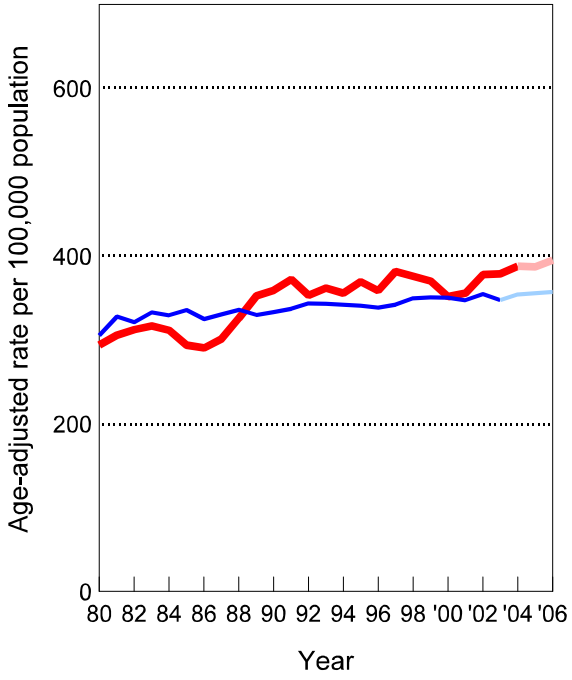


Trends in **Mortality** - Male

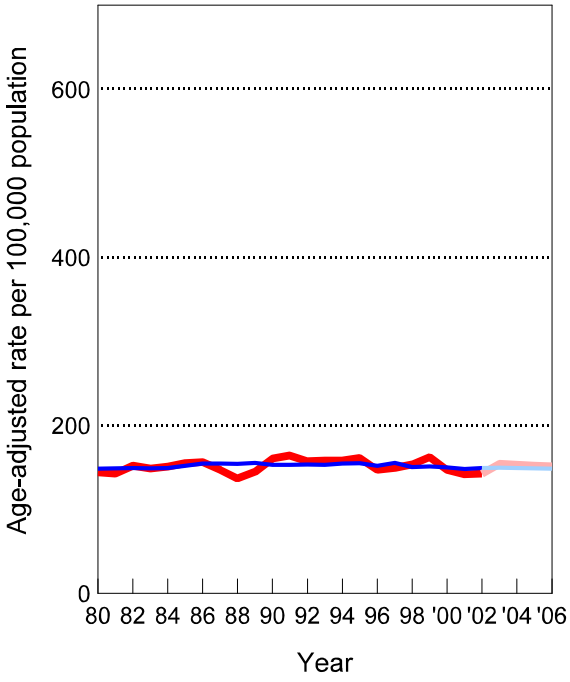


PEI Canada
lightly shaded lines are estimates

Trends in **Incidence** - Female

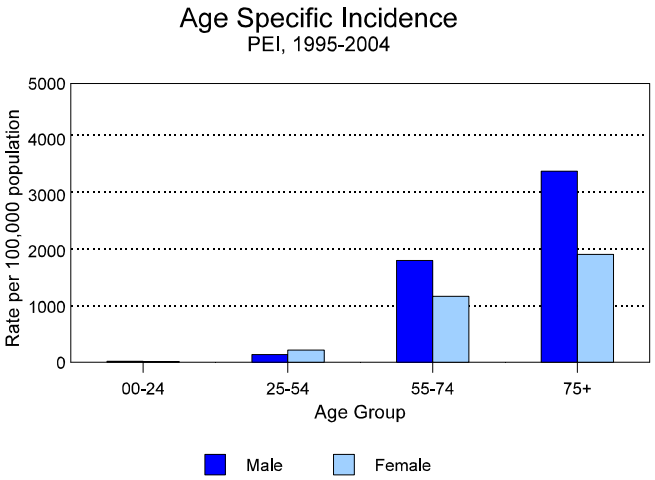


Trends in **Mortality** - Female



All Sites

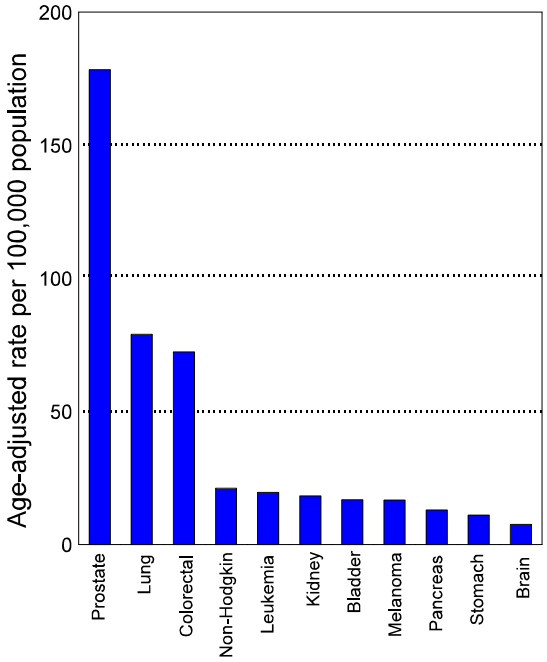
Cancer is predominately a disease of the elderly. Cancer incidence increases substantially with age in both sexes. Cancer incidence is higher for men than women, except between the ages of 25 and 54. By age 75 and older, the male incidence rate is almost double the female rate.



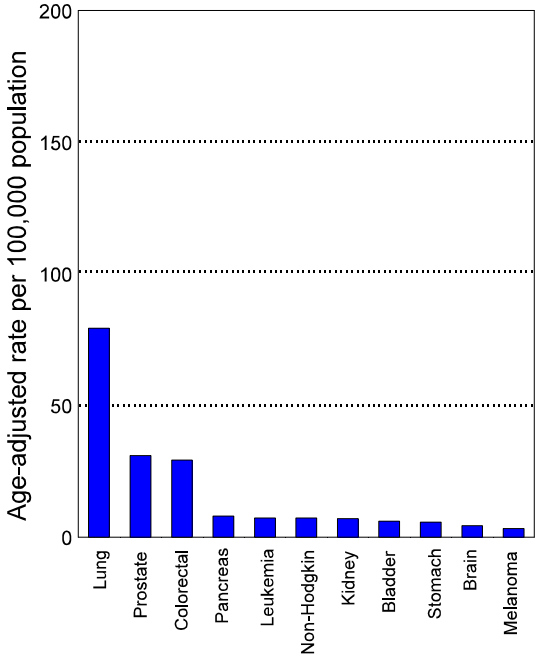
The incidence rate and mortality rate of cancers differs by site. To make frequency comparisons across the sites described in this report, the following page graphs the most recent 3-year average incidence and mortality rates.

All Sites

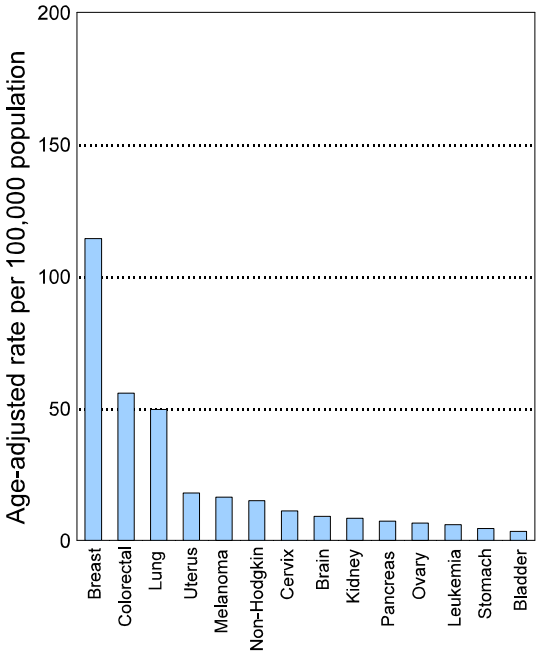
PEI Male Cancer Incidence, 2002-04



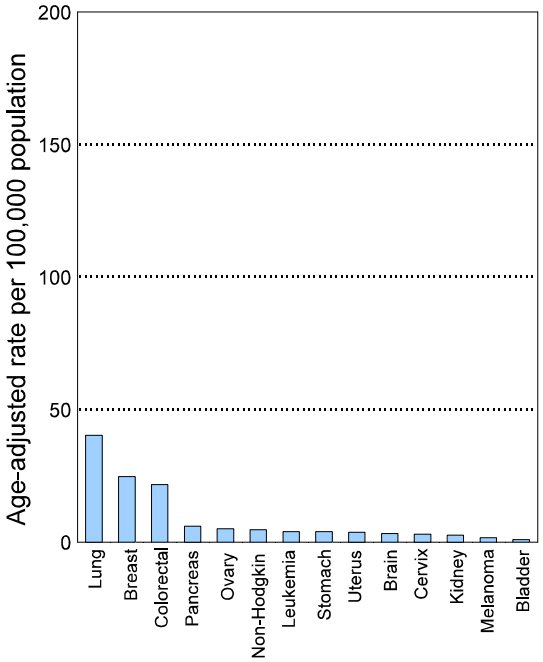
PEI Male Cancer Mortality, 2000-02



PEI Female Cancer Incidence, 2002-04



PEI Female Cancer Mortality, 2000-02

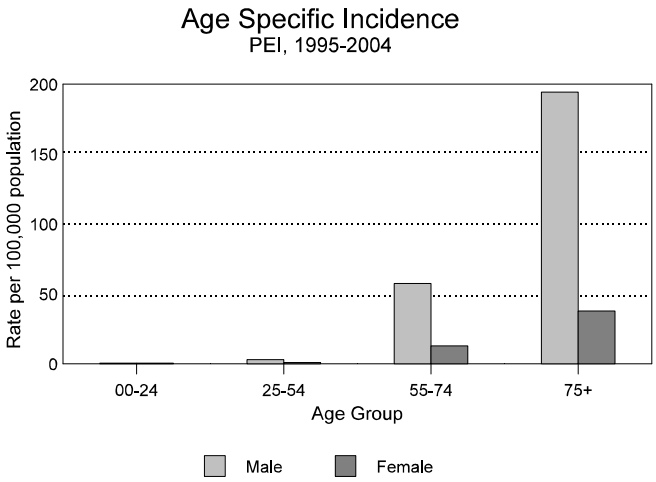


Bladder

Incidence of bladder cancer has declined in men, and has been stable in women, with similar rates in PEI and Canada. Mortality of bladder cancer has been stable, with similar rates in PEI and Canada. The five-year relative survival for this cancer is 77% in Canada.[4]

Age and Gender Influence

The chance of developing bladder cancer increases with age, especially among men 75 and older.



Risk factors

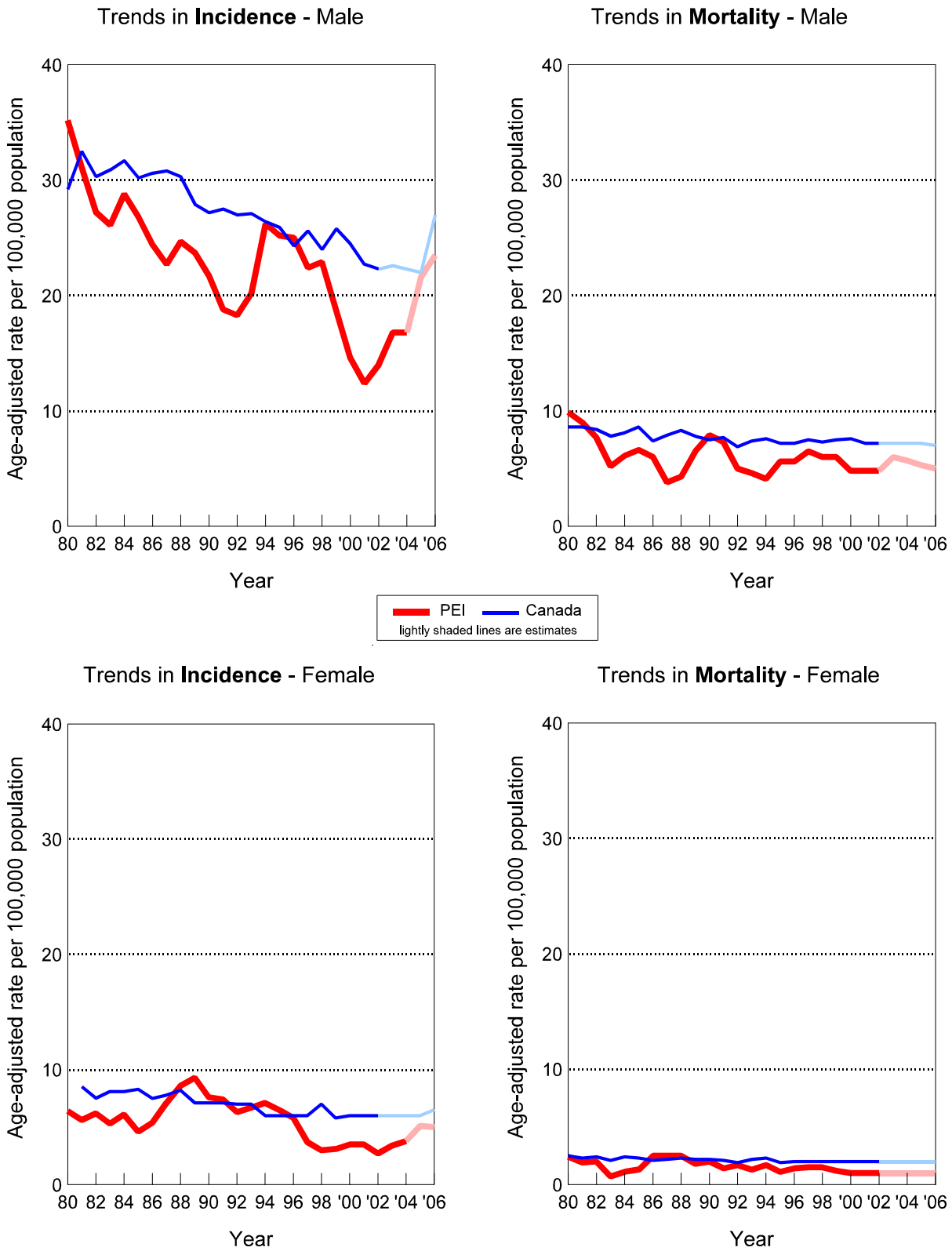
The risk of bladder cancer is higher[5] for persons who:

- smoke tobacco
- have chronic occupational exposure to dyes, rubber, leather, paint, or aluminum refining

Prevention and Early Detection

The most effective way to reduce bladder cancer is to reduce smoking.[5] There is no screening test that has demonstrated a benefit for reducing the mortality of bladder cancer.[3]

Bladder


Trends in **Incidence** - Male
Trends in **Mortality** - Male
Trends in **Incidence** - Female
Trends in **Mortality** - Female
Age-adjusted rate per 100,000 population
0
10
20
30
40
80 82 84 86 88 90 92 94 96 98 '00 '02 '04 '06
Year
PEI
Canada
lightly shaded lines are estimates

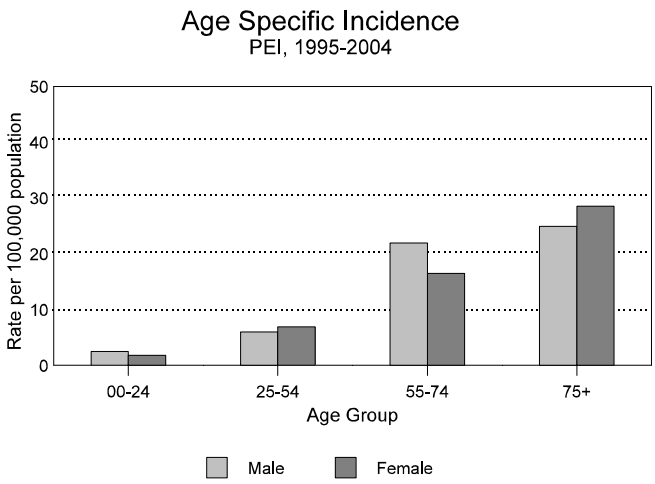
Brain

Benign and malignant tumours of the central nervous system (CNS) occur in the brain, meninges, and spinal cord. Mortality and incidence have been quite stable over time, with similar rates in PEI and Canada. The five-year relative survival is 23% in Canada.[4] Survival is better for children.

Age and Gender Influence

Brain tumours are the second most common neoplasm in children.

The chance of developing brain tumours increases with age, especially after 55 years of age.



Risk factors

Little is known about the causes of brain tumours. Tobacco, alcohol, diet, and head injury do not appear to cause brain tumours.

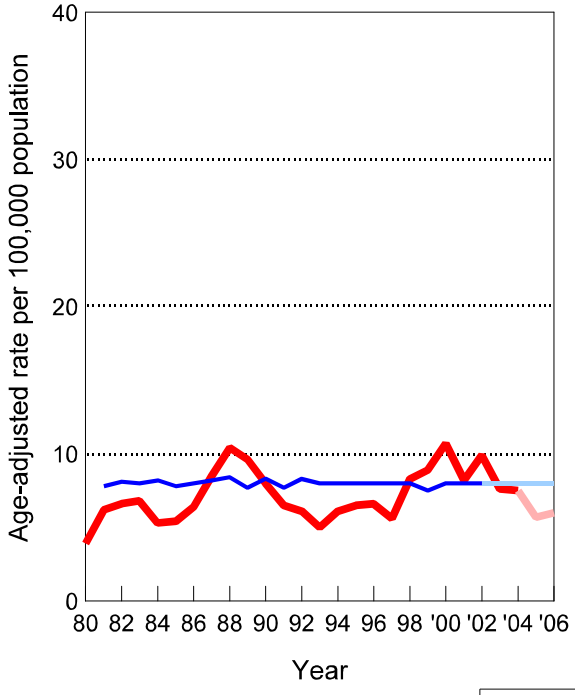
Exposure to ionizing radiation is associated with malignant brain tumours. A family history of brain tumours or certain genetic disorders may predispose people to brain tumours.[5]

Prevention and Early Detection

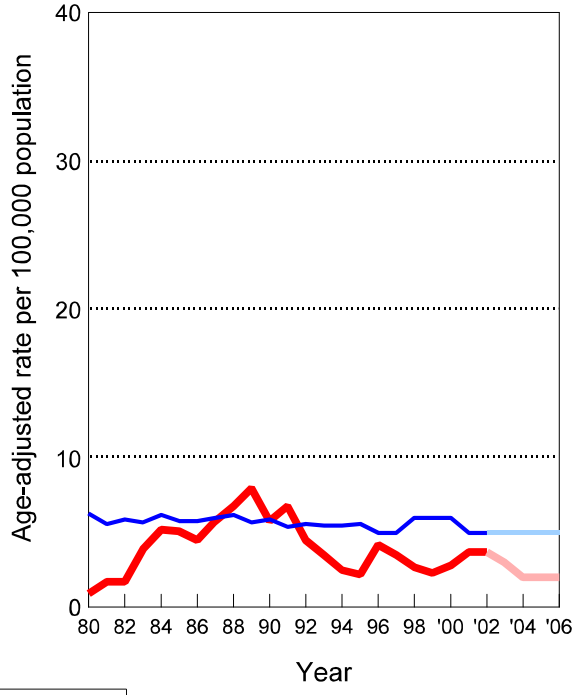
There is not enough known about the causes of brain tumours to prevent them.[5] There are no screening tests available.[3]

Brain

Trends in **Incidence** - Male

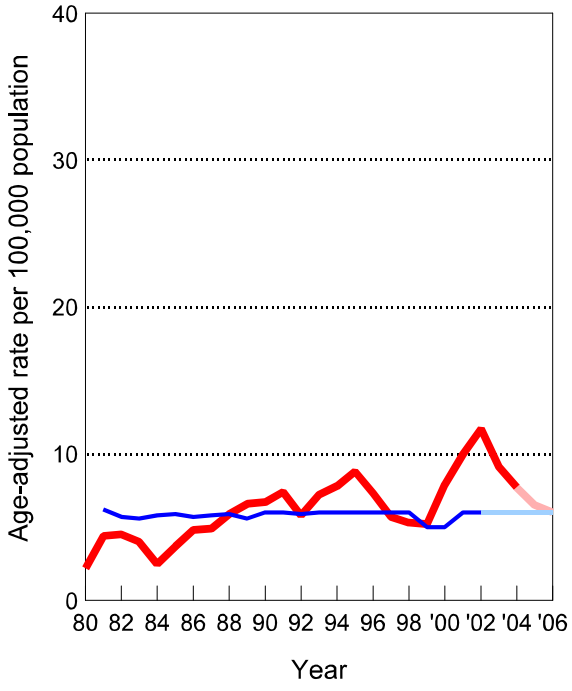


Trends in **Mortality** - Male

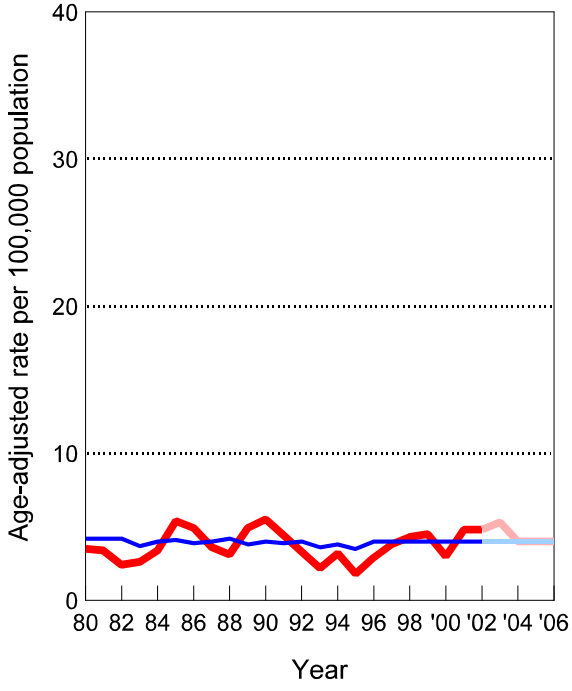


PEI Canada
lightly shaded lines are estimates

Trends in **Incidence** - Female



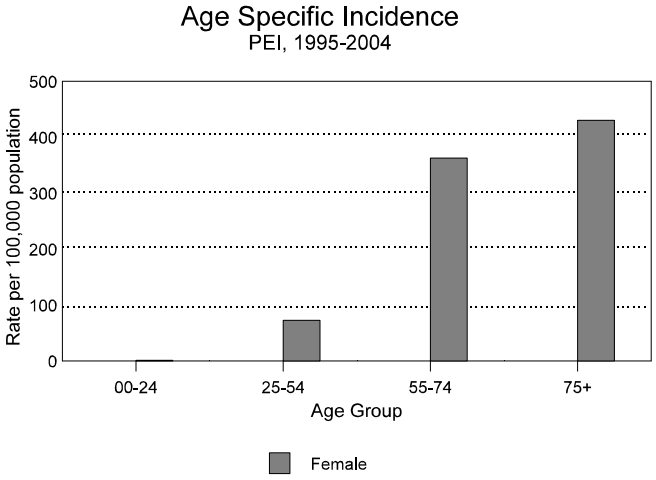
Trends in **Mortality** - Female



Breast

Breast cancer is currently the most commonly diagnosed cancer in Prince Edward Island women and in women in most industrialized countries. The incidence of breast cancer has stabilized after peaking in 1999, with similar rates in PEI and Canada. Mortality rates are gradually declining, with similar declines in PEI and Canada. This suggests improved survival due to screening and treatment. The five-year relative survival is 86% in Canada, and 91% in PEI.[4] Unfortunately, breast cancer can recur beyond five years.

Age and Gender Influence
Breast cancer does occur in males, but it is rare. The chance of developing breast cancer increases with age; the incidence shows a dramatic increase among women 60 years or older.



Staging
In PEI, breast cancer cases diagnosed in 2002 to 2004 were staged. Over this period, 52% of cancers were diagnosed at stage 1 (least advanced), 35% were at stage 2, 7% were at stage 3, and 6% were diagnosed at stage 4 (most advanced; see Appendix 3).

Risk factors
The risk of breast cancer is higher[5] for women who:

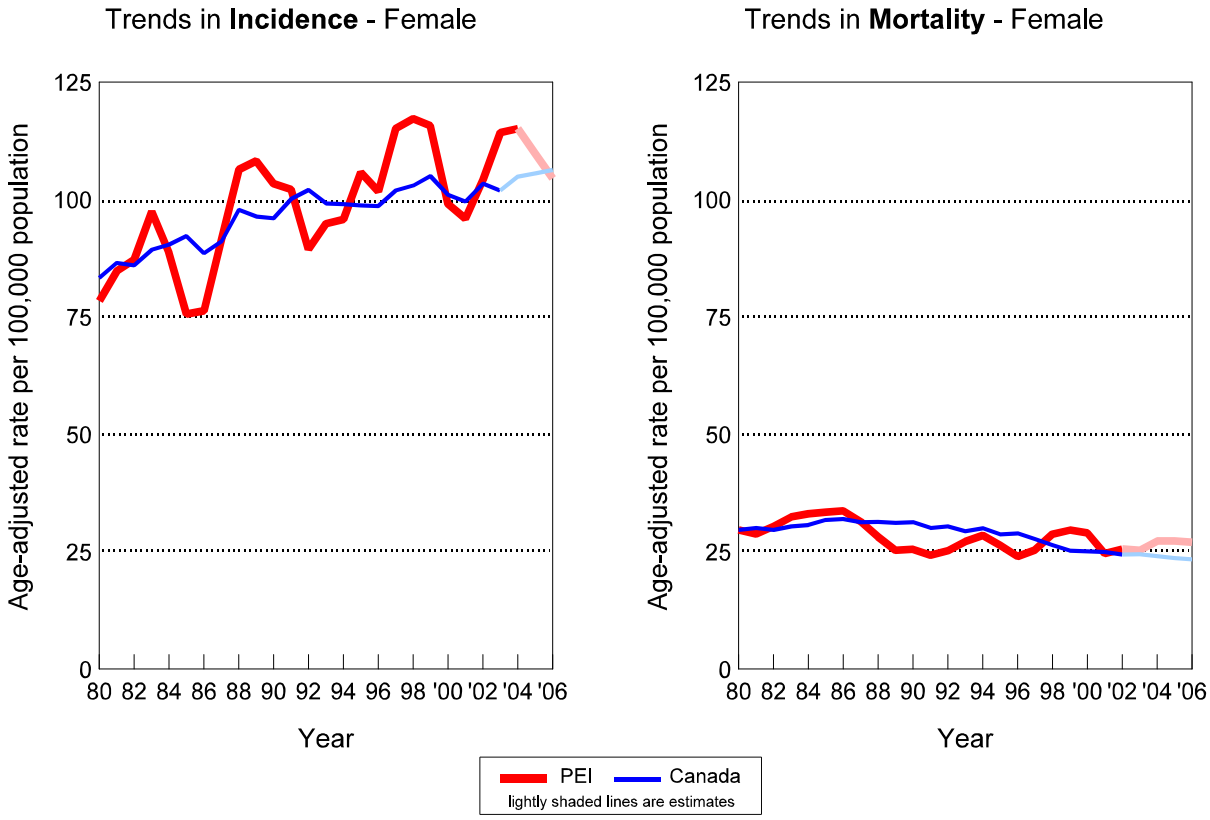
- have never been pregnant or having a first pregnancy after age 35
- have a previous diagnosis of benign breast disease
- have taken hormone replacement therapy (estrogen plus progestin) for more than 5 years
- have a family history of breast cancer, especially in a mother or sister diagnosed before menopause or if mutations on BRCA1 or BRCA2 genes are present
- have taken oral contraceptives
- drink alcohol

The effects of smoking, diet, physical activity and obesity are under study.

Prevention and Early Detection
Current knowledge of the risks of developing breast cancer is not easy to modify.[5]

The early detection of breast cancer by mammography in women over the age of 50 has been shown by many studies to reduce mortality by about 30%.[3] Ad hoc screening became available in PEI in 1987. The PEI mammography screening program began in 1998, and recruits women age 50 to 69 for screening every two years.

Breast

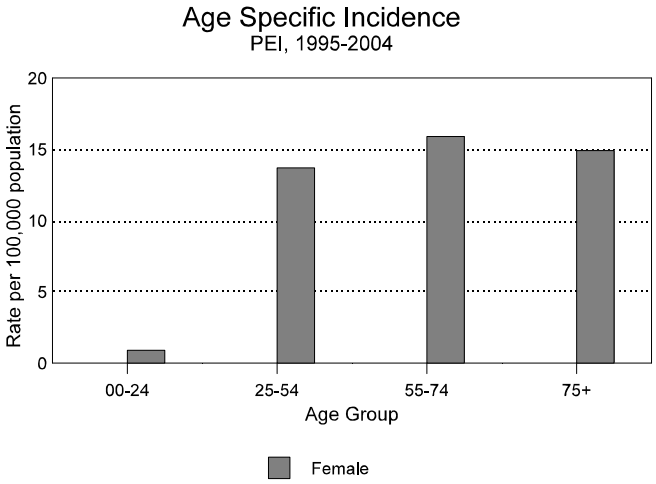

Trends in **Incidence** - Female
Trends in **Mortality** - Female
Age-adjusted rate per 100,000 population
125
100
75
50
25
0
80 82 84 86 88 90 92 94 96 98 '00 '02 '04 '06
Year
PEI
Canada
lightly shaded lines are estimates

Cervix

Invasive cancer of the cervix is the easiest cancer to prevent. The incidence of cervical cancer is declining in both PEI and Canada, although PEI rates are consistently higher than Canadian rates. The mortality of cervical cancer is declining in Canada, although this trend is not apparent in PEI. The five-year relative survival is 72% in Canada.[4]

Age Influence

Cervical cancer generally develops before the age of 70. Unfortunately, PEI women over 70 are still diagnosed if they were not screened earlier.



Risk factors

The risk of cervical cancer is higher[5] for women who:

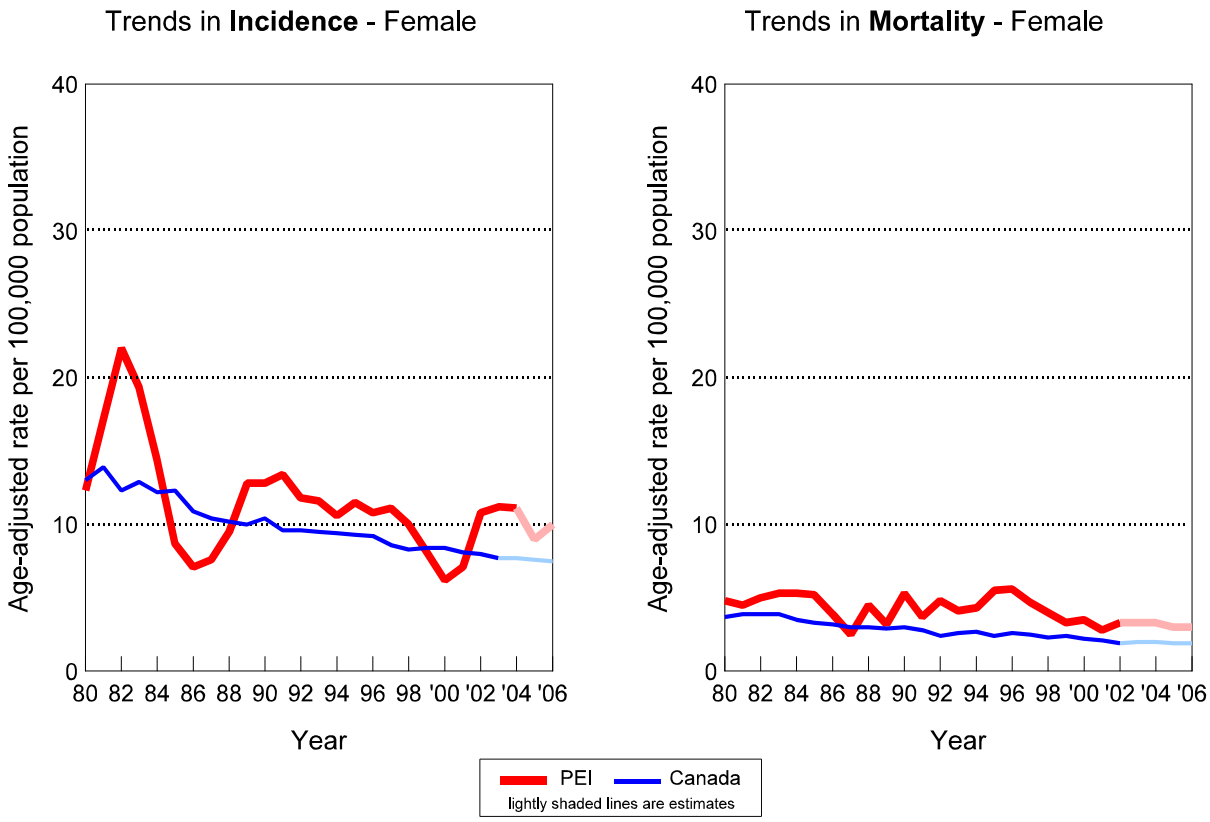
- have been sexually active
- have been infected with human papillomavirus (HPV)

Prevention and Early Detection

Early detection involves performing a Pap smear to detect abnormal cervical cells before they become cancerous or invasive. This pre-cancerous lesion can be treated successfully.[7] Pap testing became available in PEI in 1967. The PEI Pap screening program began in 2001, and recruits women age 20 to 69 for screening every two years.

HPV immunization was approved for use in Canada in 2006; it has the potential to reduce cervical cancer incidence in the future. Currently no government funding for HPV vaccine is available in any Canadian province.

Cervix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Trends in **Mortality** - Female
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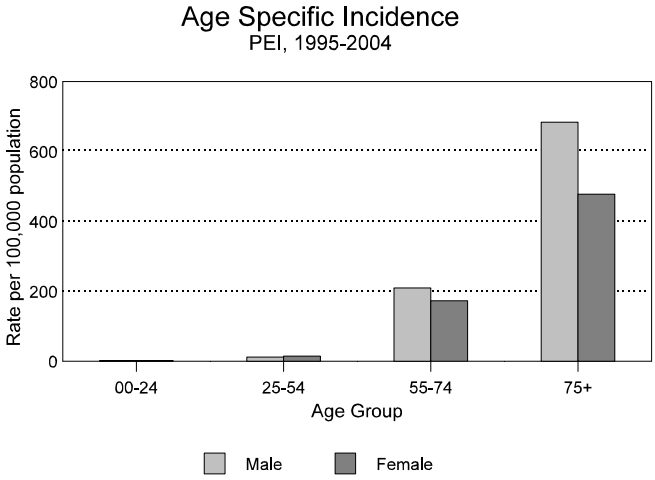
Canada
lightly shaded lines are estimates

Colon and Rectum

The majority of colorectal cancers occur in the region of the sigmoid colon and rectum. In males the incidence has been stable, with similar rates in PEI and Canada. In females, incidence has been decreasing in Canada, but increasing among PEI women; over the past 10 years (1995 -2004) incidence among women is 30% higher in PEI than Canada. Mortality has been decreasing for both men and women in Canada. In PEI men, the mortality rate is similar to the Canadian rate. In PEI women, the mortality rate is stable. The five-year relative survival is 60% in Canada and PEI.[4]

Age and Gender Influence

The incidence of colorectal cancer increases with age, showing a dramatic increase among men and women 75 years or older.



Staging

In PEI, colorectal cancer cases diagnosed in 2002 to 2004 were staged; similar patterns were seen for men and women. Over this period, 18% of cancers were diagnosed at stage 1 (least advanced), 31% were at stage 2, 30% were at stage 3, and 22% were at stage 4 (most advanced; see Appendix 3).

Risk Factors

The risk of colorectal cancer is higher[5] for persons who:

- have polyps (benign growths on the inner walls of the colon/rectum)
- have chronic inflammatory bowel disease
- are obese and have low physical activity
- drink alcohol
- smoke tobacco
- have a diet high in fat, and low in fibre, fruits and vegetables

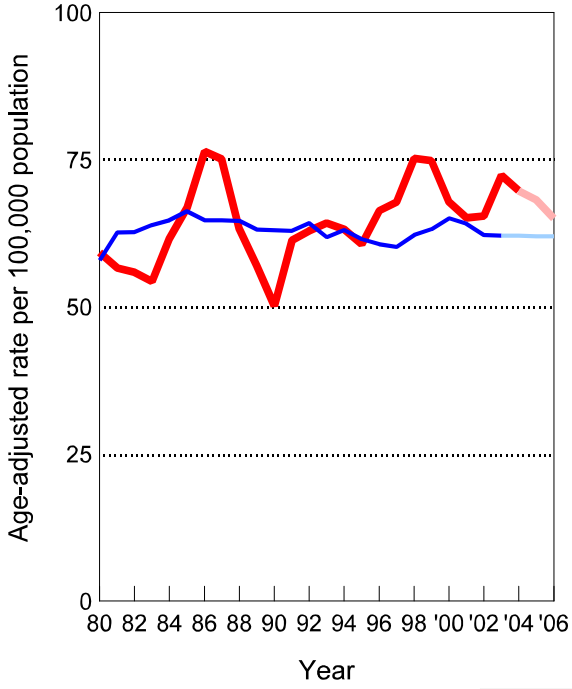
Prevention and Early detection

Dietary change to include more fruits, vegetables, and fibre; and increasing physical activity will reduce the risk of colorectal cancer.[5]

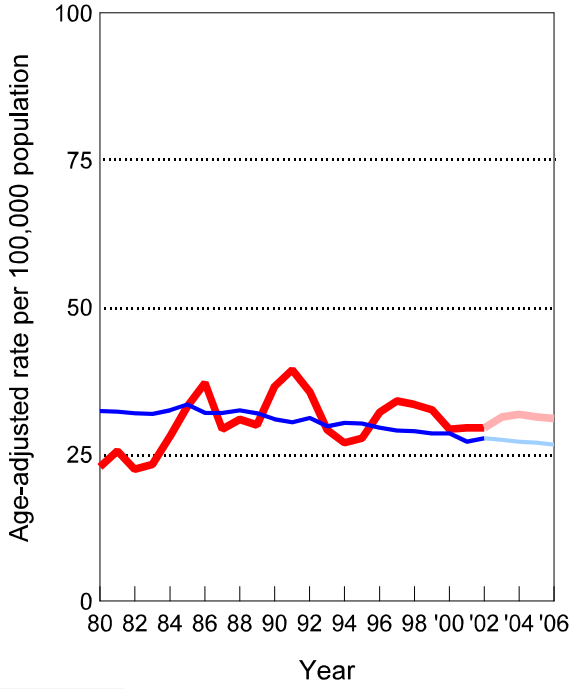
Screening of 50 to 74 year olds every two years with fecal occult blood test (FOBT) may reduce mortality by about 20%.[3] Currently several Canadian provinces are developing screening programs.

Colon and Rectum

Trends in **Incidence** - Male



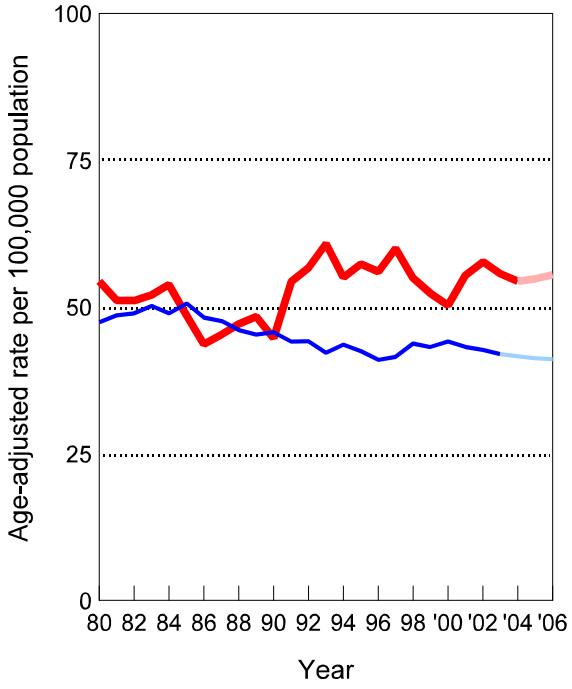
Trends in **Mortality** - Male



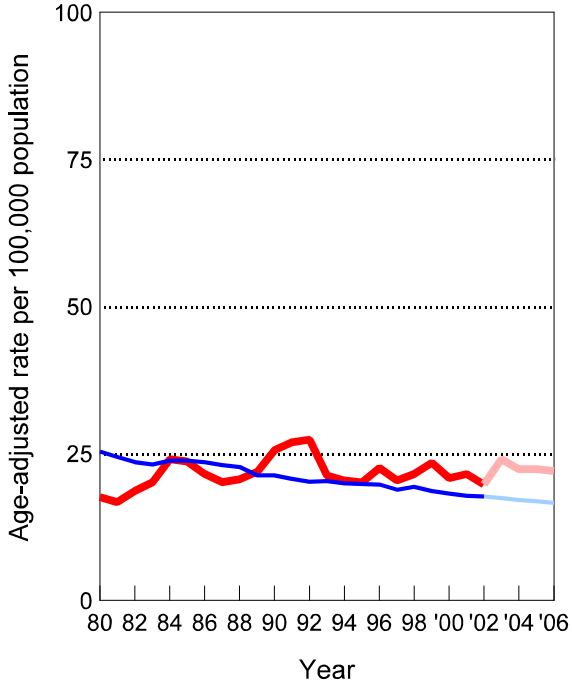
PEI — Canada

lightly shaded lines are estimates

Trends in **Incidence** - Female



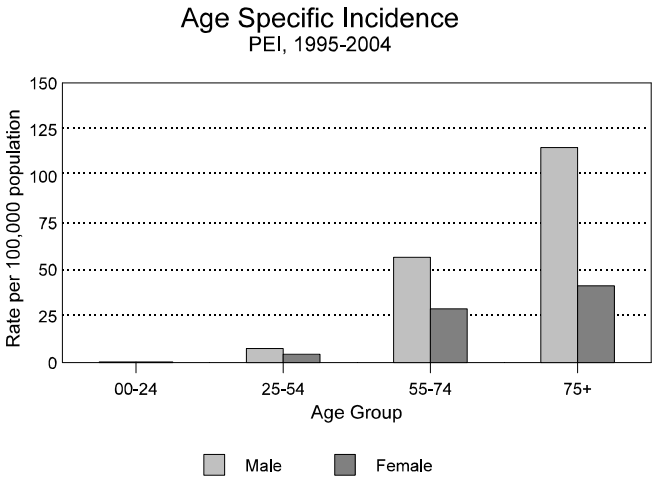
Trends in **Mortality** - Female



Kidney

The incidence of cancer of the kidney is rising, with similar increases in PEI and Canada; the rise is more pronounced for men than women. Mortality has been stable in both PEI and Canada. The five-year relative survival is 65% in Canada.[4]

Age and Gender Influence
Cancer of the kidney is twice as common in men as in women.
The incidence of cancer of the kidney increases with age.



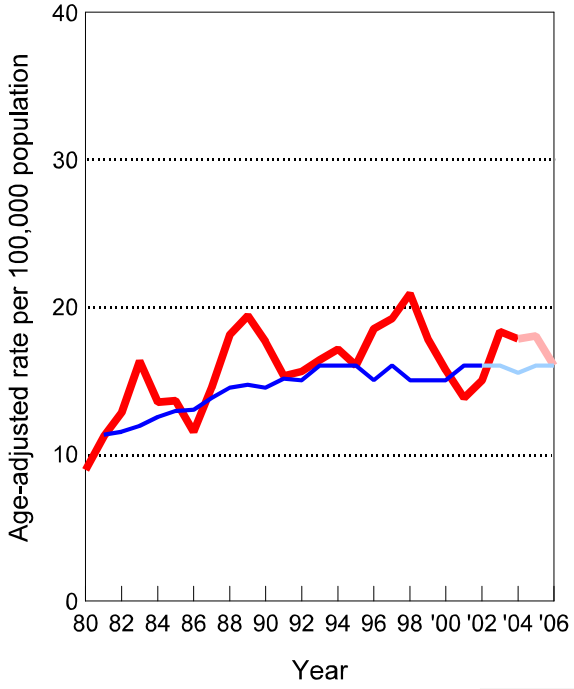
Risk factors
The risk of kidney cancer is higher[5] for persons who:

- smoke tobacco
- are obese
- have a family history of kidney cancer
- have hypertension

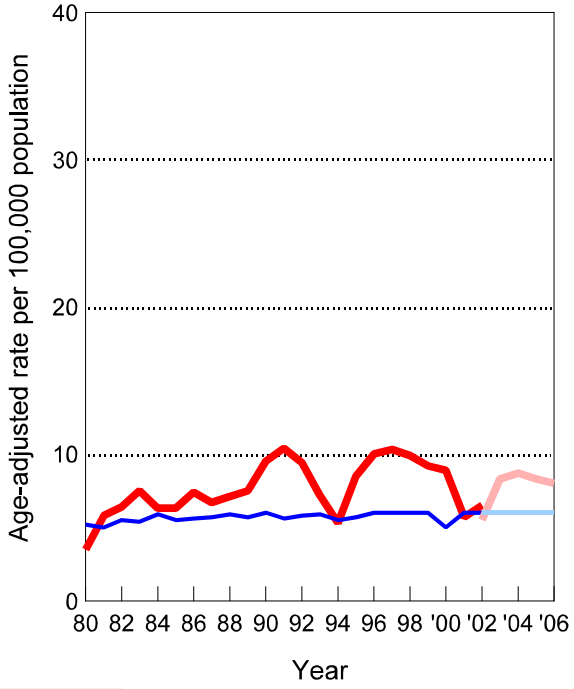
Prevention and Early Detection
Cancer of the kidney may be reduced by reducing smoking and obesity.[5] There is no effective screening test for the general population.[3]

Kidney

Trends in **Incidence** - Male



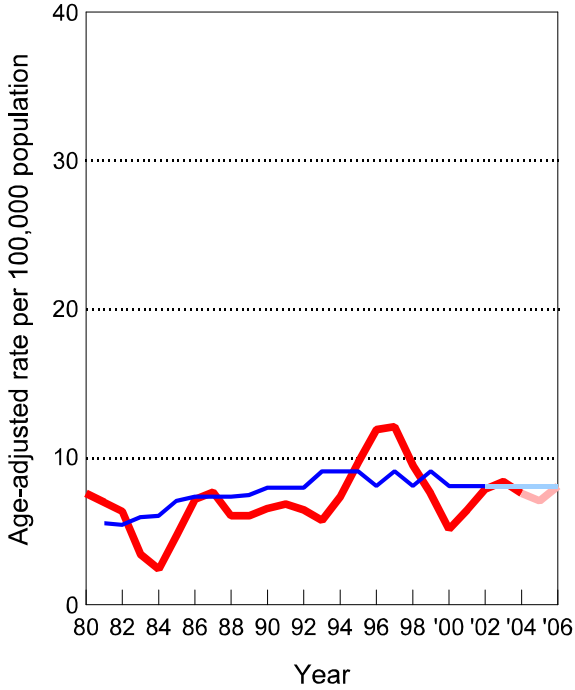
Trends in **Mortality** - Male



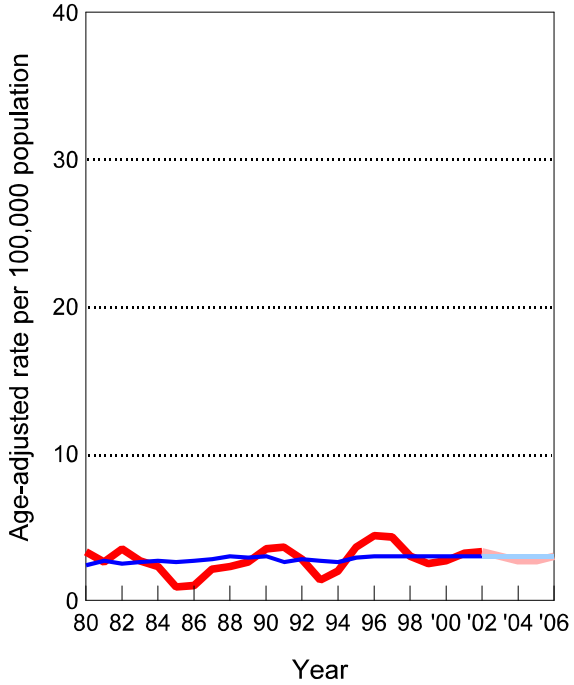
PEI — Canada

lightly shaded lines are estimates

Trends in **Incidence** - Female



Trends in **Mortality** - Female



Leukemia

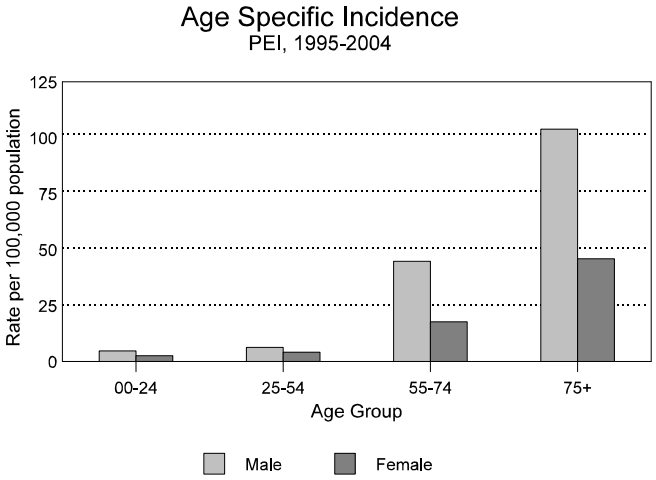
Leukemia is a diverse group of neoplasms of the white blood cells, arising mostly in the bone marrow. Leukemia is generally classified as either acute or chronic (about 50% each) and lymphocytic or myeloid (50% each). Each type of leukemia has a characteristic way of behaving and requires different treatment.

Incidence and mortality rates for leukemia have been stable, with similar rates in PEI and Canada. The five-year relative survival is 46% in Canada.[4] Survival is higher for chronic leukemia than for acute leukemia.

Age and Gender Influence

The incidence of leukemia is twice as high in men compared to women.

The four major subtypes have different age patterns: chronic lymphocytic leukemia is the most common type and is uncommon before age 40; acute lymphocytic leukemia accounts for most childhood leukemias; acute and chronic myeloid leukemia increase with age.



Risk factors

The risk of myeloid leukemia is higher[5] for persons who:

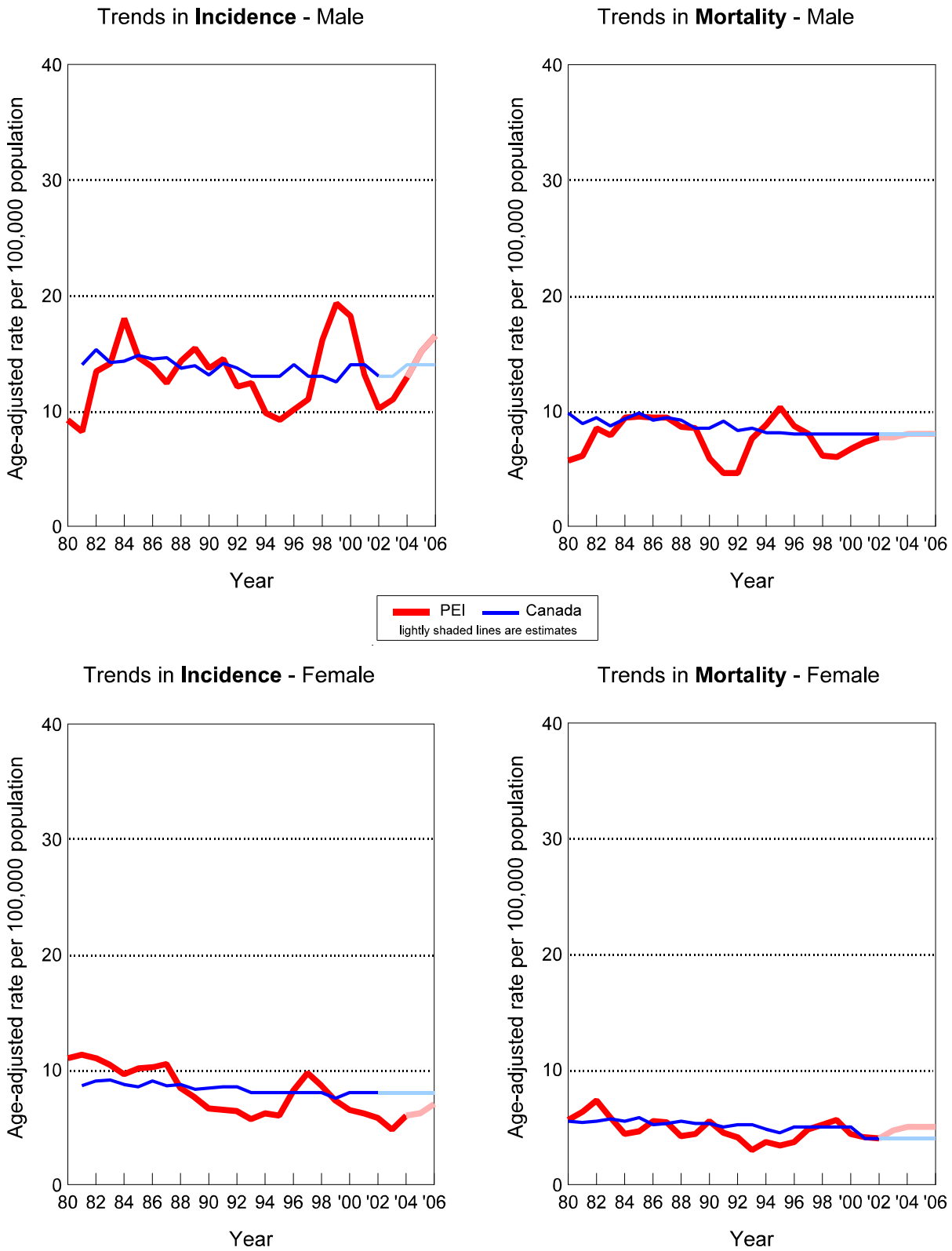
- are exposed to ionizing radiation
- are exposed to benzene, rubber or petroleum industries
- smoke tobacco

The known risk factors explain only a small proportion of leukemia diagnoses.

Prevention and Early Detection

Large gains in primary prevention are unlikely, since the potential contributing causes are not well understood.[5] Screening for leukemia is not effective.[3]

Leukemia


Trends in **Incidence** - Male
Trends in **Mortality** - Male
Trends in **Incidence** - Female
Trends in **Mortality** - Female
Age-adjusted rate per 100,000 population
0
10
20
30
40
80 82 84 86 88 90 92 94 96 98 '00 '02 '04 '06
Year
PEI
Canada
lightly shaded lines are estimates

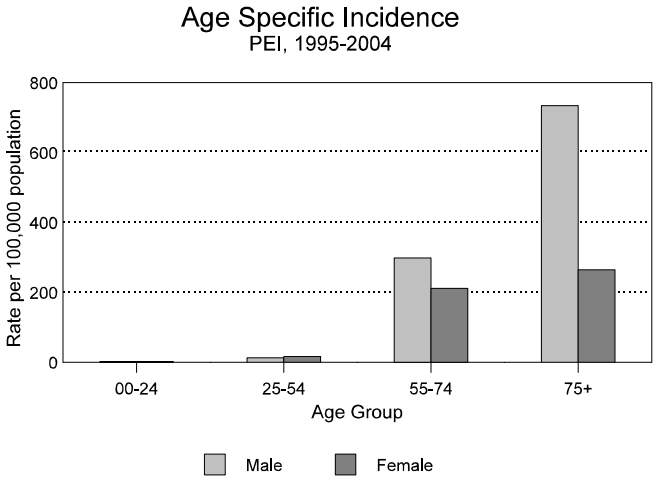
Lung

Lung cancer is the most common cause of cancer deaths in both men and women. In men, both incidence and mortality are stable in PEI, while decreasing in Canada. In women, both incidence and mortality are rising for women. In PEI, the rising trend for women is more pronounced than the Canadian trend; over the past 10 years (1995-2004) the incidence is 20% higher in PEI women than Canadian women. The five-year relative survival is 16% in Canada and PEI.[4]

Age and Gender Influence

Lung cancer is more common in men than women, although the gap is narrowing.

In PEI, the incidence of lung cancer is increasing most rapidly in men 75 years and over, and in women 55 and over.



Risk factors

The risk of lung cancer is higher[5] for persons who:

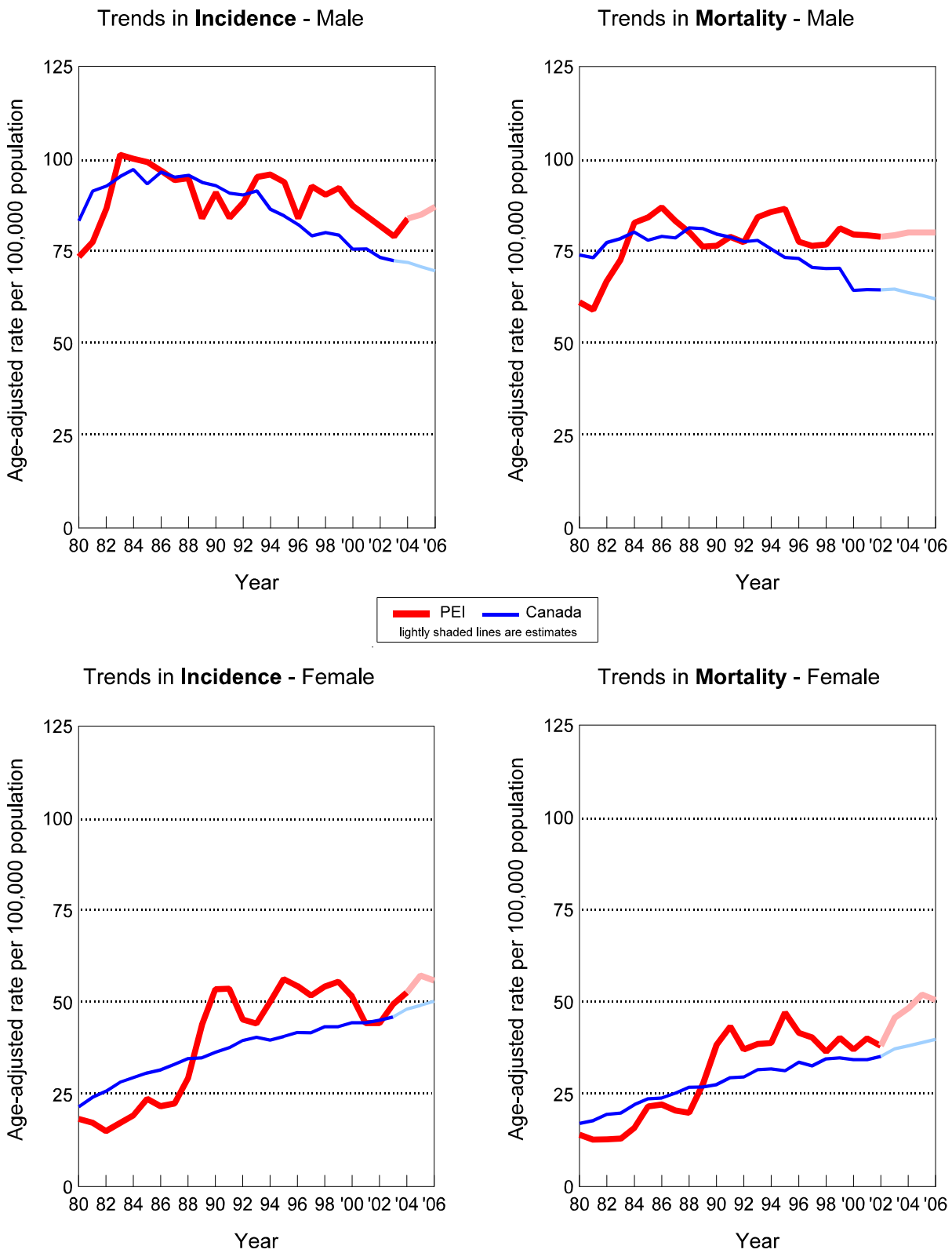
- smoke tobacco
- have chronic exposure to radiation, coal tar, asbestos, arsenic, nickel, chromium, or silica
- have a family history of lung cancer
- have been exposed to second-hand tobacco smoke

Although air pollution has been investigated as a possible cause, there is no evidence that it increases risk.

Prevention and Early Detection

Elimination of smoking would prevent 80% of lung cancers in Canada.[5] Screening tests such as CT scanning are under evaluation. Currently, no screening test is recommended to reduce the risk of fatal lung cancer.[3]

Lung

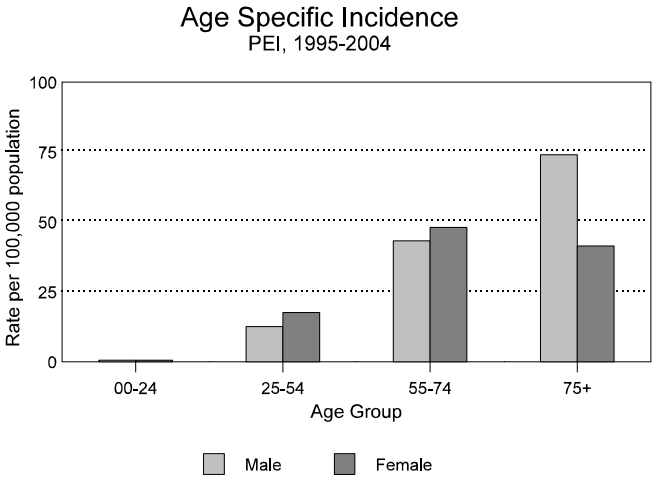

Trends in **Incidence** - Male
Trends in **Mortality** - Male
Trends in **Incidence** - Female
Trends in **Mortality** - Female
Age-adjusted rate per 100,000 population
0
25
50
75
100
125
80 82 84 86 88 90 92 94 96 98 '00 '02 '04 '06
Year
PEI
Canada
lightly shaded lines are estimates

Melanoma

Melanoma is a type of cancer that begins in the melanocytes, the pigment-producing cells of the epidermis. Over 90% of melanomas occur in the skin. The incidence of melanoma has been rising in Canada. In PEI, the increase in incidence is more pronounced than in Canada. Over the past 10 years (1995-2004) incidence is 35% higher in PEI men than Canadian men; incidence is 80% higher in PEI women than Canadian women. Mortality has been stable in both PEI and Canada. Although it is the most serious type of skin cancer, melanoma has a good prognosis, with a five-year relative survival rate of 90% in Canada.[4]

Age and Gender Influence

The incidence of melanoma is similar in men and women. Melanoma is one of the more common cancers in young adults.



Risk factors

The risk of melanoma is higher[5] for persons who:

- have chronic exposure to ultraviolet radiation in sunlight or sunlamps
- tend to burn rather than tan on exposure to the sun
- have many freckles or moles
- have a rare familial inherited risk

PEI's higher rates of melanoma may be due to the predominantly fair-skinned population.

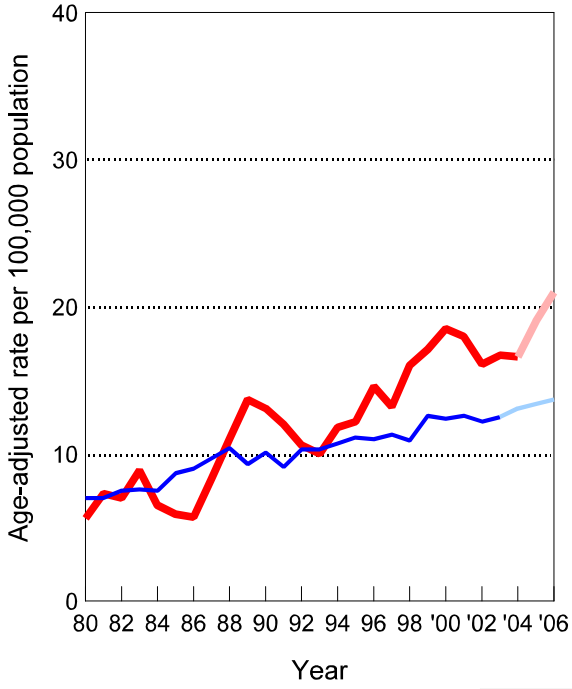
Prevention and Early Detection

Melanoma can be reduced by avoiding sun exposure at mid-day. When exposure is necessary, people should wear a long sleeved shirt, and wear a hat.[5]

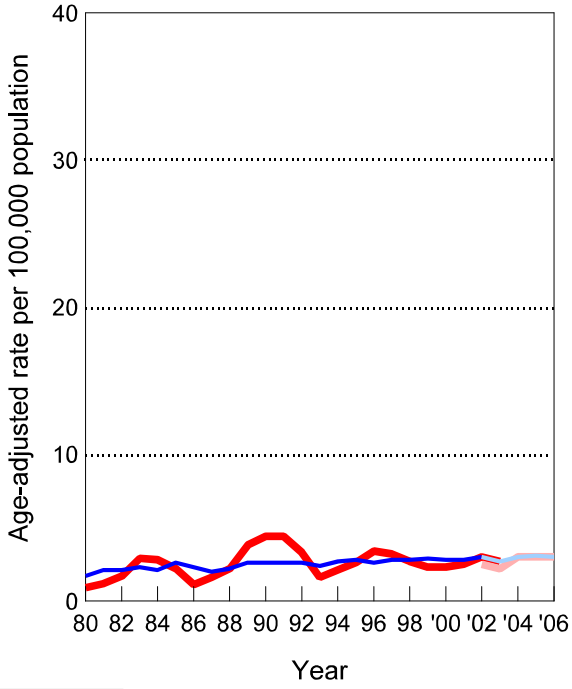
Individuals at high risk of melanoma can be identified on the basis of pigmentation characteristics. There is no effective screening test for the general population.[3]

Melanoma

Trends in **Incidence** - Male



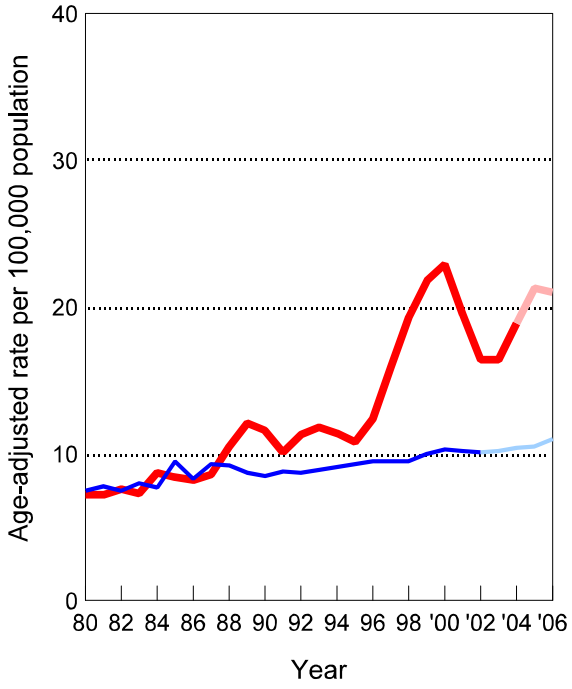
Trends in **Mortality** - Male



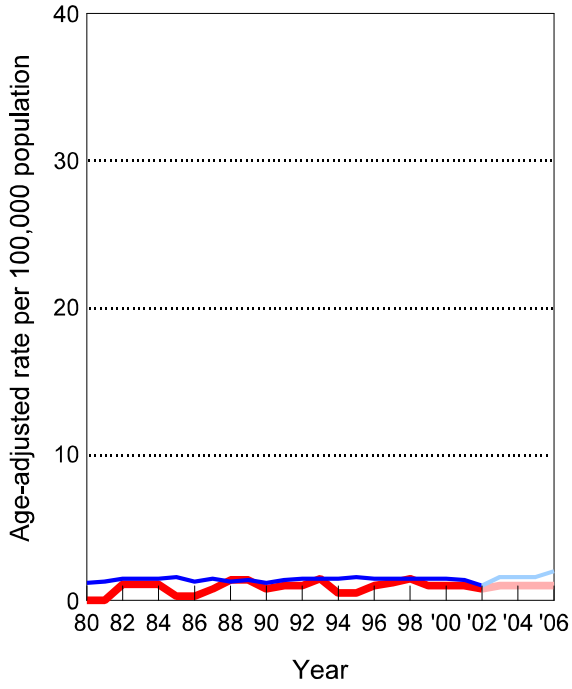
PEI — Canada

lightly shaded lines are estimates

Trends in **Incidence** - Female



Trends in **Mortality** - Female



Non-Hodgkin Lymphoma

The lymphomas are a group of diverse cancers of the lymphocytes, the most important cells of the immune system. Non-Hodgkin lymphomas outnumber Hodgkin by a ratio of over 4:1. Advances in treatment for Hodgkin lymphoma have improved the 5-year survival to 85%.[4]

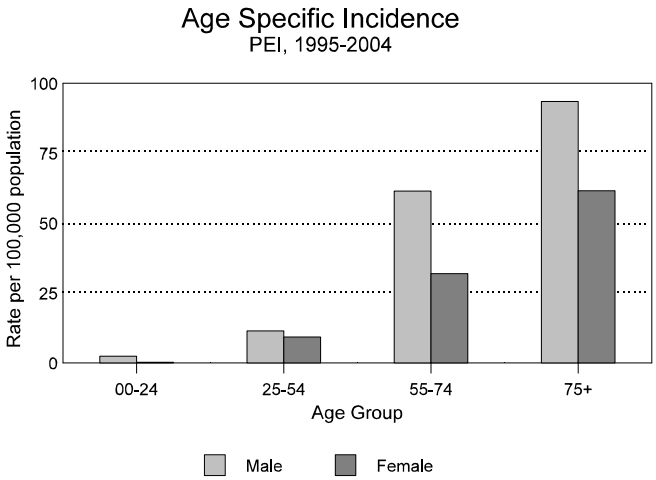
Incidence and mortality of non-Hodgkin lymphoma have been slowly increasing. The rates are similar in PEI and Canada. The five-year relative survival is 56% in Canada.[4]

Age and Gender Influence

Lymphomas occur more commonly with advancing age.

Non-Hodgkin lymphomas are more common in men than women.

In PEI, the incidence of non-Hodgkin lymphoma is increasing most rapidly in men 55 years and over.



Risk factors

The risk of non-Hodgkin lymphoma is higher[5] for persons who:

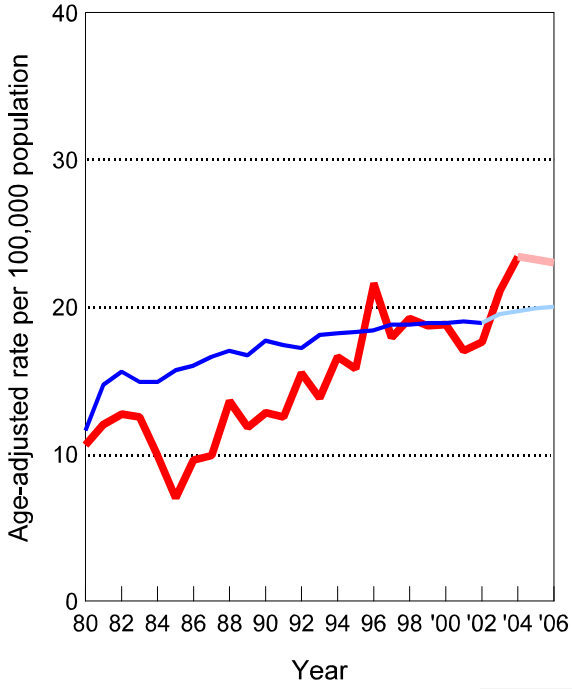
- have an immune disorder, including AIDS
- are infected with HTLV-1, HHV-8, EBV, *H. pylori*
- have chronic exposure to ionizing radiation
- have a family history of non-Hodgkin lymphoma
- have chronic exposure to some chemicals used in the agriculture and forestry industries, such as phenoxy acids, chlorophenols, organic solvents, and insecticides

Prevention and Early Detection

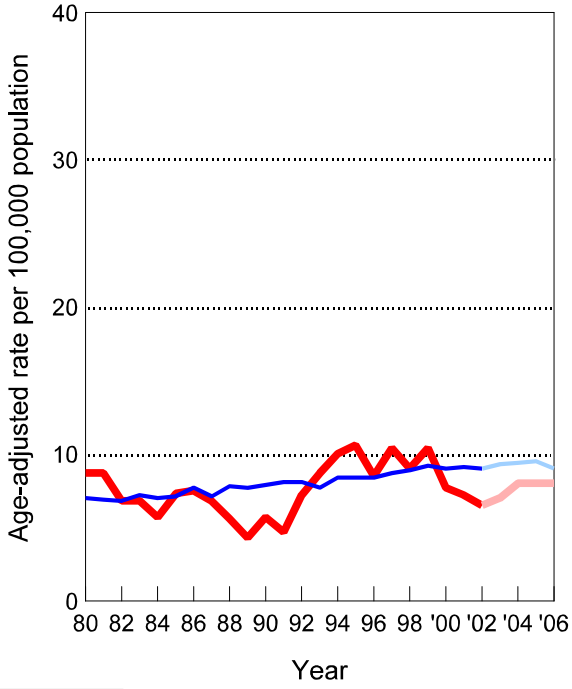
There are no preventive strategies.[5] There are no screening tests for lymphoma.[3]

Non-Hodgkin Lymphoma

Trends in **Incidence** - Male



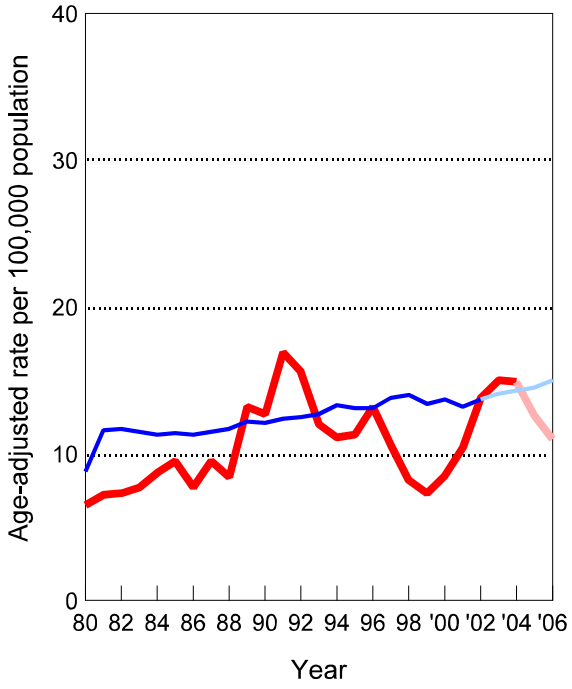
Trends in **Mortality** - Male



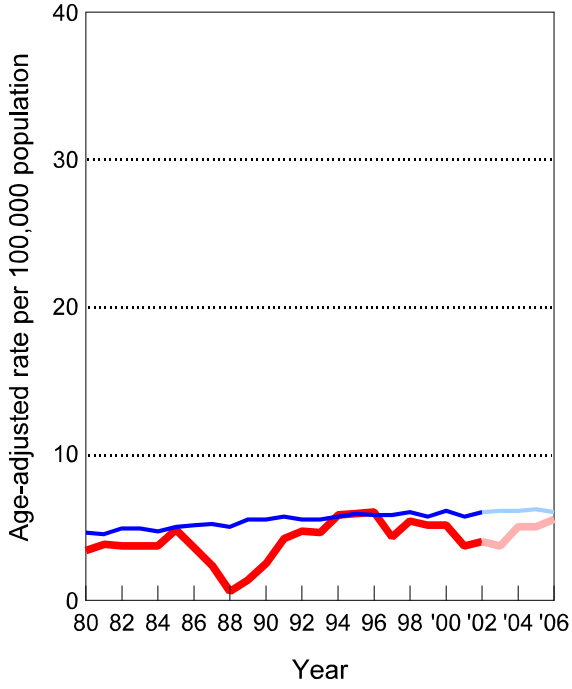
PEI — Canada

lightly shaded lines are estimates

Trends in **Incidence** - Female



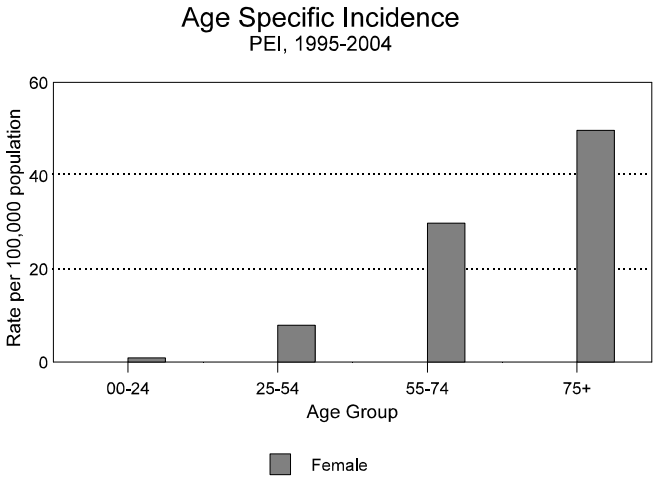
Trends in **Mortality** - Female



Ovary

Incidence and mortality of ovarian cancer have declined slightly. The rates are similar in PEI and Canada. The five-year relative survival is 38% in Canada.[4]

Age Influence
The incidence of ovarian cancer increases with age.

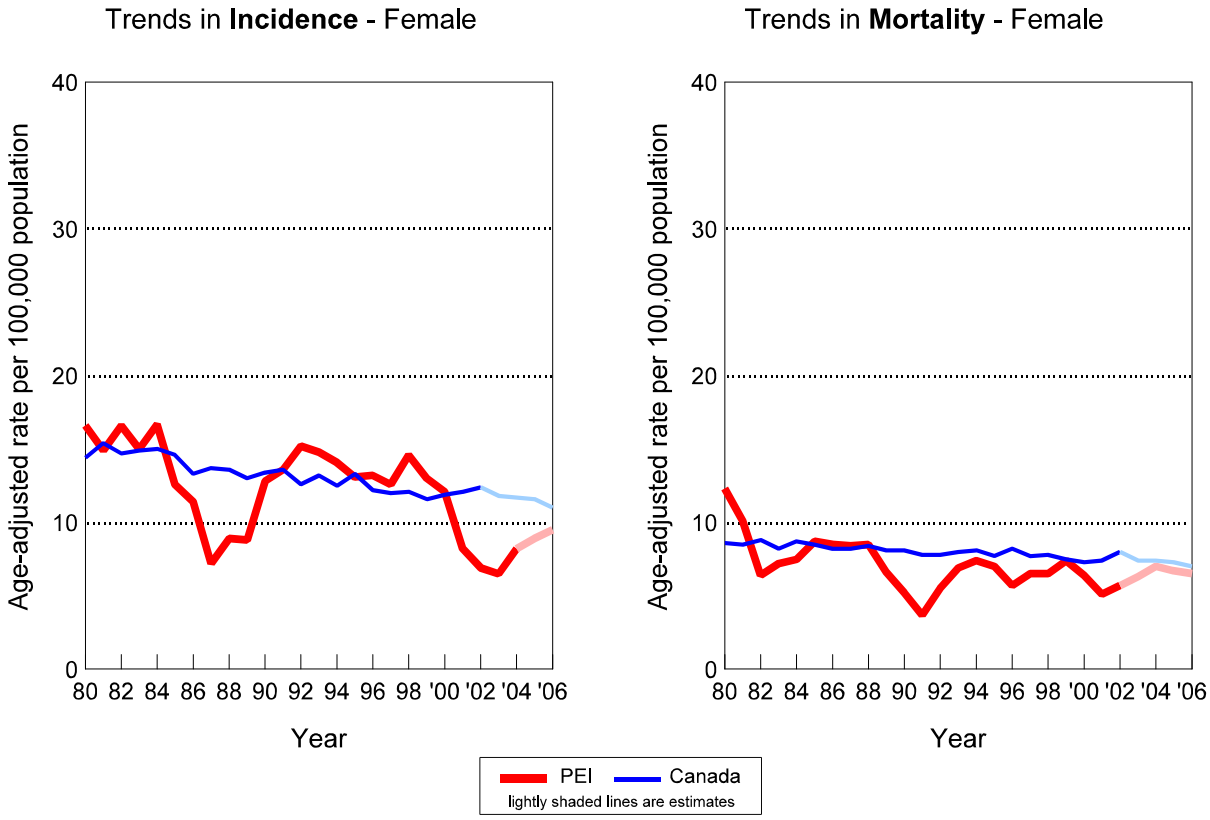


Risk factors
The risk of ovarian cancer is higher[5] for women who:

- have a family history of ovarian or breast cancer
- have never been pregnant

Prevention and Early Detection
At this time, the risk factors are not understood well enough to consider approaches to primary prevention.[5] Possible screening tests, including pelvic exam, ultrasound and antigen CA125 have been evaluated. There is no screening test that has demonstrated a benefit for reducing the mortality of ovarian cancer.[3]

Ovary

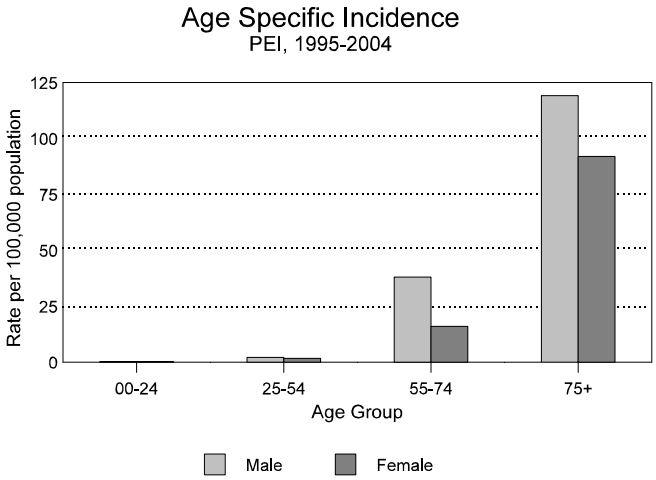

Trends in **Incidence** - Female
Trends in **Mortality** - Female
Age-adjusted rate per 100,000 population
40
30
20
10
0
80 82 84 86 88 90 92 94 96 98 '00 '02 '04 '06
Year
PEI
Canada
lightly shaded lines are estimates

Pancreas

Cancer of the pancreas is a fatal cancer. The five-year relative survival is 6% in Canada.[4] Incidence and mortality have been stable. The rates are similar in PEI and Canada.

Age and Gender Influence
Pancreatic cancer is slightly more common in men than in women.

The incidence of pancreatic cancer increases with age.



Risk factors
The risk of pancreatic cancer is higher[5] for persons who:

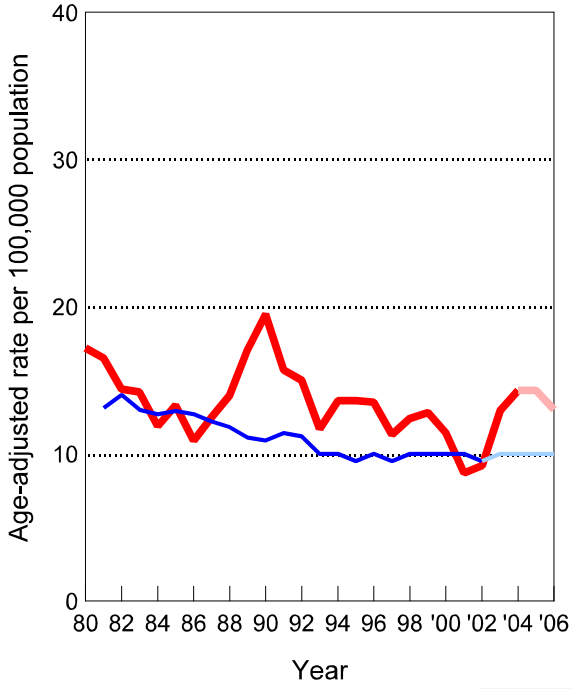
- smoke tobacco
- have workplace exposure to gasoline manufacturing processes

A diet high in fruits, vegetables, and fibre may reduce the risk of pancreatic cancer. Both chronic pancreatitis and diabetes mellitus are positively associated with cancer of the pancreas, but it is not clear if these are causes.

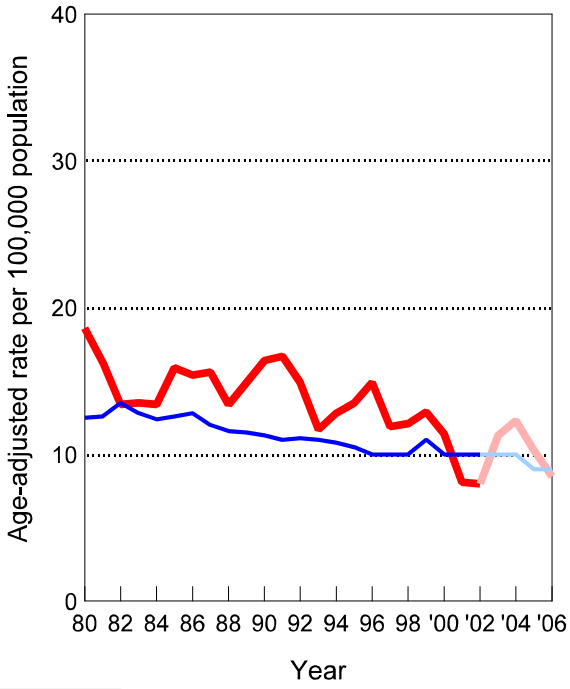
Prevention and Early Detection
Smoking prevention programs may have some effect in reducing pancreatic cancer.[5] There is no method for early detection, and no effective treatment.[3]

Pancreas

Trends in **Incidence** - Male

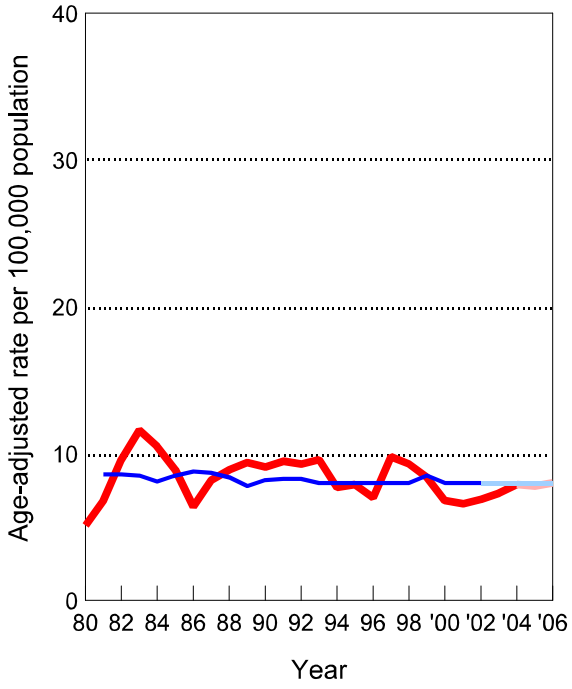


Trends in **Mortality** - Male

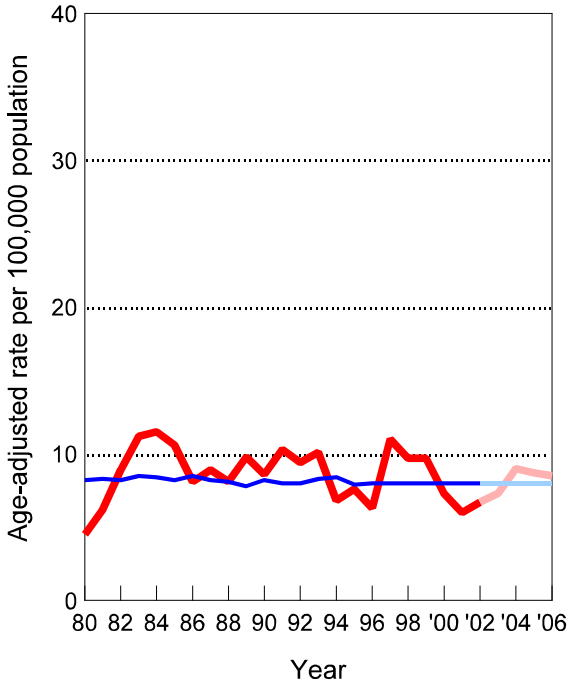


PEI Canada
lightly shaded lines are estimates

Trends in **Incidence** - Female



Trends in **Mortality** - Female

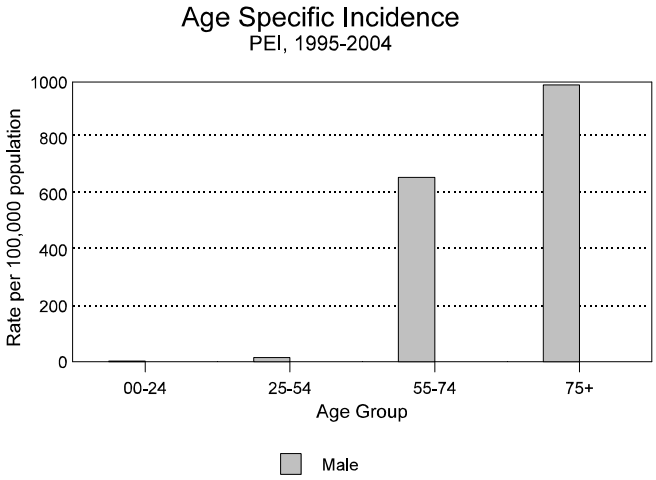


Prostate

Prostate cancer is currently the most commonly diagnosed cancer in Prince Edward Island men. The incidence of prostate cancer has risen dramatically in Canada and PEI. In PEI, the rising incidence trend is more pronounced than for Canada; over the past 10 years (1995-2004), the incidence is 30% higher in PEI than Canada. Mortality is dropping in Canada, with a similar trend in PEI. The five-year relative survival is 91% in Canada and PEI.[4]

Age Influence
The chance of developing prostate cancer increases with age.

In PEI, incidence peaked in 1994 for men age 75 and older; incidence peaked in 2002 for men aged 55 to 74.



Risk factors
The risk of prostate cancer is higher[5] for men who have:

- a family history of prostate cancer

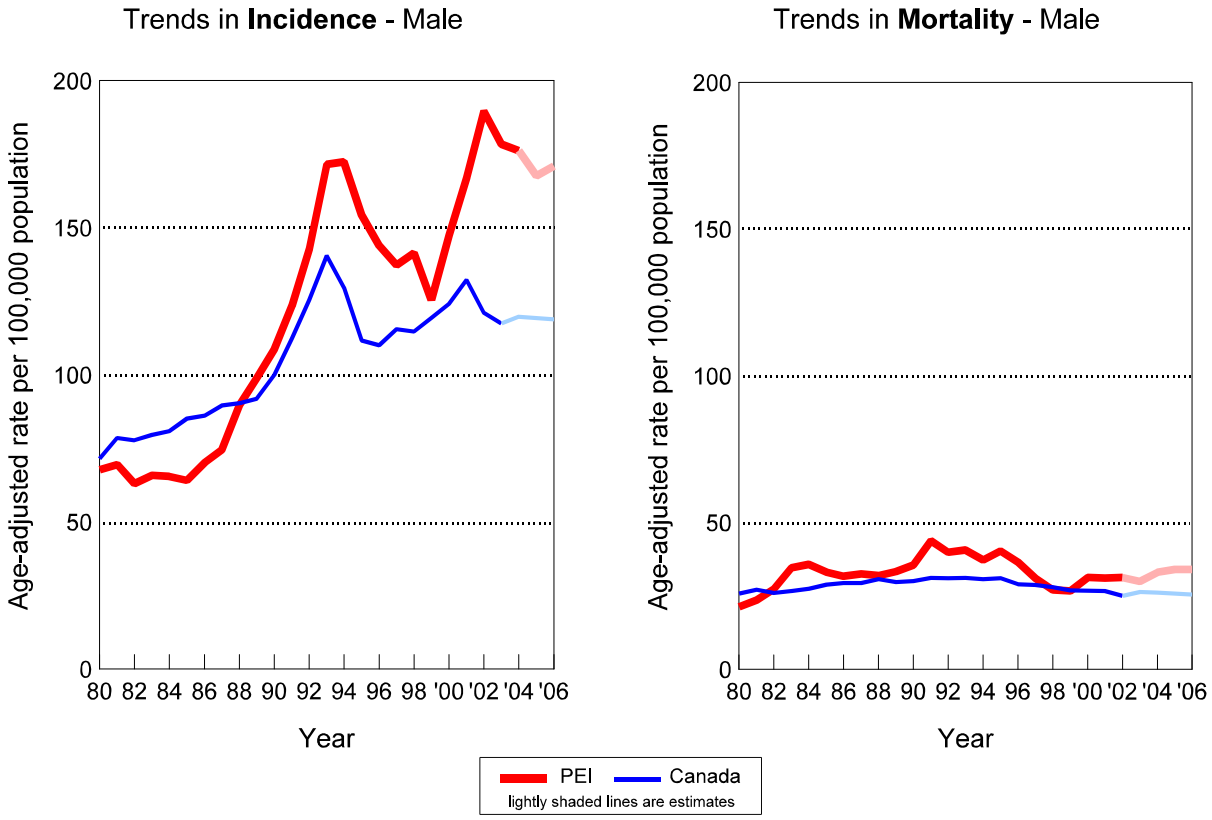
The causes of prostate cancer are largely unknown. A diet that includes tomatoes may reduce the risk of prostate cancer. The effect of factors such as obesity and physical activity are being studied.

Prevention and Early Detection
While prostate specific antigen (PSA) can identify prostate cancer at an earlier stage, there is insufficient evidence that PSA testing reduces mortality.[3]

PSA testing became available in PEI in 1991. This corresponds to the period of dramatic increase in the incidence of previously undiagnosed prostate cancer; the increased detection may be of cancers that would not become serious clinical problems.

PSA testing is under evaluation. Currently, no screening test is recommended.[3]

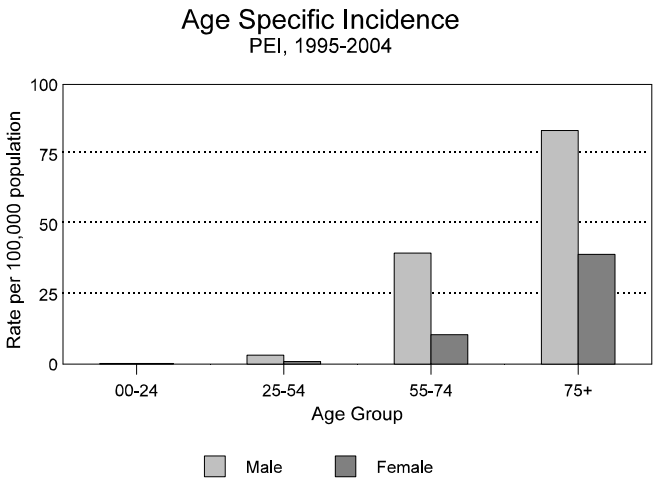
Prostate


Trends in **Incidence** - Male
Trends in **Mortality** - Male
Age-adjusted rate per 100,000 population
200
150
100
50
0
80 82 84 86 88 90 92 94 96 98 '00 '02 '04 '06
Year
PEI
Canada
lightly shaded lines are estimates

Stomach

Incidence and mortality of stomach cancer have been declining. The rates are similar in PEI and Canada. The five-year relative survival is 23% in Canada.[4]

Age and Gender Influence
Stomach cancer is twice as common in men than in women. Stomach cancer is more common in older age groups.



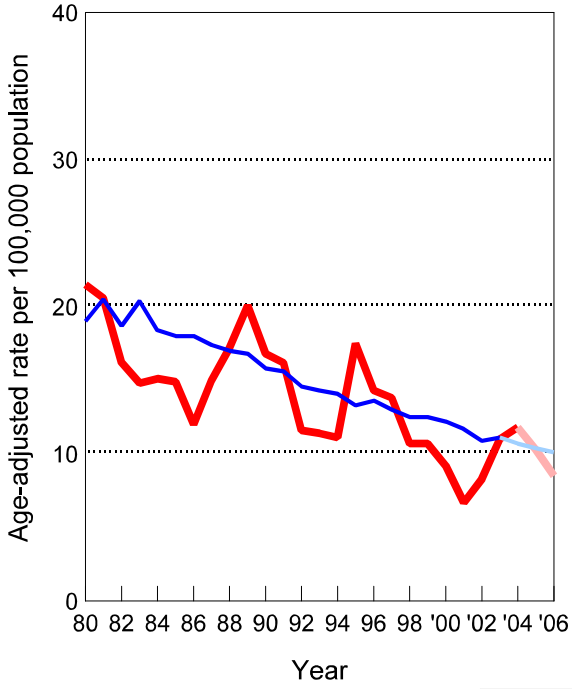
Risk factors
The risk of stomach cancer may be higher[5] for persons who:

- have infection with *Helicobacter pylori* bacteria
- eat a diet low in fruits and vegetables
- smoke tobacco
- have a family history of stomach cancer

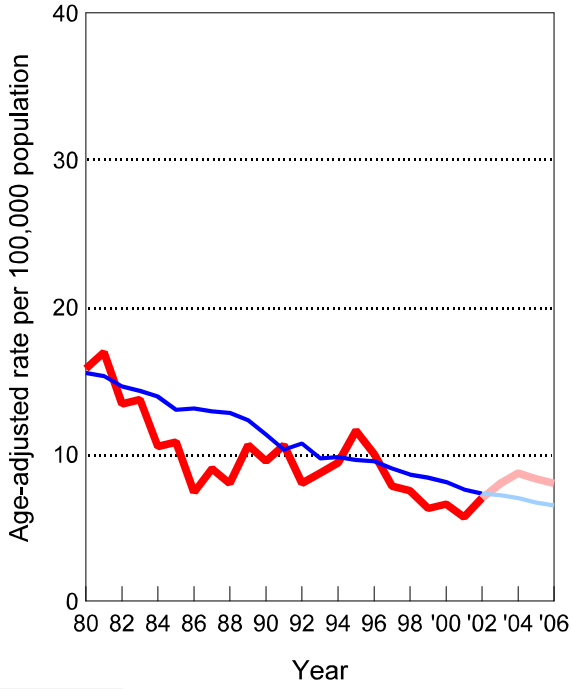
Prevention and Early Detection
Prevention focuses on the year-round consumption of fruits and vegetables, and restriction of salted, pickled and smoked foods.[5] While screening is done in Japan (where rates are 10 times higher than North America), stomach cancer screening is not recommended in North America.[3]

Stomach

Trends in **Incidence** - Male



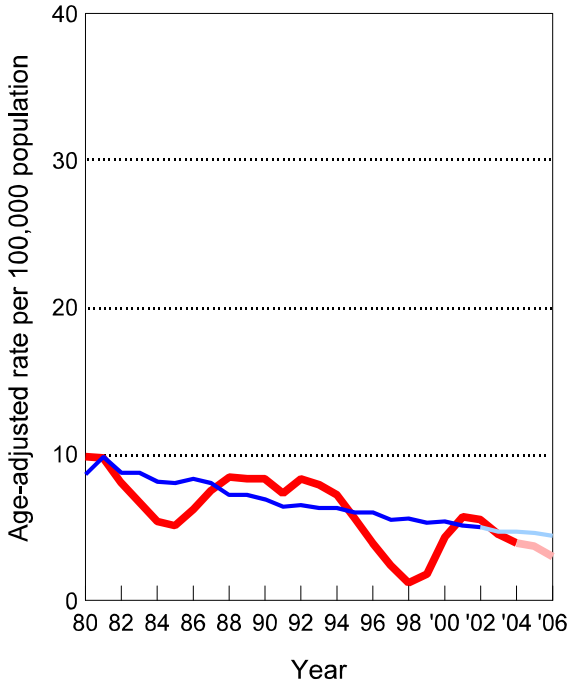
Trends in **Mortality** - Male



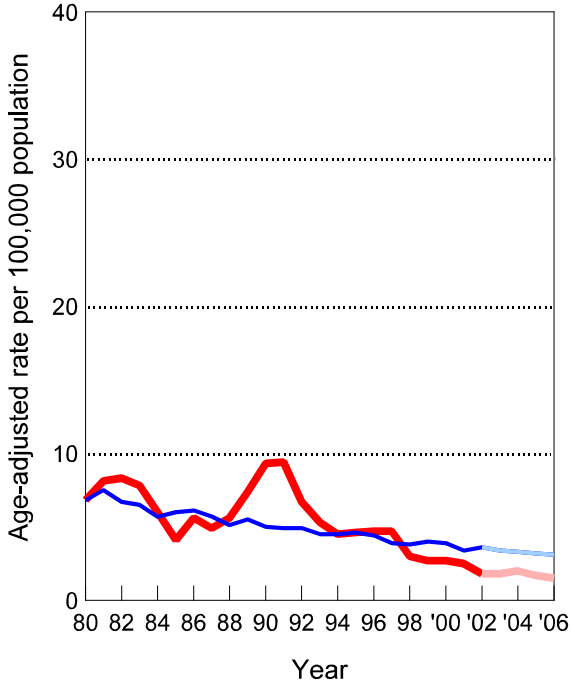
PEI — Canada

lightly shaded lines are estimates

Trends in **Incidence** - Female



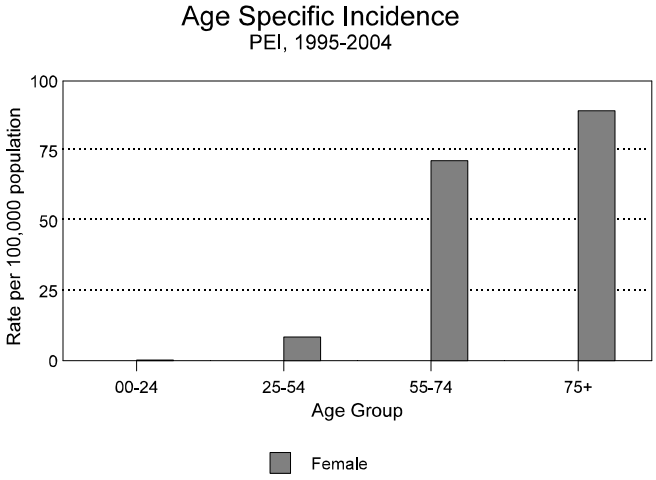
Trends in **Mortality** - Female



Uterus

Cancer of the uterus involves the endometrium (lining) and/or the myometrium (muscle). Incidence and mortality of uterine cancer have been stable. The rates are similar in PEI and Canada. The five-year relative survival is 87% in Canada.[4]

Age Influence
The risk of uterine cancer increases with age, especially around menopause.



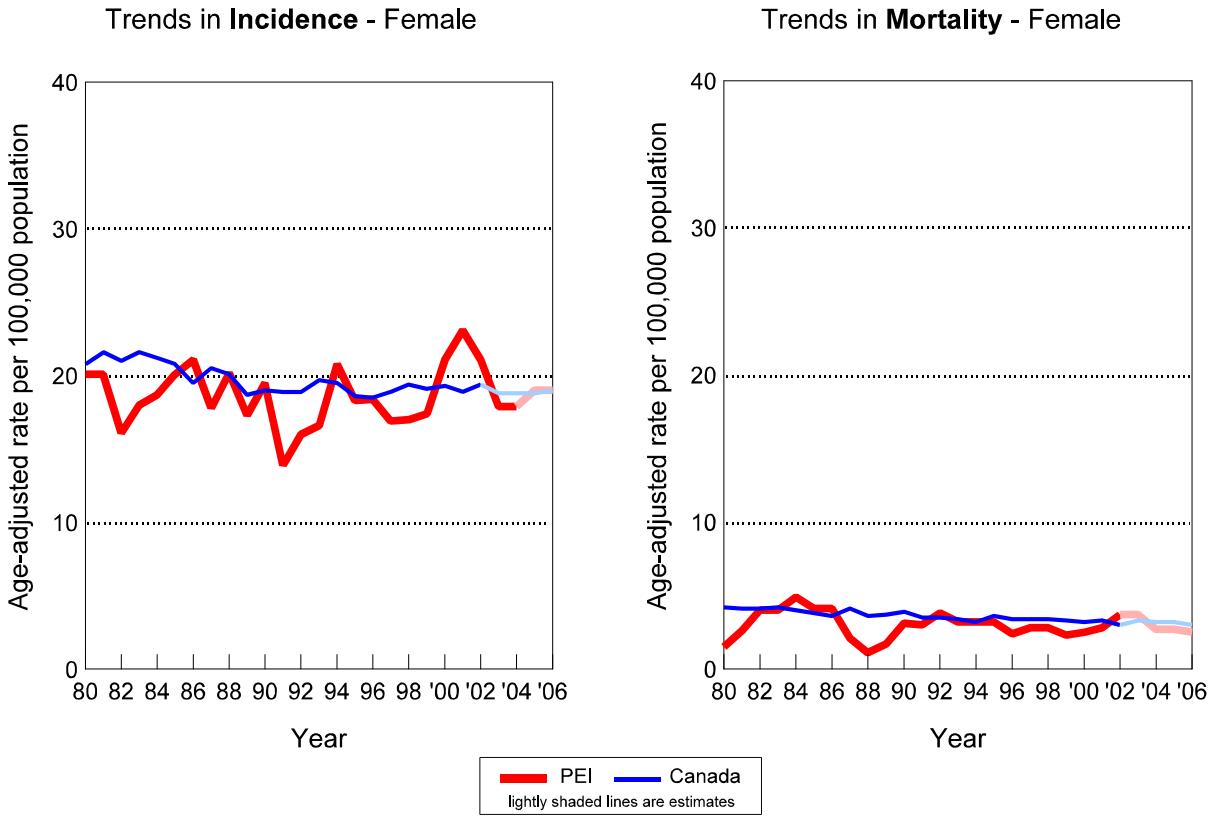
Risk factors
The risk of uterine cancer is higher[5] for women who:

- use estrogen replacement therapy without added progesterone for five or more years
- are obese
- have a history of estrogen-secreting ovarian tumours or endometrial hyperplasia
- have never been pregnant

The association with a high fat diet, diabetes, and hypertension is being studied.

Prevention and Early Detection
Uterine cancer can be reduced by weight loss among obese post-menopausal women.[5] There are no methods of early detection that have been shown to reduce mortality.[3]

Uterus


Trends in **Incidence** - Female
Trends in **Mortality** - Female
Age-adjusted rate per 100,000 population
40
30
20
10
0
80 82 84 86 88 90 92 94 96 98 '00 '02 '04 '06
Year
PEI
Canada
lightly shaded lines are estimates

Childhood Cancer

Cancer is relatively rare in children and youth, compared to the frequency of cancer in adults. In PEI, over the 10 year period 1995 to 2004, there were 57 persons less than 20 years of age diagnosed with cancer. Based on the Canadian incidence rate, PEI would expect about 60 cases in 10 years.

The five-year survival rate is 80% for childhood cancers in Canada, indicating a good prognosis compared with 59% for all adult cancers.[4] Survival in Canada has improved significantly over several decades primarily due to improved treatment. Prognosis has improved for acute lymphocytic leukemia, Hodgkin lymphoma, and germ cell tumours. In PEI, cancer mortality for children and youth is so rare it is difficult to present reliable trends on a graph.

Childhood cancers are grouped differently than for adults. Categories are based on histologic cell types rather than organ site, using the 1996 International Classification Scheme for Childhood Cancer. The most common categories are leukemia, lymphoma, and brain tumours. Other cancer types include carcinoma, germ cell and gonadal neoplasms, soft tissue sarcomas, bone sarcomas, sympathetic nervous system tumours, renal tumours, retinoblastoma, hepatic tumours, and other/unspecified cancers. The distribution of types is similar in both PEI and Canada, as demonstrated by the following table.

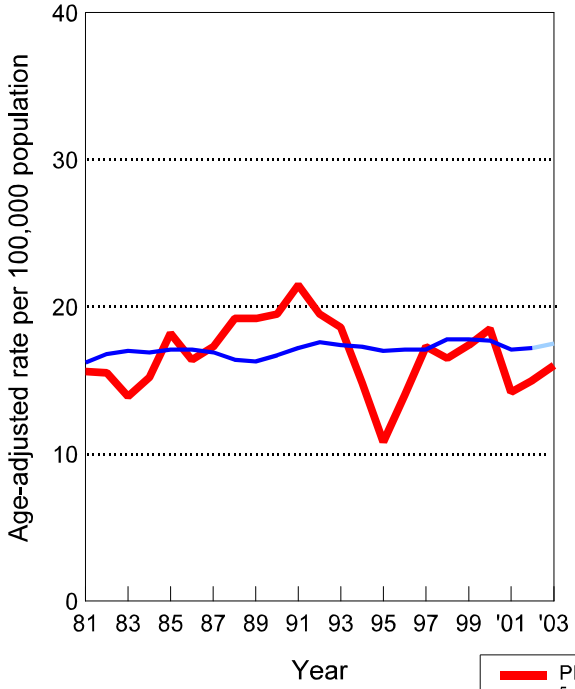
Most common childhood cancers
(% of incident cancers)

	PEI (1980 to 2004)	Canada[4]
Leukemia	29%	26%
Lymphoma	17%	17%
Brain	16%	17%
Other	38%	40%
Total	100%	100%

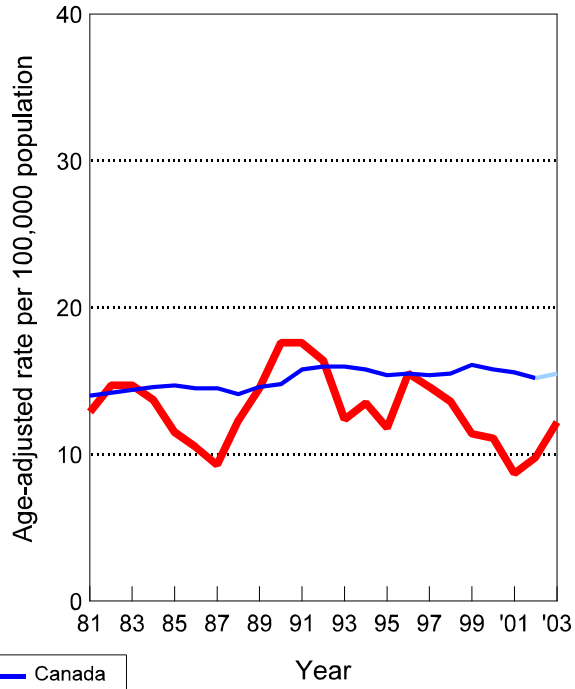
Childhood cancers are more common in males than in females. The incidence of childhood cancers has remained stable in both PEI and Canada.

Childhood Cancer

Trends in **Incidence** - Male

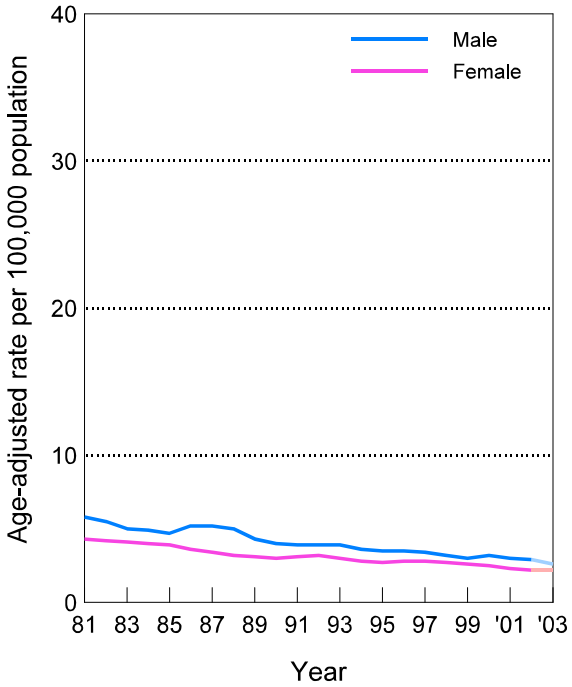


Trends in **Incidence** - Female



PEI Canada
5 yr MA
lightly shaded lines are estimates

Trends in **Mortality** - CANADA



Cancer in PEI Communities

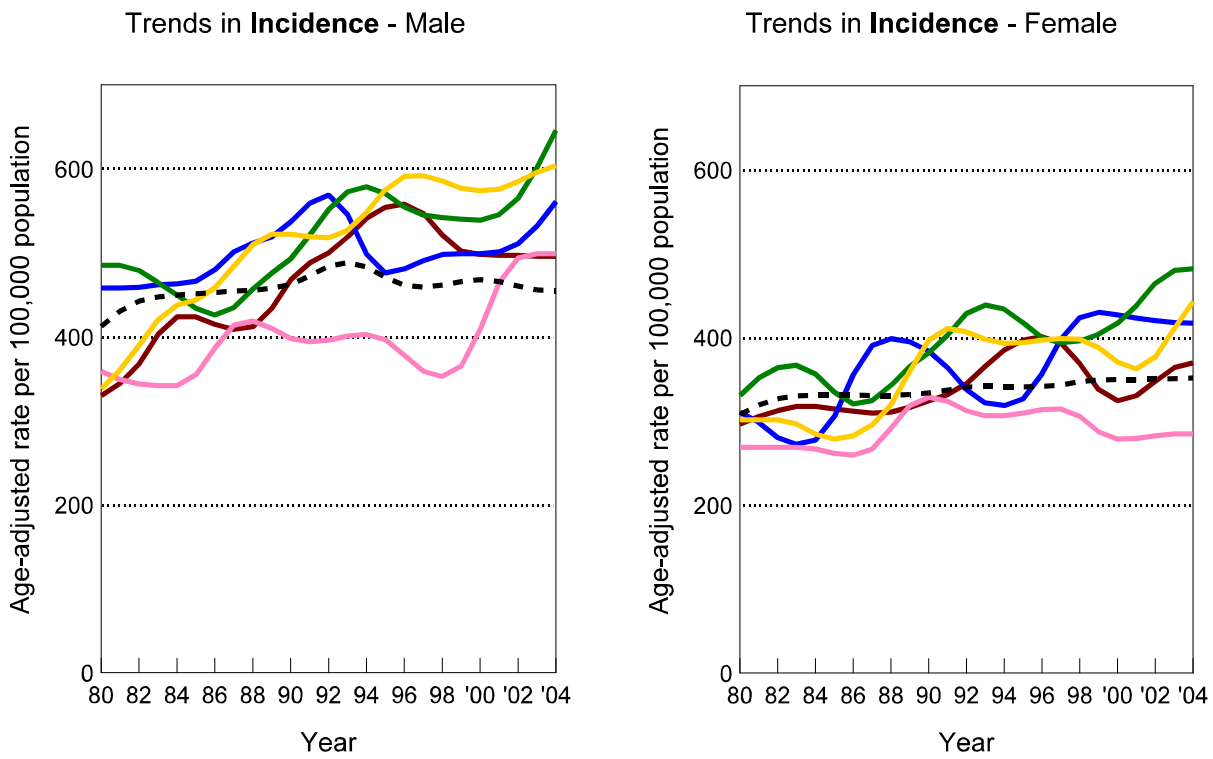
Cancer incidence within PEI was examined by dividing the province into 5 communities: the two urban communities of Summerside and Charlottetown, and three rural communities of Western, Central, and Eastern PEI.

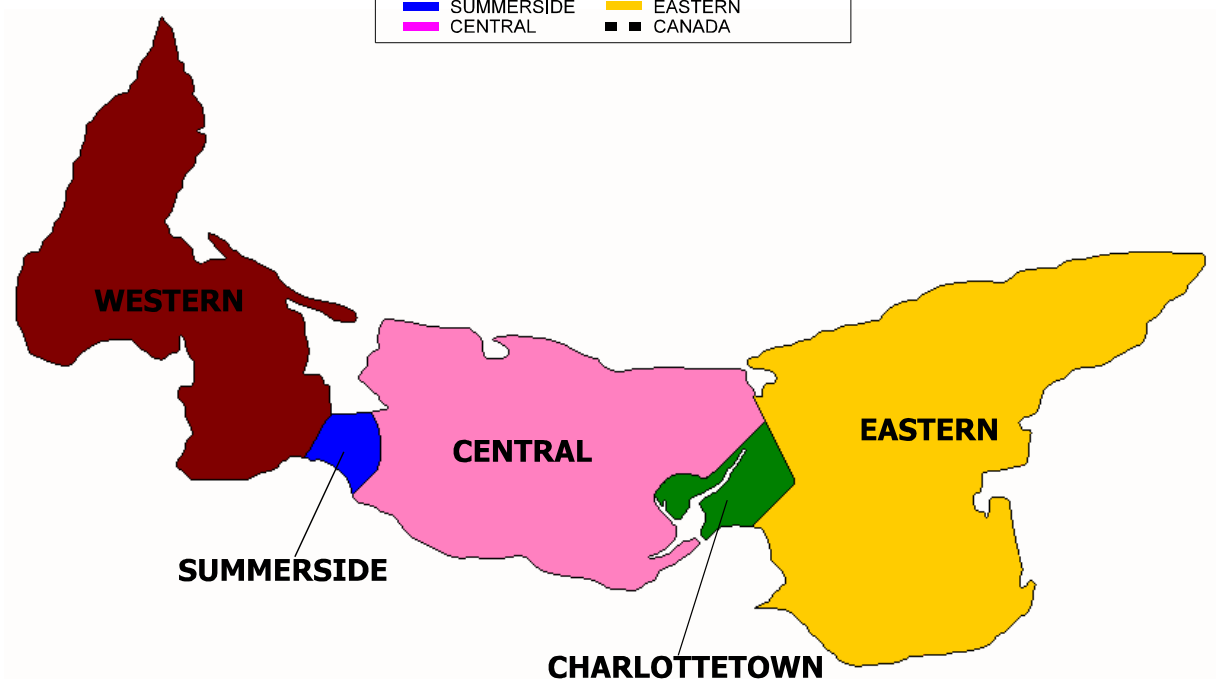
Cancer registration includes the address at the time of diagnosis. This information was used to generate cancer incidence by community. Cancer rates for small areas have large fluctuations that make it difficult to present reliable trends on a graph. The graphs of cancer incidence by community use nonparametric smoothing instead of moving averages.

Cancer incidence by community shows rates in all communities fluctuate around the Canadian incidence rate. Over the period 1980 to 2004, cancer incidence in three communities (Summerside, Charlottetown, and Eastern) was above the Canadian rate. In Western PEI, cancer incidence was similar to the Canadian rate. In Central PEI, cancer incidence was below the Canadian rate. The same pattern by community is seen for both men and women.

The increase in PEI's cancer incidence is occurring in three of PEI's five communities: Summerside, Charlottetown, and Eastern. This does not reflect an urban/rural pattern of cancer incidence.

All Sites


Trends in **Incidence** - Male
Trends in **Incidence** - Female
Age-adjusted rate per 100,000 population
0
200
400
600
80 82 84 86 88 90 92 94 96 98 '00 '02 '04
Year
Community
WESTERN
SUMMERSIDE
CENTRAL
CHARLOTTETOWN
EASTERN
CANADA


WESTERN
CENTRAL
EASTERN
SUMMERSIDE
CHARLOTTETOWN

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Appendix 1: Description of Cancer Sites

SITE:	DESCRIPTION:	ICDO-3 CODES (Incidence)	ICD-10 (Mortality)
All sites	all primary sites of malignant neoplasms; exclude non-melanoma skin cancer	C00-C80, exclude C44 (M805-811)	C00-C80, exclude C44
STOMACH	stomach including fundus, body, pylorus	C16	C16
COLON/ RECTUM	colon, rectum, rectosigmoid junct, anus	C18-C21, C26.0	C18-C21, C26.0
PANCREAS	pancreas including ducts, Islets of Langerhans	C25	C25
LUNG	bronchus, lung	C34	C34
MELANOMA	malignant melanoma (skin and other sites)	M872-M879	C43
BREAST	female breast	C50	C50
CERVIX	cervix, including cervical stump	C53	C53
UTERUS	uterus including endometrium, myometrium, fundus, body	C54, C55	C54, C55
OVARY	ovary	C56	C56
PROSTATE	prostate gland	C61	C61
BLADDER	urinary bladder	C67	C67
KIDNEY	kidney, ureter, unspec. urinary organs	C64-C66, C68	C64-C66, C68
BRAIN	central nervous system including meninges, brain, spinal cord, cranial nerves (includes benign and malig.)	C70-C72	C70-C72
N-H LYMPHOMA	Non-Hodgkin Lymphoma: lymphomas other than Hodgkin	9590-9596,9670-9719, 9727-9729, (9823,9827 if not C420,C421,C424)	C82-C85, C96.3
LEUKEMIA	lymphoid, myeloid, monocytic, other leukemias	9733,9742,9800,9801,9805, 9820,9826,9831-9837,9840, 9860,9861,9863,9866,9867, 9870-9876,9891,9895-9897, 9910,9920,9930,9931,9940, 9945,9946,9948,9963,9964 (9823,9827 if C420,421,424)	C91-C95

Appendix 2: Data Tables

A1. PEI Cancer Incidence 1995 to 2004, by site and sex

Site	Males (n)	Males average age-adjusted ‡ incidence rate	Females (n)	Females average age-adjusted ‡ incidence rate
Bladder	133	19.1	39	4.2
Brain	55	8.1	64	8.1
Breast	-	-	921	110.2
Cervix	-	-	69	8.2
Colorectal	491	69.4	524	56.1
Kidney	124	17.6	72	8.8
Leukemia	91	16.1	58	6.8
Lung	599	85.4	445	53.1
Melanoma	114	16.1	143	18.1
NH Lymphoma	143	19.8	101	12.1
Ovary	-	-	90	10.8
Pancreas	88	12.3	79	7.7
Prostate	1092	153.6	-	-
Stomach	80	11.4	37	3.9
Uterus	-	-	162	19.1
All Sites	3596	509.1	3210	375.2

‡ rates are adjusted to the age distribution of the 1991 Canadian population; all sites exclude non-melanoma skin cancer.

A2. PEI Cancer Deaths 1993 to 2002, by site and sex

Site	Males (n)	Males average age-adjusted ‡ mortality rate	Females (n)	Females average age-adjusted ‡ mortality rate
Bladder	40	5.3	15	1.3
Brain	24	3.2	27	3.8
Breast	-	-	233	27.0
Cervix	-	-	33	4.0
Colorectal	205	30.0	209	21.2
Kidney	57	7.6	27	2.5
Leukemia	54	7.7	47	4.3
Lung	550	80.3	326	39.1
Melanoma	25	2.5	10	0.8
NH Lymphoma	60	9.0	46	4.9
Ovary	-	-	61	6.6
Pancreas	81	11.5	78	7.9
Prostate	220	32.2	-	-
Stomach	57	7.8	38	4.0
Uterus	-	-	30	3.6
All Sites	1647	241.3	1355	151.7

‡ rates are adjusted to the age distribution of the 1991 Canadian population; all sites exclude non-melanoma skin cancer.

A3. PEI Cancer Incidence for all cancer sites, by sex and year

Year	Males (n)	Males age-adjusted ‡ incidence rate	Females (n)	Females age-adjusted ‡ incidence rate
1980	225	399.1	193	296.2
1981	225	395.2	193	299.7
1982	233	406.5	218	338.0
1983	239	411.2	214	317.9
1984	262	446.5	217	311.8
1985	243	409.1	222	319.0
1986	228	377.7	187	265.5
1987	290	471.2	219	302.6
1988	270	436.8	257	350.2
1989	306	491.6	249	340.7
1990	309	488.4	279	384.5
1991	277	433.6	280	367.9
1992	319	496.3	295	379.4
1993	346	535.2	251	325.5
1994	349	529.9	304	395.8
1995	337	513.2	284	361.2
1996	309	468.4	297	365.8
1997	338	505.1	297	363.3
1998	338	490.5	353	431.9
1999	366	524.1	302	354.2
2000	341	477.7	305	346.2
2001	363	504.8	328	375.6
2002	386	523.4	330	363.6
2003	412	554.3	368	411.5
2004	406	529.6	346	378.3
2005	420	525	350	386
2006	410	516	370	404

‡ rates exclude non-melanoma skin cancer and are adjusted to the age distribution of the 1991 Canadian population.

estimated numbers

A4. PEI Cancer Deaths for all cancer sites, by sex and year

Year	Males (n)	Males age-adjusted ‡ mortality rate	Females (n)	Females age-adjusted ‡ mortality rate
1980	113	201.3	91	135.3
1981	122	212.4	102	152.6
1982	132	229.0	96	139.7
1983	127	220.7	118	163.8
1984	152	252.9	104	141.3
1985	158	262.6	114	146.2
1986	148	243.1	129	173.9
1987	159	259.4	104	135.5
1988	151	243.4	96	118.6
1989	148	238.1	111	144.1
1990	169	267.6	137	168.4
1991	168	262.3	135	167.2
1992	178	278.4	122	154.2
1993	149	227.7	126	148.3
1994	173	265.6	139	169.9
1995	174	265.0	129	157.0
1996	184	277.6	143	158.1
1997	158	237.2	113	126.0
1998	158	231.7	142	163.9
1999	164	233.9	151	168.9
2000	171	241.6	148	152.0
2001	156	215.3	114	118.7
2002	160	217.0	150	154.0
2003	180	249	150	154
2004	190	251	150	154
2005	190	249	150	151
2006	180	229	150	151

‡ rates exclude non-melanoma skin cancer and are adjusted to the age distribution of the 1991 Canadian population.

estimated numbers

A5. PEI Cancer Incidence (all sites) 1995 to 2004, by age group and sex

Age	Males (n)	Males average age-adjusted ‡ incidence rate	Females (n)	Females average age-adjusted ‡ incidence rate
00 - 24	45	17	35	13
25 - 54	486	139	748	218
55 - 74	1966	1827	1370	1184
75+	1099	3427	1057	1934

‡ rates exclude non-melanoma skin cancer and are adjusted to the age distribution of the 1991 Canadian population.

A6. PEI Cancer Incidence (all sites) 1995 to 2004, by community and sex

Community	Males (n)	Males average population	Males average age-adjusted ‡ incidence rate	Females (n)	Females average population	Females average age-adjusted ‡ incidence rate
Western (Tignish, Alberton, O'Leary, Tyne Valley, Wellington, Miscouche)	552	9838	530	437	9901	371
Summerside (St. Eleanor's, Wilmot, Summerside)	378	7438	489	429	8134	412
Central (Kensington, Hunter River, Cavendish, Crapaud, Cornwall)	720	16969	426	564	16987	303
Charlottetown (Stratford, West Royalty, Parkdale, Sherwood, Ch'town)	1144	19371	559	1212	21267	434
Eastern (Morell, Montague, Murray River, Souris)	802	12266	592	568	12235	394

‡ rates exclude non-melanoma skin cancer and are adjusted to the age distribution of the 1991 Canadian population.

Appendix 3: Definitions

AGE
The age of the patient at the time of diagnosis in years.

DATE OF DIAGNOSIS
Diagnosis can be confirmed at the time of a pathology report, X-ray report, surgical report, clinical determination, or on the death certificate. The date of diagnosis is the date of the *earliest* confirmatory report following the sequence specified by the Canadian Cancer Registry rules.

CANCER INCIDENCE
The number of new cases of invasive cancer diagnosed per year. Metastatic and carcinoma-in-situ cancers are excluded. Benign tumours are only included for the central nervous system. Non-melanoma skin cancers are excluded, since they are usually treated simply and successfully without requiring hospitalization, and they are therefore difficult to register completely.

AGE STANDARDIZED INCIDENCE RATE
The numerator is new cancer cases, weighted by the age structure of a standard population (1991 Canadian population) by 5-year intervals. The denominator is the population estimates produced each year by Statistics Canada. The age-adjusted rate is expressed as the number of new cancer cases per 100,000 population per year.

CANCER MORTALITY
The number of deaths due to cancer, based on the cause of death as reported on the death certificate.

AGE STANDARDIZED MORTALITY RATE
The numerator is cancer deaths, weighted by the age structure of a standard population (1991 Canadian population). The age-adjusted rate is expressed as the number of cancer deaths per 100,000 population per year.

SMOOTHING OF GRAPHS
Incidence and mortality rates for PEI are 3-year moving averages to smooth out annual fluctuations, since small numbers of cases can cause large fluctuations in rates. This was not used for Canadian rates shown on the graphs, since the large number of cases produces more stable rates.
Graphs of PEI childhood cancers are 5-year moving averages; Canada childhood cancers are 3-year moving averages.
Graphs of cancer in PEI communities use nonparametric smoothing.

ESTIMATES

Where recent mortality and incidence were not available, estimates were used from "Canadian Cancer Statistics" produced by the National Cancer Institute of Canada[4], using age-specific incidence and demographic projections. All estimates are shown on the graphs in this report as lightly shaded lines.

Estimates are used for 2005 and 2006 for new cancer cases in PEI.

Estimates are used for 2002-2004 to 2006 for new cancer cases in Canada; the start year varies by site.

Estimates are used for 2003 to 2006 for cancer deaths in PEI and Canada.

AGE-SPECIFIC INCIDENCE RATE

The rate of new cases in one age group of the population. The age groups used are: 0-24 years, 25-54 years, 55-74 years, and 75+ years at time of diagnosis. Within these age categories, the rates are weighted by a standard population (1991 Canadian population).

FIVE-YEAR RELATIVE SURVIVAL RATE

The survival of cancer patients over the first 5 years after diagnosis, adjusted for causes of death other than cancer. Survival rates measure prognosis, and are influenced by the ability to cure the disease, as well as the stage of the cancer at the time of diagnosis. Five-year survival rates are interpreted as:

1. excellent prognosis (5-year survival 85% or greater)
2. good prognosis (5-year survival 70% - 84%)
3. fair prognosis (5-year survival 30% - 69%)
4. poor prognosis (5-year survival less than 30%)

Canadian survival rates are used in this report.[4]

STAGE AT DIAGNOSIS

Tumour staging follows AJCC Cancer Staging Manual Sixth Edition, and is based on site-specific criteria from clinical and pathology records. In general, the stages are described as:

Stage 1: least advanced stage, no lymph node involvement
Stage 2: larger or more invasive tumour than stage 1, lymph node involvement varies by site
Stage 3: larger or more invasive tumour than stage 2, usually involves lymph nodes
Stage 4: most advanced stage; involves distant metastasis