The 2014 Cancer System Performance Report

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Executive Summary

The **Canadian Partnership Against Cancer** (the Partnership) works with Canada's cancer community to reduce the burden of cancer through co-ordinated system-level change. The Partnership supports the collective work of the broader cancer control community in achieving long-term outcomes with direct impact on the health of Canadians. These results are achieved through sustained effort and a focus on the full cancer continuum, from prevention and treatment through to survivorship and end-of-life care.

Working with provincial, territorial and national partners, the Partnership's **System Performance Initiative** constitutes a national effort to identify aspects of the cancer control system that need to be measured, to define performance indicators, to collect valid and comparable data and to report findings in an integrated manner that allows for synthesis of results and interpretation of patterns to inform opportunities for pan-Canadian system improvements. Findings are published in a series of reports aimed at informing provincial cancer agencies, clinicians, policy-makers, researchers and cancer patients and their families.

The *2014 Cancer System Performance Report* is the fifth annual compendium of indicators measuring cancer system performance across Canada. It updates previously reported indicators with more recent data and includes new indicators on cancer control domains such as system efficiency. Also new in this report is the inclusion of performance targets for three treatment

indicators, developed by a panel of experts from across the country.

As were past editions, the 2014 report was produced in close collaboration with partners at the provincial and national levels and was further informed by consultations with subject matter experts and knowledge leaders from across the country. Provincial cancer agencies and programs provided data for calculation and development of many indicators found in the report. At the national level, the Partnership worked closely with Statistics Canada, the Canadian Institute for Health Information, the National Research Corporation Canada, the C[17] Council of pediatric oncology programs across Canada, the pan-Canadian Colorectal Screening Network and the Canadian Cancer Research Alliance to develop several of the indicators discussed in the report.

Indicator results are generally compared by province or territory, age group and sex. Where appropriate, results are compared with those of international jurisdictions, highlighting potential best practices and benchmarks. Commentary on emerging evidence or studies nationally or internationally is also provided in some instances. As in previous editions, the 2014 report is organized along the dimensions of the cancer control continuum: prevention, screening, diagnosis, treatment and person-centred perspective. Also included are chapters covering research, system efficiency and long-term outcomes.

Results Highlights

In **prevention**, analysis of smoking prevalence has shown that in 2012, 20% of Canadians aged 12 or older reported smoking in the previous year. The lowest percentage was 14.5%, in British Columbia. Of recent smokers aged 20 or older, 17% reported quitting in the past two years. The province with the highest percentage of smokers kicking the habit was Nova Scotia at 20.3%. Among Canadians aged 12 and older, 12.8% reported exposure to second-hand smoke in public places. Vehicle and

home exposures were lower at 6.3% and 4.7%, respectively. Vehicle and home exposures were lowest in British Columbia at 4.8% and 2.6%, respectively. Exposure in public places was lowest in Yukon (7.7%) and Newfoundland and Labrador (8.2%).

In 2012, 19.9% of Canadians aged 18 or older had abstained from alcohol consumption in the previous year. The highest percentages were

25.6% in Nunavut and 22.4% in Ontario. Meanwhile, 12.8% of adults in Newfoundland and Labrador reported exceeding the World Cancer Research Fund alcohol intake recommendations of two drinks per day for men and one drink per day for women.

Of Canadians aged 18 or older, 52.5% were classified as overweight or obese in 2012. British Columbia had the lowest percentage at 46.5%.

As of 2010, all provinces and territories had implemented organized school-based human papillomavirus vaccination programs. For those provinces reporting immunization rates for all three doses of the vaccine, uptake rates ranged from 59% in Ontario to 76% in New Brunswick.

In **screening**, in 2012 the percentage of Canadians who were up to date on colorectal cancer screening (based on self-reported data) ranged from 28% in Quebec to 59% in Manitoba. When compared with the range of 16% to 47% in 2008, these rates demonstrate the progress in colorectal screening uptake across the country.

Self-reported cervical cancer screening rates were relatively comparable across provinces and territories in 2012, ranging from 71% in Quebec to 89% in Prince Edward Island. From 2008 to 2012, the rate appears to have decreased by a few percentage points in several provinces and territories, which warrants monitoring.

Self-reported screening mammography rates vary by province and territory, ranging from 57% in Yukon to 75% in Quebec. Screening rates remained relatively stable in most provinces between 2008 and 2012.

In **diagnosis**, as of the 2010 diagnosis year population-level stage data were available for the four most common disease sites from nine of 10 Canadian provinces. The stage distribution is comparable to data available from other major developed countries. Approximately 68% of invasive breast cancer cases diagnosed in 2010 were early stage (Stage I or II). Colorectal cancer cases were evenly distributed among the four cancer stages. For lung cancer, Stage IV had the highest proportion of cancer cases, while approximately 50% of prostate cancer cases were Stage II.

None of the provinces reporting data achieved the wait time target for resolution following an abnormal screening mammogram in 2011, although trends show improvements in wait times in several provinces, including Saskatchewan, New Brunswick and Alberta. The Northwest Territories has met the target for women requiring a tissue biopsy. Median wait times from an abnormal fecal test result for colorectal screening to a colonoscopy ranged from 35 days in British Columbia to 96 days in Saskatchewan (between 2009 and 2011). Of the five reporting provinces, only Nova Scotia and British Columbia reported median wait times below the 60-day benchmark. Efforts will focus on expanding the number of reporting provinces in future reports for this important access-to-care indicator.

In **radiation treatment**, in 2012 nine of 10 provinces had achieved the target of 90% of patients treated with radiation within the national wait time benchmark of 28 days. The tenth province (Nova Scotia) is within a few percentage points of the target. Saskatchewan and Ontario had the shortest 90th percentile wait time at 15 days. Radiation therapy use varied slightly by province. The highest usage rate was in Prince Edward Island at 36%.

A target of 70% was established as of 2014 for the percentage of Stage II or III rectal cancer cases undergoing pre-operative radiation therapy, as recommended by evidence-based guidelines. The rate of concordance with this guideline has increased for most provinces over the past four years but is still below the 70% target. The province with the highest guideline treatment rate for 2010 was Manitoba at 48%. The treatment rate drops from around 45% for patients under age 70 to 20% for patients over 80.

There was some interprovincial variation in the percentage of early-stage breast cancer cases treated with radiation therapy. The province with the highest guideline treatment rate for 2010 was Alberta at 88%. The treatment rate drops from 85% for patients under age 70 to 43% for patients 80 and older.

In **systemic treatment**, post-operative chemotherapy rates for patients with Stage III

colon cancer range from 51% to 80% (Prince Edward Island having the highest provincial rate). There is a steep downward trend in chemotherapy rates with increasing patient age, from 86% for patients under age 60 to 18% for patients 80 and older in 2010. This may be a result of incomplete capture of oral chemotherapy, which is more commonly prescribed to older patients.

The percentage of patients with Stage II or IIIA non–small cell lung cancer (NSCLC) receiving adjuvant chemotherapy appears to be decreasing over time. Provincial rates range from the mid-30%s to the high 50%s. The post-surgical chemotherapy rate for patients aged 70 and older is 32%, a full 20 percentage points lower than the rate for patients younger than 70. In 2014, a target treatment rate of 45% has been established for patients 70 and older to encourage greater consideration of adjuvant therapy for older patients who may benefit from it.

In **surgical treatment**, there was interprovincial variation in the percentage of patients who had a surgical resection for colorectal or lung cancer in 2010. The resection rates ranged from 70% to 100% for Stage II or III rectal cancer, from 84% to 100% for Stage III colon cancer and from 25% to 42% for Stage II or IIIA NSCLC. The resection rate for lung cancer for patients over 70 was half that for patients under 70 and was higher across age groups for women than for men.

There was also interprovincial variation in the percentage of colon resections with 12 or more lymph nodes removed (as recommended by guidelines), with rates ranging from 62% in New Brunswick to 89% in Ontario. The target established as of 2014 for this indicator is 90%; most provincial trends are moving toward the target, with Ontario closest to achieving it.

In **person-centred perspective**, the implementation of standardized symptom screening tools varied across the country. In 2013, eight provinces used a standardized symptom screening tool for at least a portion of patients at some or all provincial cancer centres (compared with seven in 2012). In other

provinces, screening tools may be used but data on their use are not available provincially.

In 2014, results of the Ambulatory Oncology Patient Satisfaction Survey were examined by socio-demographic, disease site and phase, health status and other factors. Of the patient satisfaction domains reported in the survey, emotional support received by far the strongest negative response (between 19% and 31% of survey respondents reported a negative rating provincially). Analysis suggested that younger and more educated people were more likely to rate their experience negatively.

In 2009, 71% of cancer deaths in Canada occurred in hospital. The provincial percentages of people with cancer dying outside of the hospital ranged from 11% to 47%. Comparable studies in Europe have reported the percentage of cancer deaths occurring at home to be as high as 45%.

In **research**, the ratio of adult patients enrolled in clinical trials to the number of incident cases ranged from 0.007 to 0.055 across the nine provinces that reported data in 2012 and from 0.014 to 0.064 across disease sites for the eight provinces that submitted data. The ratio of pediatric patients enrolled in clinical trials to new patient registrations at children's treatment centres ranged from 0.19 to 0.41 across the eight provinces that have pediatric cancer centres.

Data on funding from 2010 showed that breast cancer has a proportionally higher share of disease site–specific research funding (27%) relative to its burden of illness (7% of cancer deaths), while lung cancer has a proportionally lower share of funding (8%) relative to its burden of illness (27% of cancer deaths).

System efficiency was examined for the first time in this report using three indicators. The first looked at mammography screening outside the recommended age groups and found that depending on the province, anywhere from 22% to 40% of women aged 75 and over reported having received a screening mammogram in the past two years.

The second indicator examined the use of day surgery as opposed to more resource-intensive

inpatient surgery for mastectomies and found that although in Ontario 35% of mastectomies are done as day surgery, that rate is less than 10% in five provinces.

The final indicator measures the use of intensive care units (ICUs) near the end of life and found that depending on the province, anywhere from 6% to 14% of people who died of cancer were admitted to an ICU in the last two weeks of life. All three indicators point to opportunities for improvement in system efficiency.

In **long-term outcomes**, and for the first time as of this report, incidence and mortality rates have been age-standardized to the 2011 Canadian population as opposed to the 1991 population, which was used for many years. The re-standardization allows for the rates to better reflect substantial shifts in the age structure of the Canadian population over the past 20 years. Also examined are changes in cancer survival between 1992–1994 and 2006–2008, which show improvements in five-year relative survival from 82% to 88% for breast cancer, from 56% to 65% for colorectal cancer and from 14% to 18% for lung cancer.

Looking Ahead

In the year ahead, plans are in place to develop and release a **spotlight** report on prostate cancer. Also in the spotlight series, a report focusing on stage-based indicators will be released in 2014. Furthermore, the **in-depth study** on the use of positron emission tomography scanners in the diagnosis and management of non–small cell lung cancer that began in the spring of 2013 will be completed. This study will shed light on opportunities for more consistent evidence-based use of this resource-intensive technology across the country. Also in 2014, a two-year in-depth study will begin to look at cancer patients' transitions through phases of treatment and follow-up care and survivorship.

The development of performance targets and benchmarks for reported indicators will continue to feature in the work ahead. Knowledge translation and exchange efforts will continue in order to enhance the reach and impact of system performance information across a broad range of target audiences in the Canadian cancer control system. Part of the knowledge translation and exchange effort is the recent launch of the Partnership's System Performance website to allow users to navigate through the content of the *2014 Cancer System Performance Report* in a user-friendly and interactive manner. Later in 2014, the website will allow users to view cancer system performance information by disease site and by province or territory. The website is available at systemperformance.ca.

Finally, beginning with the 2015 edition of the cancer system performance report, the scope of the annual reports will change to feature a short list of well-established indicators that represent each cancer control domain and that address key aspects of Canada's cancer control system performance. These "dashboard" indicators will be updated annually and will feature targets or benchmarks in the future. All other indicators previously reported on will be available through the Partnership's System Performance website and will be updated periodically.

Future reports on the performance of the Canadian cancer control system, together with the online presence of system performance information and other publications and knowledge translation and exchange tools, will continue to provide health system decision-makers with the system performance knowledge they need to inform quality improvements across the country.

About the Canadian Partnership Against Cancer and the System Performance Initiative

The **Canadian Partnership Against Cancer** (the Partnership) works with Canada's cancer community to reduce the burden of cancer through co-ordinated system-level change. The organization plays a unique role working with partners in stimulating and supporting the generation of knowledge emerging from cancer research and in promoting the exchange and uptake of best practices across the country. This work is grounded in and informed by the experiences of those working closely with those most affected by cancer. This, in turn, allows for the optimization of cancer control planning and drives improvements in quality of practice in Canada. Partners include provincial and territorial cancer programs; federal organizations and agencies; First Nations, Inuit and Métis organizations; national health and patient organizations; and individual experts who provide strategic cancer control insight and advice from both patient and professional perspectives.

Through sustained effort and a focus on the full cancer continuum, from prevention and treatment through to survivorship and end-of-life care, the Partnership supports the collective work of the broader cancer control community in achieving long-term outcomes with direct impact on the health of Canadians: reduced incidence of cancer, less likelihood of Canadians dying from cancer and an enhanced quality of life for those affected by cancer.

The Partnership's **System Performance Initiative** constitutes a national effort to identify aspects of the cancer control system that need to be measured, to define performance indicators, to collect valid and comparable data and to report findings in an integrated manner that allows for synthesis of results and interpretation of patterns to inform quality improvement strategies. This work is accomplished in close collaboration with provincial and national partners. Findings are published in a series of reports targeted at the cancer control community, especially provincial cancer agencies, provincial departments or ministries of health, clinicians, researchers and cancer patients and their families. The performance indicators are intended to aid policy-makers and health planners in identifying best practices and opportunities for quality improvements in cancer control across Canada.

The *Cancer System Performance Report* is the most comprehensive of the series of reports the System Performance Initiative produces. It includes pan-Canadian system performance indicators that span the various dimensions of cancer control (prevention, screening, diagnosis, treatment, person-centred perspective, research, system efficiency and long-term outcomes), cancer sites and the Canadian population. In addition, the System Performance Initiative produces **spotlight** reports that focus on specific aspects of cancer control through more detailed indicators and other exploratory information to help contextualize and explain performance for specific disease sites or other topics of interest. Furthermore, the initiative also conducts **in-depth studies** to shed light on areas of cancer control that are unmeasured or under-measured.

Reporting on system performance also includes working with national and provincial partners to set evidence-based targets and benchmarks for a number of performance indicators. Targets help identify the magnitude and directionality of performance improvement efforts and opportunities, which informs the implementation of quality improvement initiatives locally or nationally.

About This Publication

About This Publication

The 2014 Cancer System Performance Report *is the fifth annual compendium of indicators measuring the performance of the Canadian cancer control system. It represents another step forward in the ongoing effort, which began in 2008 with the Canadian Partnership Against Cancer working with its provincial and national partners, to make meaningful and standardized cancer control indicators available to inform performance improvements at the system level across Canada.*

Building on the previous four editions, the 2014 report updates previously reported indicators with more recent data and includes new indicators on cancer control domains that are unmeasured or under-measured, such as system efficiency. Also new in this report is the inclusion of performance targets for three treatment indicators developed by a panel of national experts. Detailed information on data specifications and calculation methodology for each indicator is available at the Canadian Partnership Against Cancer's System Performance website (systemperformance.ca).

Why Report on Canada's Cancer Control System Performance?

While each province and territory is largely responsible for planning and funding cancer service delivery within its jurisdiction, national comparisons of standardized performance indicators have allowed for knowledge exchange and uptake of best practices across provinces and the identification of areas of the system that are unmeasured or under-measured. Ultimately, national comparisons have informed opportunities for pan-Canadian system improvements. Furthermore, interprovincial measurement and comparison supports the development and adoption of national performance targets and benchmarks.

For interprovincial system performance comparisons to be meaningful, a co-ordinated approach is required to ensure standardized definitions, methodologies and interpretations.

The Canadian Partnership Against Cancer (the Partnership) develops detailed data specifications and calculation methodologies that are used in the collection and analysis of data by provincial cancer agencies to ensure consistency and comparability across provinces.

Reporting on system performance is not an end in itself, but a key mechanism in stimulating action. It helps promote a continuous improvement feedback loop in which reports on activities and performance provide important information to shed light on areas where further attention and action is required. Reporting points toward key collaborations and partnerships and allows for the best possible decision-making for improving cancer control in Canada.

How the Report Was Informed

The indicators presented in this report are the result of collaboration with a number of partners nationally and at the provincial or territorial level. Consultations with a broad range of experts and knowledge leaders from across the cancer control landscape also informed the work.

At the provincial level, the Steering Committee and Technical Working Group for System Performance, each comprising locally appointed representatives from all 10 Canadian provinces, guided the planning and development of the report. Provincial cancer agencies and programs provided data from their jurisdictions for calculation and development of most indicators found in the report, particularly in the domains of diagnosis, treatment, research and patient-centred perspective. Detailed data specifications and calculation methodologies were developed and used in the collection and analysis of data at the provincial level to ensure consistency and comparability across provinces.

At the national level, the Partnership works closely with Statistics Canada as the survey administrator and data steward for the Canadian Community Health Survey (CCHS). The report used CCHS information on health status, health-care utilization and health determinants for the Canadian population, which informed indicators reported on in the domains of prevention, screening and system efficiency. Statistics Canada also houses the Canadian Cancer Registry and Vital Statistics Database, which were used to generate key measures of long-term outcomes such as cancer incidence, mortality and survival.

The Partnership also works with the Canadian Institute for Health Information (CIHI) for indicators related to cancer surgery and intensive care unit use near the end of life, based on national hospitalization data. CIHI's data were pivotal in informing indicators reported on in the newly added domain of system efficiency. The C[17] Council of pediatric oncology programs across Canada provided data for the pediatric clinical trial participation indicator under the research domain. The National Research Corporation Canada provided access to results from the Ambulatory Oncology Patient Satisfaction Survey, which informed patient satisfaction indicators in the dimension of person-centred perspective and end-of-life care.

How the Report Is Organized

The report is organized along the dimensions of the cancer control continuum: prevention, screening, diagnosis, treatment and person-centred perspective. Also included are chapters covering research, system efficiency and long-term outcomes.

An introduction to each chapter provides background on the cancer control dimension being measured, data sources used and other relevant information. The introduction is followed by the indicators assessed under each dimension. Indicator results are provided graphically, in tabular format or both. The corresponding discussion and interpretation of results is organized into the following categories:

What are we measuring? This section describes the indicator and provides the rationale for reporting on it, along with relevant contextual information such as burden of disease or implications for cancer control activities, where appropriate. Detailed information on data specifications and calculation methodology for each indicator is available at the Partnership's System Performance website (systemperformance.ca).

What are the results? This segment is a narrative description of the results highlighting notable patterns and trends. It also provides any methodological considerations that should be taken into account when interpreting figures and tables.

What do the results mean? This section provides interpretation of the results, drawing comparisons with international jurisdictions where applicable and highlighting potential implications to health outcomes. It also discusses available or planned targets and benchmarks for the indicator.

What are some examples of efforts in this area? This section highlights some examples of activities planned or underway by the Partnership or national or international jurisdictions, as relevant to the performance area addressed by the indicator. Examples include efforts to improve the ability to measure performance, influence practice, raise awareness or other knowledge transfer and exchange activities.

For some indicators, commentary on emerging evidence or national or international studies is provided.

Summary of Indicators

Cancer control domain	Indicator	Data source	Updated	New or expanded
Prevention	Smoking prevalence	Statistics Canada – Canadian Community Health Survey	✓	
	Smoking cessation	Statistics Canada – Canadian Community Health Survey	✓	
	Second-hand smoke exposure	Statistics Canada – Canadian Community Health Survey	✓	
	Alcohol consumption	Statistics Canada – Canadian Community Health Survey	✓	
	Adult overweight and obesity	Statistics Canada – Canadian Community Health Survey	✓	
	Human papillomavirus vaccination	Pan-Canadian National Screening Network	✓	
Screening	Cervical cancer screening	Statistics Canada – Canadian Community Health Survey		✓
	Breast cancer screening	Statistics Canada – Canadian Community Health Survey		✓
	Colorectal cancer screening	Statistics Canada – Canadian Community Health Survey	✓	

Cancer control domain	Indicator	Data source	Updated	New or expanded
Diagnosis	Colorectal cancer diagnosis wait time: from abnormal fecal test to colonoscopy	Pan-Canadian National Screening Network	✓	
	Breast cancer diagnosis wait time: from abnormal breast screen to resolution	Provincial cancer programs	✓	
	Capture of stage	Provincial cancer agencies	✓	
	Stage distribution	Provincial cancer agencies		✓
Treatment	**Surgery**			
	Removal and examination of 12 or more lymph nodes in colon resections	Provincial cancer agencies	✓	
	Resection rate for Stage II or III rectal cancer patients	Provincial cancer agencies		✓
	Resection rate for Stage III colon cancer patients	Provincial cancer agencies		✓
	Resection rate for Stage II or IIIA non–small cell lung cancer patients	Provincial cancer agencies		✓
	Radiation therapy			
	Radiation therapy wait time: from ready-to-treat to treatment	Provincial cancer agencies	✓	
	Radiation therapy utilization and capacity	Provincial cancer agencies	✓	
	Pre-operative radiation therapy for Stage II or III rectal cancer patients	Provincial cancer agencies	✓	
	Post-operative radiation therapy for Stage I or II breast cancer patients	Provincial cancer agencies	✓	
	Systemic therapy			
	Post-operative chemotherapy for Stage III colon cancer patients	Provincial cancer agencies	✓	
	Post-operative chemotherapy for Stage II or IIIA non–small cell lung cancer patients	Provincial cancer agencies	✓	

Cancer control domain	Indicator	Data source	Updated	New or expanded
Person-centred perspective	Screening for distress	Provincial cancer agencies	✓	
	Patient satisfaction	National Research Corporation Canada		✓
	Place of death	Statistics Canada – Vital Statistics Death Database	✓	
Research	Adult clinical trial participation	Provincial cancer agencies	✓	
	Pediatric clinical trial participation	C[17] Council of pediatric oncology programs	✓	
	Cancer research investment	Canadian Cancer Research Alliance	✓	
System efficiency	Breast cancer screening outside recommended guidelines	Statistics Canada – Canadian Community Health Survey		✓
	Mastectomies performed as day surgery	Canadian Institute for Health Information		✓
	Intensive care unit use in the last two weeks of life	Canadian Institute for Health Information		✓
Long-term outcomes	**Incidence, mortality and relative survival**			
	Breast cancer	Statistics Canada – Canadian Cancer Registry and Vital Statistics Database	✓	
	Lung cancer	Statistics Canada – Canadian Cancer Registry and Vital Statistics Database	✓	
	Colorectal cancer	Statistics Canada – Canadian Cancer Registry and Vital Statistics Database	✓	
	Prostate cancer	Statistics Canada – Canadian Cancer Registry and Vital Statistics Database	✓	
	Pancreatic cancer	Statistics Canada – Canadian Cancer Registry and Vital Statistics Database	✓	

1. Prevention

1. Prevention

Prevention is an effective long-term strategy to reduce the burden of cancer and is a key element in cancer control. The World Cancer Research Fund estimates that approximately one-third of cancers could be prevented by not smoking and that another third could be prevented through a combination of healthy food and nutrition, including limiting alcohol consumption; participating in regular physical activity; and maintaining a healthy body weight.[1]

In addition to the behavioural risk factors described above, research has shown that certain environmental (e.g., second-hand smoke exposure) and occupational (e.g., night shift work) factors can also increase a person's risk of developing cancer. Understanding the role of behavioural, environmental and occupational risk factors and their prevalence in the population can help guide cancer prevention efforts. Many risk factors can be modified by adjusting health behaviours, such as quitting smoking; by changing public, home and work environments (such as with bylaws to limit exposure to second-hand smoke); or through

clinical interventions such as the human papillomavirus (HPV) vaccine to prevent cervical cancer. A number of risk factors cannot be modified, however, such as age and genetic makeup. The indicators included in this chapter focus on some of the most common modifiable risk factors for cancer.

This chapter presents updated results for tobacco use (prevalence, cessation and second-hand exposure), alcohol consumption and adult overweight and obesity indicators, all based on the 2012 Canadian Community Health Survey (CCHS). As well, this chapter presents results for HPV vaccination.

Indicator	Summary of results
Smoking prevalence	20.3% of Canadians aged 12 years or older reported smoking daily or occasionally, with the highest rates reported by residents of Canada's three territories. Males were more likely than females to report being daily, occasional or former smokers. More females than males reported never having smoked.
Smoking cessation	Variation was seen in cessation rates across provinces, from 10.2% in Nunavut to 20.3% in Nova Scotia. Rates did not vary significantly by gender (16.5% for males and 17.1% for females) and were highest among individuals 65 and older at 22.1% and lowest among individuals aged 45 to 64 (13.3%).
Second-hand smoke exposure	Second-hand smoke exposure rates in the home were highest in Nunavut (11.3%) and Prince Edward Island (8.7%) and lowest in British Columbia (2.6%). The Northwest Territories saw the biggest drop in second-hand smoke exposure in the home compared with other provinces and territories. Exposure in public spaces was highest in Manitoba (15.8%), Northwest Territories (14.6%) and Alberta (14.2%) and lowest in Newfoundland and Labrador (8.2%) and Yukon (7.7%). Overall, there has been a decreasing trend in second-hand exposure in Canadian homes and vehicles since 2003. Although exposure in public spaces had also been decreasing since 2003, an increasing trend has been noted since 2009. Exposure at home, in vehicles and in public spaces was greatest among individuals aged 16 to 19 and lowest among individuals 65 and older.

Indicator	Summary of results
Alcohol consumption	In 2012, 19.9% of Canadians aged 18 or older had reported abstaining from alcohol consumption in the previous year. The highest percentages were 25.6% in Nunavut and 22.4% in Ontario. Meanwhile, 12.8% of adults in Newfoundland and Labrador reported exceeding the World Cancer Research Fund alcohol intake recommendations (two drinks per day for men and one drink per day for women).
Adult overweight and obesity	In 2012, 52.5% of Canadians aged 18 or older were classified as overweight or obese, based on self-reported weight and height. British Columbia had the lowest percentage at 46.5%.
Human papillomavirus vaccination	As of 2010, all provinces and territories had implemented organized school-based HPV vaccination programs; some had catch-up programs. Significant differences still exist in HPV vaccination rates among the reporting provinces and territories, with as many as 40% of eligible females not fully vaccinated in some jurisdictions, compared with fewer than 25% in others.

Smoking Prevalence

What are we measuring?

This indicator examines the percentage of the population aged 12 and older reporting (in 2012) having smoked daily or occasionally in the previous year.

- Smoking remains the most preventable cause of disease and premature death in Canada, with cigarette smoking continuing to be the primary risk factor.[2]

- Smoking causes an estimated 30% of all cancer deaths in Canada and approximately 85% of lung cancer deaths. Lung cancer is the leading cause of cancer death among Canadian men and women.[3]

- Reporting on tobacco use patterns at a population level, a practice undertaken by many countries around the world in accordance with the World Health Organization's Framework Convention for Tobacco Control,[4] allows for monitoring of tobacco's use and assessing progress in preventive efforts, and informs opportunities for pan-Canadian smoking cessation strategies.

What are the results?

- In 2012, 20.3% of Canadians aged 12 years or older reported smoking daily or occasionally. The provincial rates ranged from 14.5% in British Columbia to 54.3% in Nunavut (Figure 1.1). The highest rates were in Canada's three territories, similar to what was seen in 2011.

- Males were more likely than females to report being daily (18.0% versus 13.0%), occasional (5.1% versus 4.5%) or former (40.4% versus 33.9%) smokers (Figure 1.2). Females were also more likely to report having never smoked (48.6%, compared with 36.5% among males).

Data and measurement considerations

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 1.1

Percentage of population (aged ≥ 12) reporting daily or occasional smoking, by province/territory – 2012 reporting year

Percent (%)

Daily ☐ Occasional

	BC	ON	SK	MB	AB	PE	NB	NS	QC	NL	YT	NT	NU
Occasional	3.8	4.7	4.8	4.7	4.9	3.8	5.1	5.4	5.3	5.1	6.6	7.2	5.5
Daily	10.7	14.3	15.2	15.4	16.7	18.1	18.6	18.3	18.5	21.0	22.8	28.6	48.8
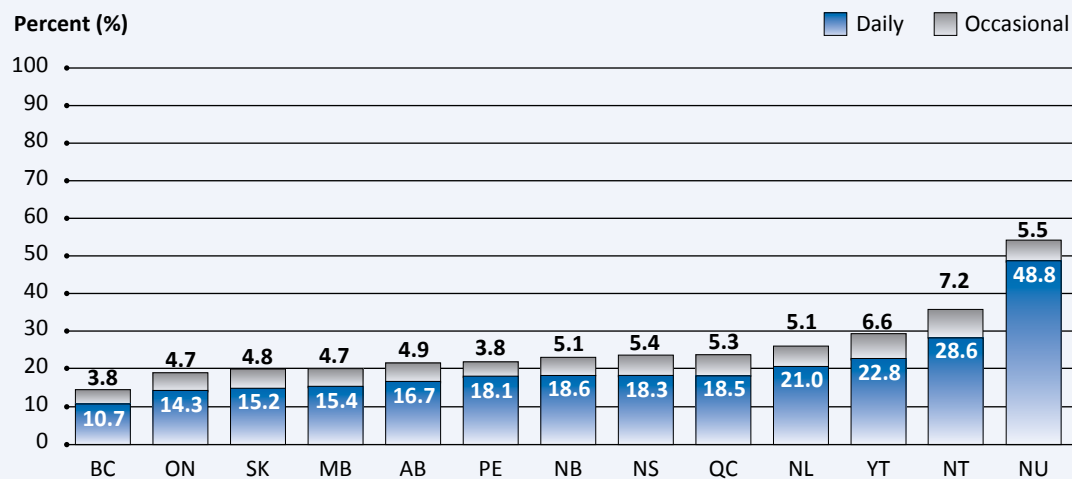
Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.2

Percentage of population (aged ≥ 12), by smoking behaviour, by sex, Canada – 2012 reporting year

Percent (%)

Male ☐ Female

Smoking Behaviour	Male	Female
Daily	18.0	13.0
Occasional	5.1	4.5
Former	40.4	33.9
Never	36.5	48.6
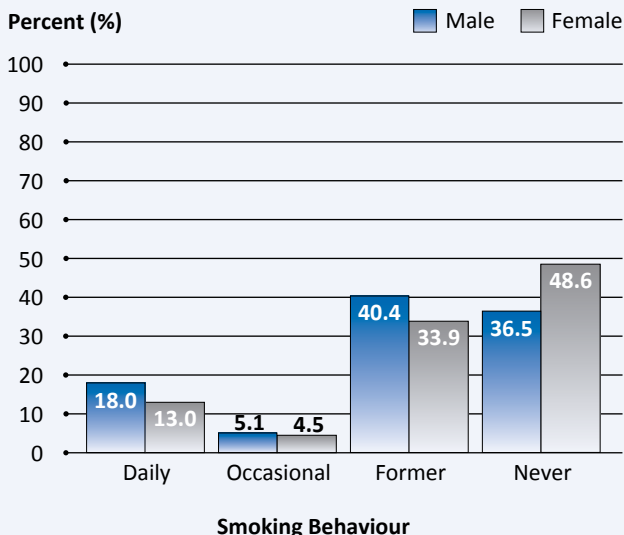
Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- One in five Canadians aged 12 and older reported daily or occasional smoking in 2012. More co-ordinated prevention and smoking cessation efforts are required across the country.

- When compared with international jurisdictions, the Canadian smoking rate of 20.3% was similar to what has been reported in the United States, the United Kingdom and Australia. With somewhat different adult age cut-offs, reported smoking rates in these three countries were 21%, 20% and 19%, respectively.[5-7]

- Although overall smoking rates in Canadian provinces and territories decreased slightly from 2011 to 2012, the 2012 daily smoking national average (15.5%) for Canadians aged 12 and older remains above the goal set by Health Canada's Federal Tobacco Control Strategy (FTCS) of reducing overall smoking prevalence from 19% in 2006 to 12% by 2011.[2]

What are some examples of efforts in this area?

- Reporting smoking prevalence data annually has helped evaluate the impact of smoking prevention and cessation programs, including those supported by the Canadian Partnership Against Cancer (the Partnership). Annual data also inform future programs. The Coalitions Linking Action and Science for Prevention (CLASP) initiative is aimed at bringing together multi-sector organizations from across provinces and territories to form coalitions and integrate cancer prevention strategies.

- The Building on Existing Tools to Improve Chronic Disease Prevention and Screening in Family Practice (BETTER) Project, a CLASP initiative funded through 2014, addresses tobacco control at the individual and primary care levels. The project aims to review and identify existing evidence-based tools for chronic disease prevention and screening and to develop and evaluate a multi-faceted intervention that adapts these strategies to the family practice setting.

- The Partnership has established the Prevention Policies Directory (cancerview.ca/preventionpolicies), a freely accessible online tool that contains up-to-date information on Canadian policies related to cancer and chronic disease prevention, including those relevant to tobacco control at a federal, provincial and municipal level. Direct access to policy documents and legal instruments related to modifiable risk factors for cancer and chronic diseases are available through the online tool.

- Health Canada's FTCS, aimed at reducing tobacco-related disease and death through smoking prevention and cessation, as well as at protection and product regulation at a population level, shifted its focus in early 2012 from reducing smoking in the general population to reducing smoking in groups with high smoking rates, such as First Nations, Inuit and Métis populations.[8]

- An inventory of clinical smoking cessation programs across Canada was developed by the Partnership to understand what programs currently exist in each province and territory.[9] The *Leading Practices in Clinical Smoking Cessation Program Scan* details programs by province and territory, the organization responsible for program administration and the extent to which the program aligns with the Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-Informed Tobacco Treatment (CAN-ADAPTT) Clinical Practice Guideline. The scan can support discussions and decisions about how to improve clinical smoking cessation programs and provides guidance on where to look in the country for strong models to learn from.

Emerging evidence and studies

- Given the flattening of the curve in the reduction of smoking prevalence rates and the continued efforts of the tobacco industry to promote the uptake of tobacco use, bold new approaches may be needed to reduce the burden of disease and death associated with tobacco use. Some health visionaries have proposed the idea of the "tobacco endgame," with the goal of reducing the toll of tobacco. To do this, mechanisms such as removing the profit incentive from selling tobacco products have been proposed. There has been remarkable progress in tobacco control over the past decade, such as smoke-free laws in restaurants and bars in almost 30 countries, graphic warnings on cigarette packages in several countries and plain packaging, which was initiated in Australia.[10] Finally, the confluence of health concerns from both a tobacco control and cancer control perspective may provide an opportunity for the Canadian cancer control and tobacco control communities to find new ways to address this ongoing threat to the health of all Canadians.

Smoking Cessation

What are we measuring?

This indicator measures the percentage of recent daily or occasional smokers aged 20 or older who reported having quit smoking in the past two years.

- International models have shown that by getting tobacco users to quit, cancer mortality can be significantly reduced in the medium term.[1]

- Research has shown that if cessation occurs before middle age, the risk of developing lung cancer attributed to smoking tobacco is cut by over 90%.[11] Smoking cessation is beneficial regardless of age. The cumulative risk of death from lung cancer up to age 75 for men who smoke is 16%; by quitting at age 50, the cumulative risk is reduced to 6%.[11]

- Reporting on smoking cessation rates across the country allows for monitoring of progress in controlling tobacco use. In addition, comparison of smoking prevalence and cessation rates allows for better assessment of the impact of prevention efforts and for the identification of opportunities for more focused prevention strategies.

What are the results?

- The percentage of recent smokers in Canada who reported quitting in the previous two years (measured in 2012) ranged from 10.2% in Nunavut to 20.3% in Nova Scotia (Figure 1.3).

- Smoking cessation did not vary significantly by gender, with 16.5% of men reporting quitting smoking in the past two years, compared with 17.1% of women (Figure 1.4).

- Smoking cessation rates were highest among individuals 65 and older at 22.1%, followed by those 20 to 34 years of age at 19.4%. This was a shift from 2011, when those aged 20 to 34 had the highest smoking cessation rates, followed by people 65 and older. Individuals aged 45 to 64 were the age group with the lowest smoking cessation rates in both 2012 and 2011 with 13.3% and 15.1%, respectively.

Data and measurement considerations

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 1.3

Percentage of recent smokers (aged ≥ 20) who reported quitting smoking in the last two years, by province/territory – 2012 reporting year

Percent (%)

Province/Territory	Percent (%)
NS	20.3
PE	19.9 E
MB	19.6
NL	18.6 E
QC	17.7
BC	17.6
AB	17.3
SK	17.3
NB	15.1
ON	15.1
YT	14.9 E
NT	13.6 E
NU	10.2 E
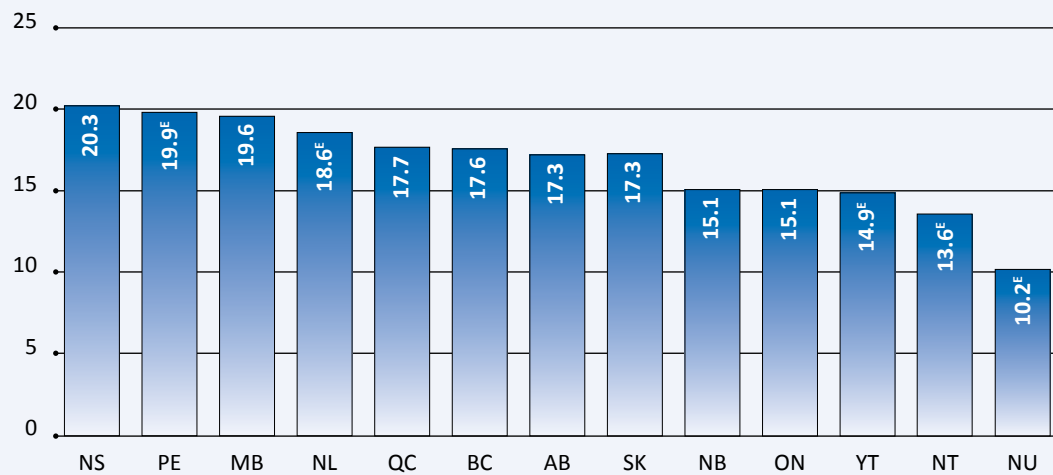
E Interpret with caution owing to large variability in the estimate.

Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.4

Percentage of recent smokers (aged ≥ 20) who reported quitting smoking in the last two years, by age group and sex, Canada – 2012 reporting year

Percent (%)   Age group   Sex

Category	Percent (%)
20 to 34	19.4
35 to 44	16.7
45 to 64	13.3
65+	22.1
Male	16.5
Female	17.1
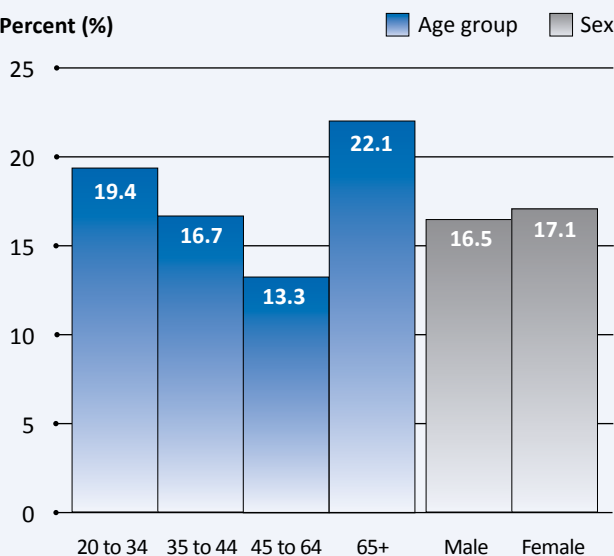
Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- Decreasing smoking cessation rates in Canada over time may imply that individuals still smoking may be having more difficulty quitting (e.g., heavy smokers), may be more resistant to efforts aimed at getting them to quit or both. This fact presents an additional challenge for smoking cessation programs and interventions if the overall smoking rate is to be brought down further over the next few years.

- Given that quitting smoking in middle age significantly reduces the risk of death from lung cancer, more attention should be directed to cessation strategies geared toward individuals aged 45 to 64, which is the age group with the lowest smoking cessation rate.

What are some examples of efforts in this area?

- As part of the Canadian Partnership Against Cancer's efforts to support the alignment of smoking cessation with the development of a national network plan for lung cancer screening, it completed a national inventory of clinical smoking cessation resources. As part of this inventory, program descriptions were evaluated in relation to the Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-Informed Tobacco Treatment (CAN-ADAPTT) guidelines to assess the extent to which evidence-based programs were available in different jurisdictions. Jurisdictions with low levels of enrolment in cessation programs and/or decreased availability of cessation programs can seek guidance from CAN-ADAPTT's evidence-based tools, resources and guidelines for health professionals.[12]

Emerging evidence and studies

- Results from the *Leading Practices in Clinical Smoking Cessation Program Scan* indicate that the availability of evidence-based clinical smoking cessation practices varies greatly across jurisdictions in Canada, especially in relation to the coverage of cessation aids (e.g., nicotine replacement therapy and medications) by provincial and territorial governments. Several evidence-based clinical smoking cessation models exist in Canada, such as the Ottawa Model for Smoking Cessation,[13] which is now expanding beyond hospital settings into primary care and communities across Canada; the STOP and STOP on the Road programs from the Centre for Addiction and Mental Health;[14] Tobacco Free Futures from Alberta;[15] Primary Care Networks Acting Collaboratively on Tobacco, also from Alberta;[16] the Prescription for Health program in British Columbia[17] and QuitPath from Yukon.[18]

- Relatively recently in Canada and many other countries, the use of electronic nicotine delivery systems, commonly known as electronic cigarettes (e-cigarettes or vapes) has emerged. These small cigarette-shaped canisters contain batteries that heat fluid-filled cartridges, which give off a vapour containing nicotine. The vapour is visible and the tip of the e-cigarette glows, simulating the sensation of smoking. On one hand, these electronic smoking products are being marketed as a safer alternative to conventional tobacco products: they have been tested in clinical trials and found to be as effective as other nicotine replacement therapies.[19] On the other hand, reports from the United States[20] and concerns in Canada suggest that a growing number of youth are taking up e-cigarettes and thus becoming addicted to nicotine. Beyond the concerns about possible detrimental effects of nicotine use on adolescent brain function, nicotine addiction via e-cigarettes may be a gateway to tobacco or other drug use.

Second-Hand Smoke Exposure

What are we measuring?

This indicator examines the percentage of non-smokers aged 12 and older who reported (in 2012) being exposed to smoke at home, in a vehicle or in a public place every day or almost every day over the previous year.

- The Canadian Cancer Society estimates that every year, 1,000 Canadians who do not smoke die from second-hand smoke.[21]

- After smoking, second-hand smoke is considered to be the second-leading cause of lung cancer.[22] According to the 2006 United States Surgeon General's report, more than 50 epidemiologic studies have addressed the association between second-hand smoke exposure and the risk of lung cancer among lifetime non-smokers. Pooled evidence from these studies suggest a 20% to 30% increase in the risk of lung cancer from second-hand smoke exposure associated with living with a smoker.[23]

- Most provincial and territorial and many municipal jurisdictions have legislation in place banning smoking in public places or in vehicles with children on board. Monitoring reductions in smoke exposure over time within provinces allows for evaluation of the impact of these measures.

What are the results?

- The percentage of the non-smoking population in Canada aged 12 and older reporting second-hand smoke exposure at home was highest in Nunavut (11.3%) and Prince Edward Island (8.7%) and lowest in British Columbia (2.6%) (Figure 1.5). The Northwest Territories saw the biggest drop in second-hand smoke exposure at home, from 8.2% in 2011 to 5.3% in 2012.

- Exposure in public spaces was highest in Manitoba (15.8%), Northwest Territories (14.6%) and Alberta (14.2%) and lowest in Newfoundland and Labrador (8.2%) and Yukon (7.7%) (Figure 1.5). While Manitoba also reported the highest exposure in public spaces in 2011, Alberta had the greatest increase, from 12.1% in 2011[24] to 14.2% in 2012.

- When comparing results with those of previous years, overall there is a decreasing trend in second-hand smoke exposure in Canadian homes and vehicles since 2003. Exposure at home and in vehicles decreased from approximately 11% in 2003 to between 5% and 7% in 2012 (Figure 1.6). However, while exposure in public spaces also decreased from 20% in 2003 to 10% in 2009, an increasing trend is noted from 2009's level to 13% in 2012. Future reporting will determine whether this is a persistent trend.

- When looking at second-hand smoke exposure by age, exposure at home, in vehicles or in public spaces is greatest among individuals aged 16 to 19 years (12.5%, 14.6% and 23.8%, respectively) and lowest among individuals 65 and older (3.4%, 2.3% and 5.3%, respectively) (Figure 1.7).

Data and measurement considerations

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 1.5

Percentage of non-smokers (aged ≥ 12) reporting second-hand smoke exposure by setting, by province/territory – 2012 reporting year
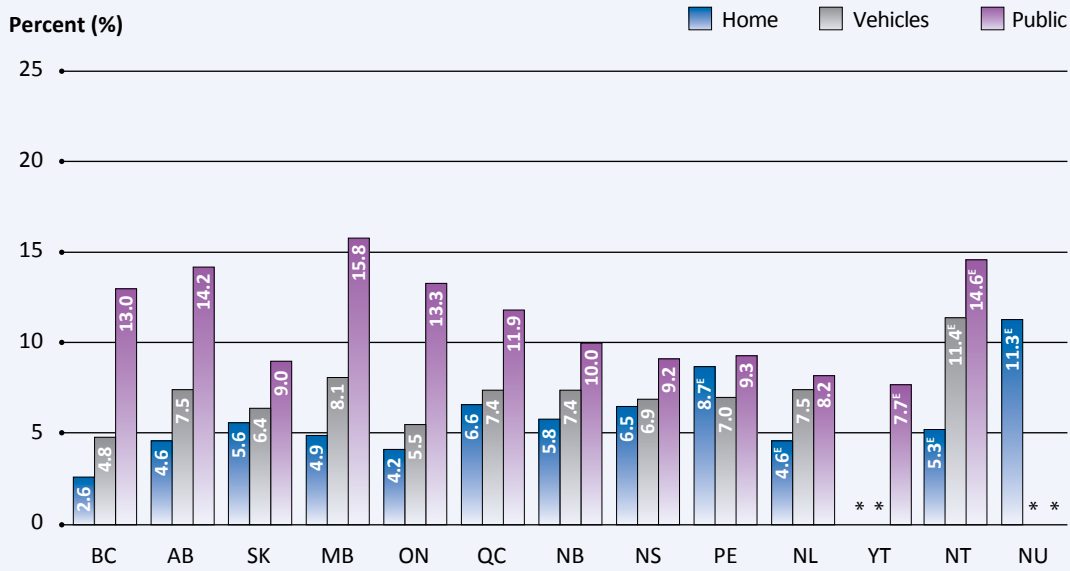
Percent (%)

Legend: Home | Vehicles | Public

Province/Territory	Home	Vehicles	Public
BC	2.6	4.8	13.0
AB	4.6	7.5	14.2
SK	5.6	6.4	9.0
MB	4.9	8.1	15.8
ON	4.2	5.5	13.3
QC	6.6	7.4	11.9
NB	5.8	7.4	10.0
NS	6.5	6.9	9.2
PE	8.7 E	7.0	9.3
NL	4.6 E	7.5	8.2
YT	*	*	7.7 E
NT	5.3 E	11.4 E	14.6 E
NU	11.3 E	*	*

* Suppressed due to statistical unreliability caused by small numbers.

E Interpret with caution owing to large variability in the estimate.

Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.6

Percentage of non-smokers (aged ≥ 12) reporting second-hand smoke exposure by setting, Canada – from 2003 to 2012 reporting years

Percent (%)

Legend: Home | Public | Vehicles
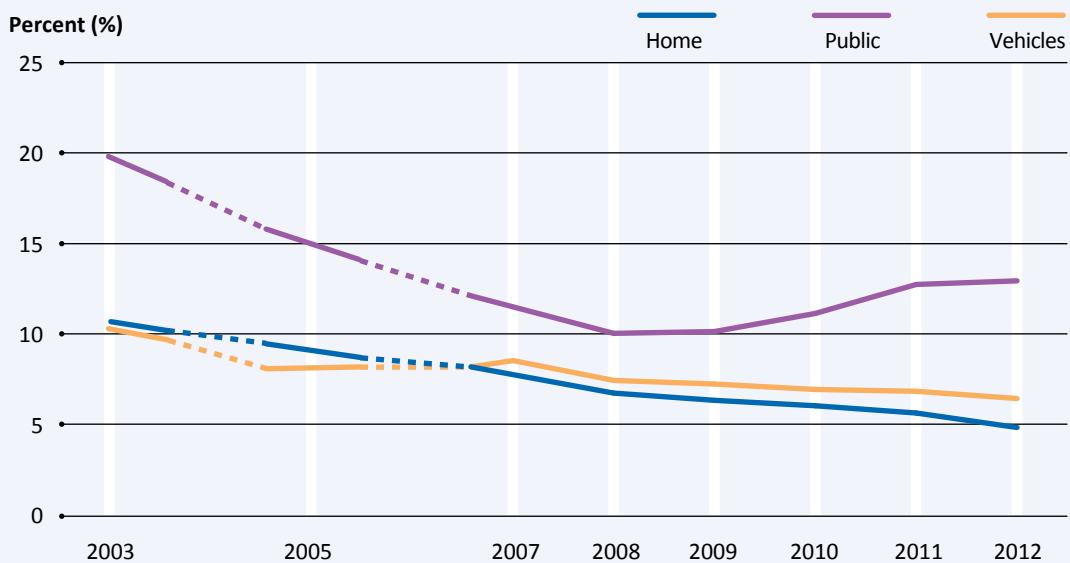
"▪ ▪ ▪" data not available.

Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.7

Percentage of non-smokers (aged ≥ 12) reporting second-hand smoke exposure by setting, by age group, Canada – 2012 reporting year
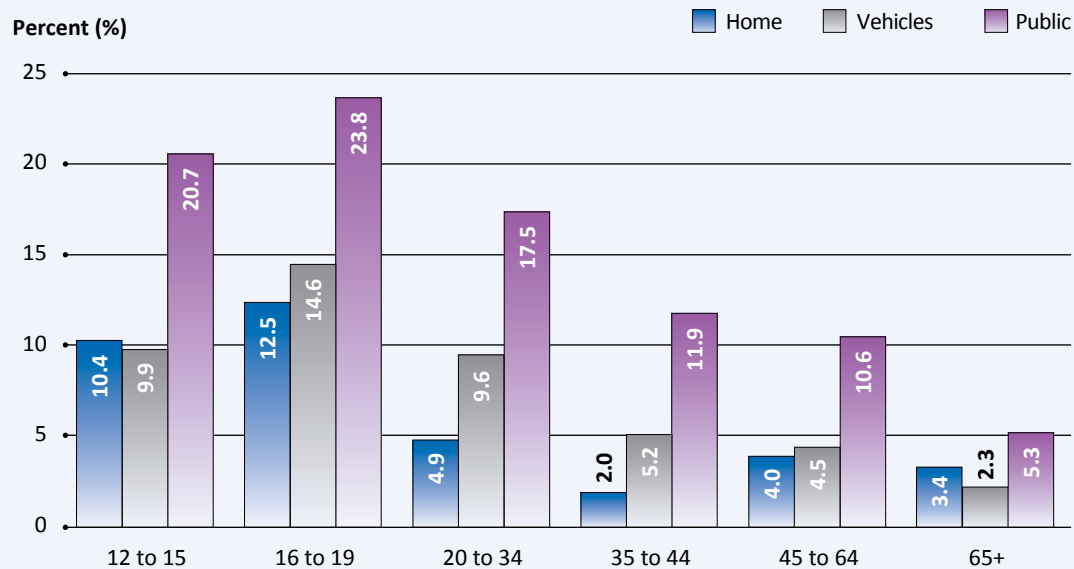
Percent (%)

Legend: Home | Vehicles | Public

Age group	Home	Vehicles	Public
12 to 15	10.4	9.9	20.7
16 to 19	12.5	14.6	23.8
20 to 34	4.9	9.6	17.5
35 to 44	2.0	5.2	11.9
45 to 64	4.0	4.5	10.6
65+	3.4	2.3	5.3

Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- Although the introduction in the mid-2000s of legislation restricting smoking in public places has led to a significant reduction in reported exposure rates, people's likelihood of reporting tobacco smoke exposure in public places appears to have been increasing since 2009, which may reflect increased awareness, actual increased exposure or both. As more restrictive legislation continues to be introduced across the country, it will be important to track whether the exposure trend turns downward.

- It is also of concern that individuals aged 16 to 19 continue to report the highest exposure to second-hand at home, in vehicles and in public spaces.

- When comparing the 2012 data with the goal set by the Federal Tobacco Control Strategy of reducing the prevalence of daily exposure to second-hand smoke among Canadians from 28% in 2006 to 20% by 2011,[2] all age groups

achieved this target regardless of location of exposure, except individuals aged 12 to 15 and 16 to 19 exposed to second-hand smoke in public spaces. This points to the need for more preventive targeted efforts to reduce second-hand smoke exposure in public places.

What are some examples of efforts in this area?

- Federal, provincial and municipal jurisdictions in Canada have been passing legislation aimed at reducing second-hand smoke exposure in a variety of settings, from workplaces, bars and restaurants and vehicles carrying children, to multi-unit dwellings and outdoor areas.[25,26]

- In particular, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick and Newfoundland and Labrador, as of 2007, had enacted full provincial bans on smoking in public places.[26-28] Laws prohibiting smoking in cars carrying children have been adopted in British Columbia, Alberta, Saskatchewan,

Manitoba, Ontario, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador and Yukon. In addition, all Canadian provinces and territories prohibit smoking in public transportation vehicles.

- The Canadian Partnership Against Cancer, through its System Performance Initiative and in collaboration with provincial and national partners, published in September 2013 a spotlight report, *Population Health in Canada's Largest Cities*,[29] looking at second-hand smoke exposure rates (among other modifiable risk factor indicators) by census metropolitan area. The relative results in several cities appeared to be aligned with the relative strength of municipal bylaws on smoking in public places.

- Smoke-free multi-unit dwelling policies are an emerging issue in tobacco control policy in Canada, with several jurisdictions enacting policies to prohibit smoking within such premises.

Emerging evidence and studies

- The next frontier in limiting second-hand smoke exposure in public places is extending smoking bans to outdoor public venues (e.g., parks, playgrounds, beaches, patios).[30] In 2014, Manitoba will become the first province in Canada to enact legislation prohibiting smoking on public beaches and playgrounds.[31]

Alcohol Consumption

What are we measuring?

***This indicator measures the percentage of adults aged 18 or older who in 2012 reported consuming no alcohol in the past 12 months and the percentage who reported exceeding an average of two drinks per day for men and one drink per day for women.*[i]**

- Convincing evidence exists that drinking alcohol increases the risk of cancer of the esophagus, mouth, throat (pharynx and larynx), breast (pre- and post-menopausal), colon and rectum.[1]

- Convincing evidence also exists that excessive alcohol consumption is a cause of liver cirrhosis, which predisposes some individuals to liver cancer.[1]

What are the results?

- The percentage of adults who reported consuming no alcohol in 2012 ranged from a low of 15.6% in Quebec to highs of 22.4% in Ontario and 25.6% in Nunavut, with a national average of 19.9% (Figure 1.8).

- In 2012, the percentage of adults exceeding the World Cancer Research Fund (WCRF) low-risk drinking guidelines ranged from 7.8% in Nunavut to 12.8% in Newfoundland and Labrador (based on the five provinces and one territory reporting data) (Figure 1.9). The range varied similarly in 2011, from 9% to 11%.[32]

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i   The World Cancer Research Fund's recommended low-risk drinking guidelines are no more than two drinks per day for men and no more than one drink per day for women.

Data and measurement considerations

- The daily average alcohol consumption was calculated based on the total number of drinks the respondent reported consuming in the week prior to the Canadian Community Health Survey interview, divided by seven days.

- This report uses the WCRF drinking guidelines for reducing the risk of cancer. The Canadian Centre on Substance Abuse has released low-risk drinking guidelines with higher cut-offs: two drinks or less per day for women (up to 10 drinks per week) and three drinks or less per day for men (up to 15 drinks per week); however, this guideline is not specifically focused on cancer risk.[33]

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 1.8

Percentage of adults (aged ≥ 18) reporting drinking no alcohol in the last 12 months, by province/territory – 2012 reporting year

Percent (%)

Province/Territory	Percent (%)
NU	25.6
ON	22.4
NS	21.7
NT	20.9
AB	20.5
BC	20.3
YT	19.5
PE	19.4
NB	18.7
NL	18.6
MB	18.5
SK	17.6
QC	15.6
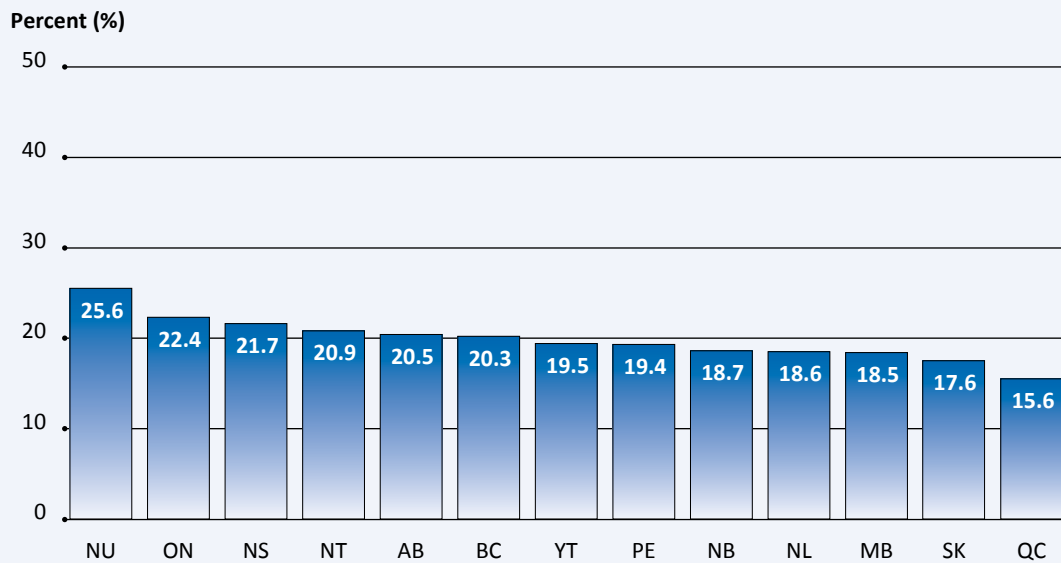
Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.9

Percentage of adults (aged ≥ 18) reporting exceeding the low-risk drinking guideline[†] in the last 12 months, by province/territory – 2012 reporting year

Percent (%)
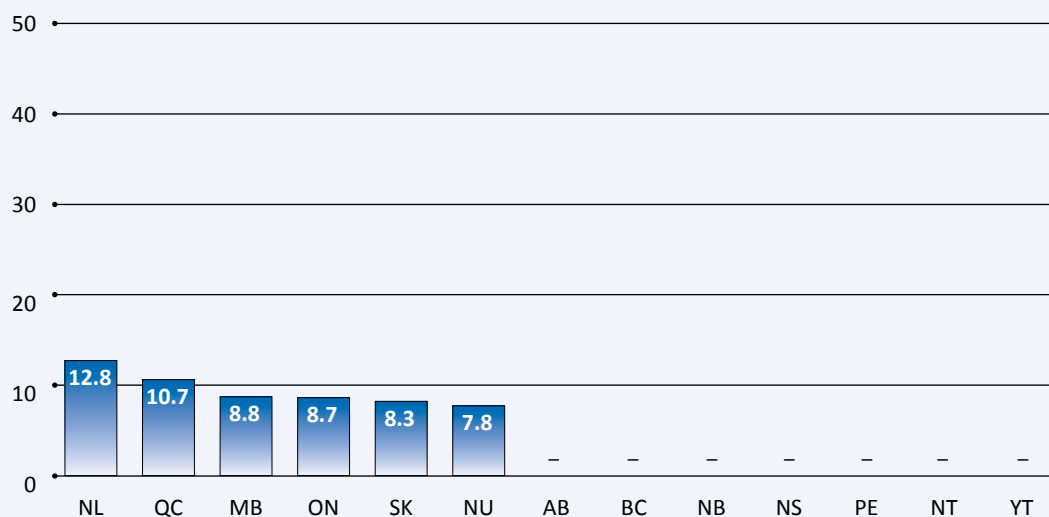
† World Cancer Research Fund recommended low-risk drinking guidelines are no more than two drinks per day for men and no more than one drink per day for women.

"–" Data not available for AB, BC, NB, NS, PE, NT and YT.

Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- Variations in alcohol abstinence rates often reflect the cultural and religious profiles of provincial populations. Since no level of alcohol consumption is considered safe in terms of cancer risk, abstinence would be the goal from a purely cancer prevention perspective. Because repeated studies have suggested a protective effect of certain alcoholic drinks, particularly red wine, for cardiovascular health, the consumption patterns relative to low-risk guidelines are also presented.

- The magnitude of the interprovincial variation in exceeding low-risk drinking guidelines (Newfoundland and Labrador's rate is over 1.5 times that of Saskatchewan's) suggests a wide difference in cancer risk due to alcohol consumption among provinces. Assessing the extent to which these differences correspond to differences in cancer incidence rates due to alcohol consumption could indicate the strength of the attributed relationship.

What are some examples of efforts in this area?

- The Building on Existing Tools to Improve Chronic Disease Prevention and Screening in Family Practice (BETTER) project, part of the Canadian Partnership Against Cancer's Coalitions Linking Action and Science for Prevention (CLASP) programs, creates resources for primary care practices using evidence-based tools for alcohol and other risk factors to help prevent cancer and other chronic diseases. To date, four health centres in Alberta and four in Ontario have piloted the BETTER project with approximately 800 participants. The project successfully demonstrated improved health behaviours.

In addition to patient benefit, this project aided primary care practitioners in optimizing the use of patient health records in their approach to supporting and improving cancer and chronic disease prevention and screening outcomes.[25] This project is being expanded to other jurisdictions, including Nova Scotia and rural and remote areas in the Northwest Territories and Newfoundland and Labrador.

- The Prevention Policies Directory maintained by the Partnership provides information on public policies related to alcohol consumption (as well as obesity) to support policy change. Many jurisdictions have, within the past few years, introduced policies, position papers and guides to public health policy aimed at reducing substance abuse and harms and at building safer communities.[34] Examples include the Ontario Ministry of Health Promotion's guidance document *Prevention of Substance Misuse*,[35] Alberta Health Services' *Developing Substance Use and Gambling Policies for Alberta Schools*[36] and the British Columbia Ministry of Healthy Living and Sport's Model Core Program paper *Prevention Harms Associated with Substance Abuse*.[37]

- Public Health Ontario's recently published report *Making the Case: Tools for Supporting Local Alcohol Policy in Ontario* discusses local policies and actions that can be enacted by the municipal government and public health units.[38] These strategies, when aligned with national and provincial legislation, can help minimize alcohol-related harms and consumption. This new report may help support other jurisdictions in the development of alcohol policies and strategies by suggesting opportunities for local governments in controlling alcohol behaviours.

Adult Overweight and Obesity

What are we measuring?

This indicator measures the percentage of the population aged 18 years and older reporting height and weight that result in a body mass index of 25 kg/m² or greater (the overweight threshold) and 30 kg/m² or greater (the obesity threshold).

- Worldwide, approximately 1.4 billion adults 20 or older are overweight, of which more than 200 million men and about 300 million women are obese.[39]

- In Canada, obesity rates have risen over the past two decades.[40,41] From 2000 through 2011, obesity rates increased by approximately 18%; however, the rate of increase slowed between 2008 and 2011.[42]

- Overweight and obesity, as measured by body mass index (BMI), are major risk factors for several chronic diseases, such as cardiovascular disease, diabetes, musculoskeletal disorders and some forms of cancer, including colon, rectal, breast (in post-menopausal women), endometrial, esophageal, pancreatic and kidney. Risk increases with higher BMIs.[1] One-third of cancers can be prevented through a combination of healthy food and nutrition, regular physical activity and avoidance of obesity.[1]

- The Pan-Canadian Healthy Living Strategy has set a target of increasing by 20% the proportion of Canadians with "normal" body weight (BMI between 18.5 kg/m² and 24.9 kg/m²) by 2015, using 2003 data as a baseline. This change translates to 56.0% of people classified as having normal body weight, up from 46.7% in 2003.[43]

What are the results?

- In 2012, 52.5% of Canadians aged 18 years and older were classified as overweight (34.1%) or obese (18.4%), compared with 33.8% and 18.3%, respectively, in 2011.[32] These findings are based on self-reports of height and weight to the Canadian Community Health Survey (CCHS) (Figure 1.10).

- There is considerable variation across provinces and territories in the percentage of Canadians classified as overweight or obese, with percentages highest in Newfoundland and Labrador (36.9% overweight, 26.3% obese) and Northwest Territories (35.4% overweight, 26.4% obese) and lowest in British Columbia (32.4% overweight, 14.1% obese) and Quebec (33.6% overweight, 17.2% obese) (Figure 1.10).

- In general, a larger percentage of male respondents than female respondents were categorized as overweight from 2003 through 2012. While men were also more likely to report obesity than women, a significant decrease in obesity was noted from 2010 to 2012 in men, while female obesity rates increased during this time period (Figure 1.11).

Data and measurement considerations

- BMI was calculated using self-reported personal height and weight. Canadian studies that use actual measurements find the prevalence of obesity to be higher than what is measured in self-reported surveys (24.3% in the Canadian Health Measures Survey from 2007 to 2009).[44] Individuals tend to underestimate their weight and overestimate their height, suggesting that the percentage of Canadians classified as overweight or obese may be higher than that reported in the CCHS.[45]

- Respondents with a BMI of 25 to 29.9 kg/m^2 were considered overweight; those with a BMI exceeding 30 kg/m^2 were considered obese.[46,47]

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 1.10

Percentage of adults (aged ≥ 18) classified as overweight or obese, by province/territory – 2012 reporting year
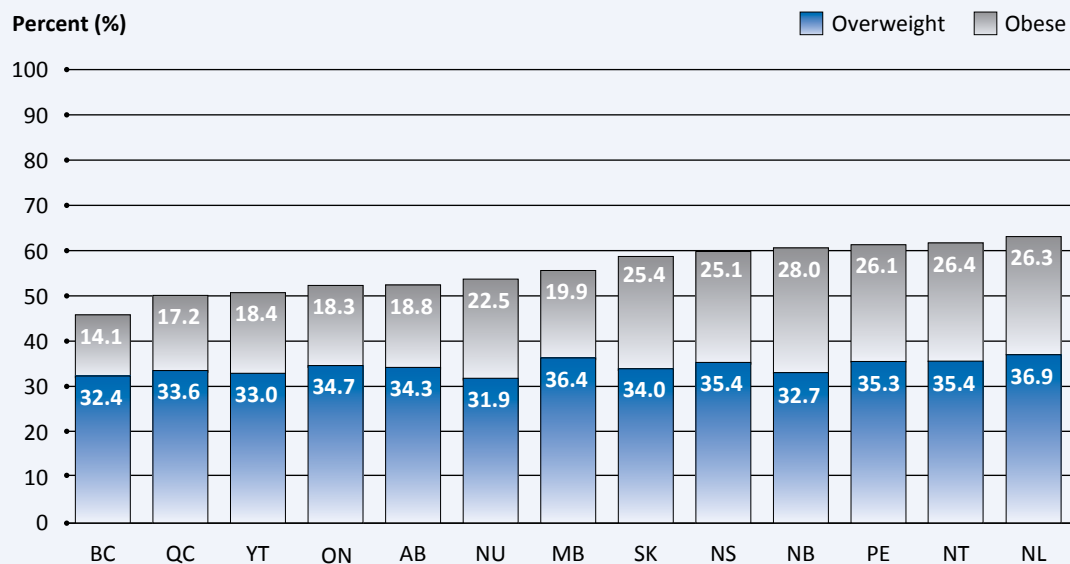
Percent (%)

Legend: ■ Overweight ■ Obese

Province/Territory	Overweight	Obese
BC	32.4	14.1
QC	33.6	17.2
YT	33.0	18.4
ON	34.7	18.3
AB	34.3	18.8
NU	31.9	22.5
MB	36.4	19.9
SK	34.0	25.4
NS	35.4	25.1
NB	32.7	28.0
PE	35.3	26.1
NT	35.4	26.4
NL	36.9	26.3

Overweight and obese classification is based on self-reported weight and height.

Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 1.11

Percentage of adults (aged ≥ 18) classified as overweight or obese, by sex, Canada – from 2003 to 2012 reporting years

Percent (%)

Male overweight   Male obese   Female overweight   Female obese
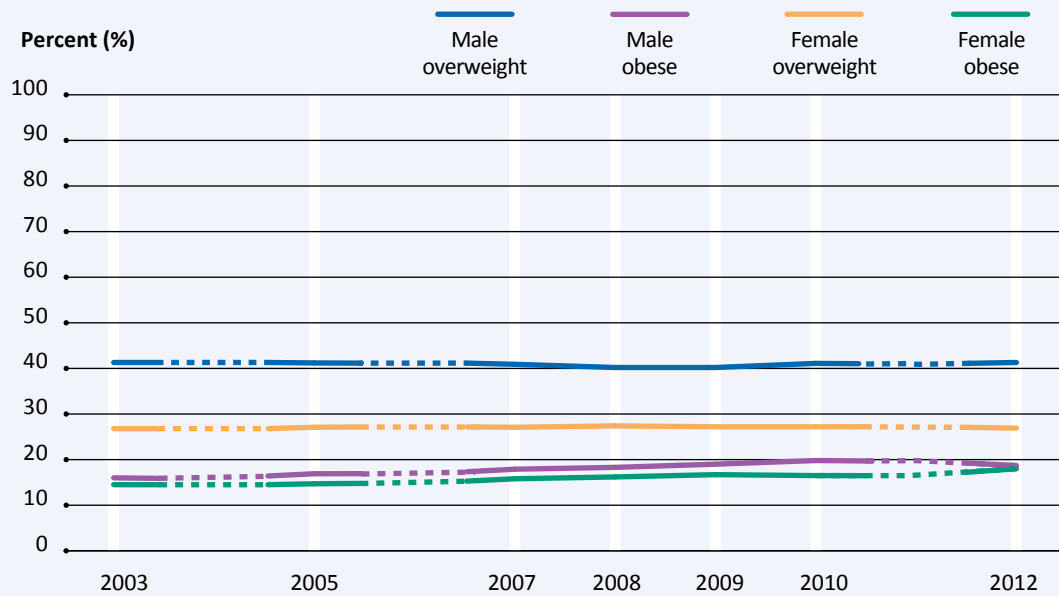
"▪ ▪ ▪" data not available.

Overweight and obese classification is based on self-reported weight and height.

Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- The steady rise in obesity rates in Canada, approaching 20% of the population in 2012, will likely have implications on morbidity in general and cancer specifically.

- Using measured BMI, Canada ranks fourth in prevalence of obesity among Organisation for Economic Co-operation and Development (OECD) countries, behind the United States, Mexico and New Zealand.[48] Using self-reported data for Canada, the country ranks 10th out of 30 OECD countries. The difference in rankings between the two types of measures may point to biases in self-reported versus measured obesity indicators and that the reporting bias is not universal (otherwise country rankings would not change).

What are some examples of efforts in this area?

- The Declaration on Prevention and Promotion by Canada's ministers of health and health promotion/healthy living was struck in 2010 to build on the basic tenets of the Integrated Pan-Canadian Healthy Living Strategy. The strategy addresses risk factors including physical inactivity, unhealthy eating and unhealthy body weight and suggests a framework for action.[49] The declaration builds on this and states that "the promotion of health and the prevention of disease, disability and injury are a priority and necessary to the sustainability of the health system."[50]

- Three Coalitions Linking Action and Science for Prevention (CLASP) initiatives – Collaborative Action on Childhood Obesity (CACO), Healthy

Canada by Design and the Building on Existing Tools to Improve Chronic Disease Prevention and Screening in Family Practice (BETTER) project – have been renewed through to the end of 2014. Each has some component that addresses risk factors for overweight and obesity, including physical activity, nutrition, the built environment, social determinants of health and screening for overweight and obesity in primary care practices.[25]

- The *Canadian Obesity Research Investment (2006–2008) Report* presents patterns and gaps according to the most current available research investment data related to obesity from Canadian research funding agencies. It provides a baseline for planning and monitoring future obesity-related research investments.[51]

Emerging evidence and studies

- In June 2013, the American Medical Association (AMA) officially recognized obesity as a disease as opposed to a "condition" or "disorder" to reduce the incidence of non-communicable diseases such as cardiovascular disease and type 2 diabetes, which are often linked to obesity.[52] This statement by the AMA may urge insurers to cover surgeries, drugs and counselling related to obesity and may lead obesity to receive more attention from physicians. The Obesity Society has recognized obesity as a disease since 2008.[53] The Council on Science and Public Health (of the AMA) does not support this new definition, stating that measuring obesity using BMI is limited and flawed and instead physicians should continue to encourage individuals to make healthy lifestyle choices in prevention of obesity. Others not in support believe that the label stigmatizes people based on weight, which is not always correlated with poor health.

- In Canada, provincial governments do not currently define obesity as a disease; however, the AMA's decision may encourage Canadian medical associations to begin a conversation around this topic.

Human Papillomavirus Vaccination

What are we measuring?
This indicator measures the proportion of people in the targeted cohort who received the first dose of the human papillomavirus (HPV) vaccination. The targeted cohort comprises girls from schools (and in specific grades or age groups) where the provincial HPV vaccination program has been offered.

- HPV infections account for virtually all cervical cancers, with types 16 and 18 responsible for over 70% of cases.[54] HPV has also been associated with a subset of head and neck cancers, oropharyngeal cancer (those involving the tonsils and base of the tongue) and anal-genital cancers.[54-56] While the

age-standardized incidence rates for head and neck cancers have declined in Canada, largely as a result of a decline in the use of tobacco, the incidence of oropharyngeal cancer has been increasing in Canada in recent years.[24,55,57] The International Agency for Research against Cancer has acknowledged HPV, in addition to smoking and alcohol, as a risk factor for head and neck cancer.[58]

- Approximately 80% of sexually active people acquire HPV infection at some point in their life; however, the majority of infections are transient and cleared by the body's own immune system.[59,60] The HPV vaccine helps protect against high-risk HPV types 16 and 18.[54]

- In 2007, the National Advisory Committee on Immunization released recommendations for the HPV vaccine,[61] and later that year the federal government announced funding for provinces and territories to implement HPV immunization programs (the majority of provinces and territories target girls only). A recent randomized controlled trial demonstrated a reduction of oral HPV 16/18 infections in women who received the HPV 16/18 vaccine compared with the control group about four years after vaccination.[62]

- Measuring and reporting on HPV vaccination program uptake allows for identification of performance gaps and informs opportunities for increased efforts in prevention activities.

What are the results?

- Uptake rates[ii] of organized HPV vaccination programs varied by province and territory (Table 1.1).

- Of provinces and territories able to report on this indicator, the percentage of the target population included in vaccination programs that received the first dose ranged from 68.7% in British Columbia to 92.0% in Newfoundland and Labrador (the school year reported varies by province and territory; see Table 1.1). Northwest Territories and Prince Edward Island were unable to provide actual data and offered estimates of participation rates. These estimates are within the range of the data provided by other provinces and territories.

- All provinces and territories have implemented an HPV vaccination program for girls. Recently, Prince Edward Island started to immunize boys, while Alberta will begin in the fall of 2014. Ontario, Nova Scotia, Newfoundland and Labrador and Prince Edward Island were first to implement school-based HPV vaccination programs, with roll-out starting in 2007; other provinces started their programs in 2008. By 2010, all provinces and territories had implemented school-based programs (Table 1.1).

Data and measurement considerations

- It was not possible to collect information consistently from all provinces and territories. As a result, Table 1.1 presents all the information obtained from provincial and territorial vaccination programs.

- Northwest Territories and Prince Edward Island were able to provide only estimates of the number vaccinated; these estimates should be interpreted with caution.

- The HPV vaccine is given in a series of three single doses over a six-month period. This indicator shows the percentage of the targeted population to receive the first of three doses (unless otherwise specified). Recent studies have suggested that HPV vaccination may be effective after only two doses.[63]

- Alberta, Ontario, New Brunswick and Nova Scotia data indicate the percentage of the targeted population to receive all three doses in series; it is expected that their results for the first dose would be higher than currently shown.

- Provincial and territorial programs have different target populations, implementation plans and associated phases. As provinces and territories continue to implement vaccine programs, it is expected that the percentages will increase and interprovincial/territorial variation will decrease.

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ii The denominator for the uptake rate reported here is the number of target-grade (which varies by province) girls in schools where the provincial HPV vaccination program has been offered. It is not the entire female population within the targeted age range for the province.

TABLE 1.1

Implementation and immunization coverage of organized human papillomavirus vaccination programs, by province/territory

Province / territory	Date of first implementation	School grade	School year	Immunization coverage			School grade	School year	Immunization coverage
				1st dose	**2nd dose**	**3rd dose**			
British Columbia	September 2008	Grade 6	2011/12	68.7%			Grade 9 (2008–11)	2011	61.7%
Alberta	September 2008	Grade 5	2010/11			60.2%	Grade 9 (2009–12)	2010/11	60.1%
Saskatchewan	September 2008	Grade 6		73.0%			Grade 7 2008/09		
Manitoba	September 2008	Grade 6	2011/12	72.0%			N/A		
Ontario	September 2007	Grade 8	2009/10			59.0%	*		
Quebec	September 2008	Grade 4 (Pr. 3), Grade 9 (Sec. 3)		84.0% (Grade 4), 91.0% (Grade 9)			< 18 years old		
New Brunswick	September 2008	Grade 7	2011/12			75.8%	Grade 8 (2008/09)		
Nova Scotia	September 2007	Grade 7	2011/12			72.0%	Grade 8 (2010/11), Grade 10 (2009/10)		
Prince Edward Island	September 2007	Grade 6		80.0% (est.)			Grade 9 (2009/10)		
Newfoundland and Labrador	September 2007	Grade 6		92.0%			Grade 9 (2008–10)		84.0%
Northwest Territories	September 2009	Grades 4, 5, 6		71.0% (est.)			Grades 11 & 12 (2009/10), Grades 10 & 11 (2010/11), Grades 9 & 10 (2011/12), Grade 9 (2012–14)		
Yukon	September 2009	Grade 6					Grades 7 & 8		
Nunavut	March 2010	Grade 6 or ≥ 9 years old					N/A		

* Ontario offers extended eligibility to grade 9 girls who received at least one dose in grade 8.

Data source: Pan-Canadian Cervical Screening Initiative, Public Health Agency of Canada's *Canada Communicable Disease Report*

What do the results mean?

- Based on these results, there are still significant differences in HPV vaccination rates between provinces and territories, with as many as 40% of eligible girls not fully vaccinated in some jurisdictions, compared with fewer than 25% in others. These differences could have implications for future cervical cancer incidence rates in the various provinces.

- On examining the 2012 HPV vaccination coverage in the United States among adolescent girls aged 13 to 18, the Centers for Disease Control and Prevention found that 53.8% of girls received one or more dose (compared with 53.0 % in 2011), while 33.4% received three or more doses (compared with 34.8% in 2011). Vaccination rates increased in the United States from 2007 to 2011; 2012 was the first year with no observed increase.[66]

- In the United Kingdom, 76.4% of girls aged 12 to 13 years who were eligible to routinely receive HPV vaccine in the academic year 2009/10 completed the three-dose course and 84.3% received at least one dose.[67] Participation in Australia's national school-based HPV vaccination program, implemented in 2007, was also high. Among 12- to 13-year-old girls who could receive the vaccine as part of their school-based program from 2007

through 2012, 81% received the first dose and 69% received all three doses.[68] This national school-based HPV vaccination program now includes boys.

What are some examples of efforts in this area?

- Target populations for the vaccination programs vary by province and territory, with the youngest being in grade 4 (approximately eight to 10 years old) and the oldest being in grade 8 or 9 (approximately 13 to 15 years old). Catch-up cohorts were established in 10 of 13 provinces and territories to offer the vaccine to older age groups. Catch-up cohorts are typically one to four grades ahead of the target population. Provincial and territorial programs continue to be rolled out, allowing for more girls in the target age range to be offered vaccination.

- The Surveillance and Epidemiology Division of the Public Health Agency of Canada, in direct collaboration with the Pan-Canadian Cervical Screening Initiative, is in the process of drafting quality indicators for HPV vaccination and assessing readiness for the measurement of these indicators across provinces. These activities are oriented to future reporting of a core set of indicators for cervical cancer control.

Emerging evidence and studies

- The majority of provincial and territorial HPV vaccination programs continue to target girls only. Prince Edward Island was the first province to extend its publically funded HPV vaccination program to school-aged boys, followed recently by Alberta after the Society of Obstetricians and Gynaecologists of Canada urged jurisdictions to extend their HPV vaccination programs to school-age boys up to age 18 years.[69] As well, in 2012, Canada's National Advisory Committee on Immunization, a committee that reviews scientific literature on vaccines and provides recommendations, updated the recommendations to include vaccinating males between nine and 26 years of age.[70]

- Extending the HPV vaccine program to boys (to offer them the same protection as girls) will protect them against anal-genital and oropharyngeal cancers caused by HPV and will reduce the risk of them infecting girls through sexual contact. The National Cancer Institute estimates that 85% of anal cancers and more than half of penile cancers are linked to HPV.[71] However, the cost-effectiveness of vaccinating boys remains an evolving debate.

- Quebec's Ministry of Health announced in August 2013 the discontinuation of the third dose of the HPV vaccine for girls, commencing in the fall of 2013. This change applies only to girls who received their first two doses of vaccine as pre-adolescents (aged nine or 10). The revised vaccination schedule adopted by Quebec resulted from a study published in the *Journal of the American Medical Association* showing that girls aged nine to 13 had an immune response from two doses of the vaccine similar to the response of those who received three doses.[63]

2. Screening

2. Screening

Of an estimated 187,600 new cancer cases diagnosed in Canada in 2013, one-quarter (26%) were breast, colorectal or cervical cancer, the same three cancers for which there are population-based screening programs in Canada.[72] Screening may take place within these programs or outside of programs.

Regular screening has been shown to reduce both incidence and mortality rates for cervical[73-76] and colorectal cancer,[77-80] and mortality from breast cancer,[81-86] by detecting cancers before they advance to the metastatic stage and by finding pre-cancers. For these outcomes to be fully realized, however, a large proportion of the target population needs to access high-quality screening.

This chapter presents self-reported screening rates for cervical, breast and colorectal cancer using the Canadian Community Health Survey

(CCHS). To evaluate changes in screening rates over time, both 2008 and 2012 survey results are presented.

While the data presented for this section are based on self-reported survey results, a previous study on breast cancer screening in Canada shows that screening rates based on self-report approximate screening taking place inside and outside organized programs combined.[87]

Indicator	Summary of results
Cervical cancer screening	In 2012, the percentage of women in the target age group who reported receiving a Pap test within three years was greater than 70% across the country, ranging from 71.4% in Quebec to 88.7% in Prince Edward Island. Overall, screening rates remained fairly stable between 2008 and 2012.
Breast cancer screening	Data from 2012 show variation across the country in self-reported breast screening rates, ranging from 57.4% in Yukon to 74.9% in Quebec. Screening rates remained relatively stable in most provinces between 2008 and 2012.
Colorectal cancer screening	There is variability across the country in self-reported colorectal cancer screening rates, ranging from 28.3% in Quebec to 59.2% in Manitoba. Between 2008 and 2012, all provinces showed an increase in the percentage of Canadians who reported being up to date with their colorectal cancer screening, defined as having had a fecal occult blood test in the past two years and/or sigmoidoscopy or colonoscopy in the past five years.

Cervical Cancer Screening

What are we measuring?

The indicator measures the percentage of women aged 18 to 69 who reported having had at least one Pap test in a three-year period. The indicator is presented for both 2008 and 2012.

- An estimated 1,460 women were diagnosed with cervical cancer in Canada in 2013.[72] Infection with high-risk types of human papillomavirus (HPV) causes almost all cases of cervical cancer, with approximately 70% of cases caused by HPV types 16 and 18.[88] The incidence of and mortality from cervical cancer has declined in Canada and other developed countries, largely as a result of screening using cervical cytology (the Pap test). Pap tests can detect abnormal cell changes, allowing for intervention before invasive cancer develops.[89,90]

- The Pap test was introduced throughout Canada as a screening tool for cervical cancer in the late 1960s. Despite its widespread use, not getting screened for cervical cancer within the recommended interval remains a major risk factor for developing cervical cancer.[91] A meta-analysis showed that on average, 53.8% of women diagnosed with invasive cervical cancer had inadequate screening histories and of these, 41.5% had never been screened.[92]

What are the results?

- Data from 2012 show that cervical cancer screening rates were greater than 70% across the country, ranging from 71.4% in Quebec to 88.7% in Prince Edward Island (Figure 2.1). Generally, screening rates for cervical cancer remained fairly stable between 2008 and 2012, increasing in some provinces and decreasing in others but with rates for the two years falling within 2% to 3% of each other. The exceptions are Prince Edward Island, Nunavut and the Northwest Territories, where larger year-to-year variations are expected owing to smaller survey sample sizes.

Data and measurement considerations

- For cervical cancer screening, data are presented for women aged 18 to 69 because this represents the target age population in 2008 according to national guidelines. Since then, the Canadian Task Force on Preventive Health Care has revised guidelines and recommend that screening be initiated at age 25, a change from the previous recommendation of age 18.[93] In most provinces and territories, provincial guidelines recommend screening be initiated at age 21.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 2.1

Percentage[†] of women (aged 18 to 69) reporting at least one Pap test in the last three years, by province/territory – 2008 and 2012 reporting years

Percent (%)

■ 2008 ■ 2012

Province/Territory	2008	2012
BC	80.2	78.4
AB	80.3	77.3
SK	81.8	78.7
MB	83.2	82.7
ON	78.8	77.6
QC	74.1	71.4
NB	81.3	78.9
NS	82.8	80.1
PE	83.1	88.7
NL	82.4	83.4
YT	80.8	82.7
NT	87.5	83.7
NU	73.8	77.7
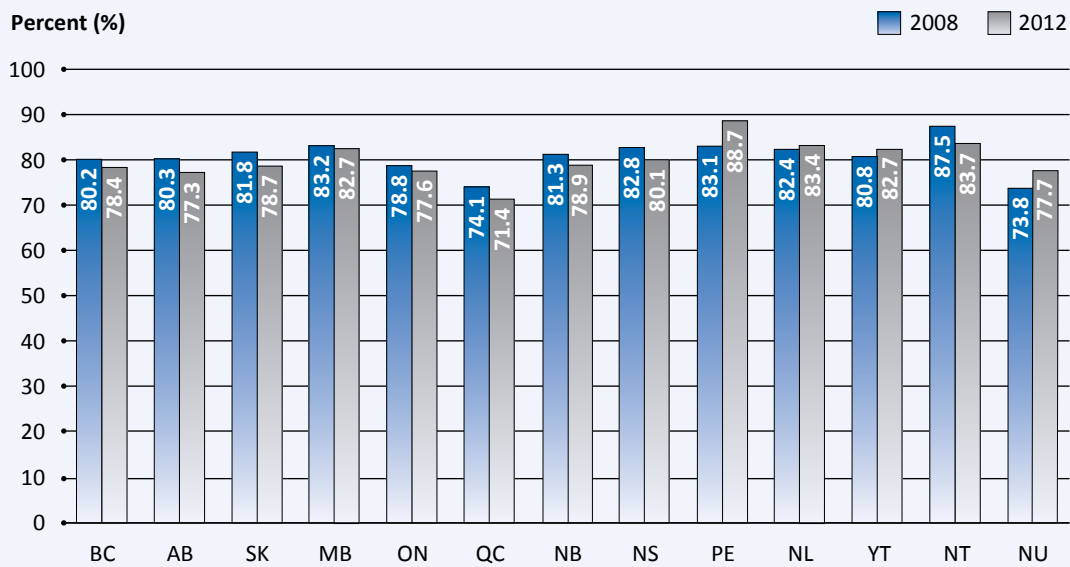
† Age standardized to 1991 standard population.

Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- In order to continue reducing the incidence and mortality rates for cervical cancer, more women will need to be screened with the Pap test as recommended and have timely and appropriate follow-up care for abnormal results.

- While cervical cancer screening rates are greater than 70% across the country, a recent report from the Canadian Partnership Against Cancer has shown that screening rates for cervical cancer are lower for some populations, namely women from low-income households and recent immigrants to Canada. For example, 72.0% of women from low-income households reported having had at least one Pap test within the past three years, compared with 88.0% of women in the highest-income households. Thus, future efforts should focus on reaching under-screened and never-screened women.[94]

- Vaccines are available to protect women from the two forms of HPV responsible for most cervical cancers (HPV types 16 and 18). Monitoring of cervical cancer screening nevertheless needs to continue in the era of HPV vaccination for several reasons:

  - First, current vaccines do not provide protection for those infected with high-risk HPV before immunization (HPV is a group of over 150 related viruses, some of which are referred to as "high risk" because they may lead to cancer).

  - Second, the vaccine targets only HPV types 16 and 18, which together account for only about 70% of cervical cancer cases.[95]

  - Finally, HPV vaccines were only recently introduced and there currently is not enough evidence to determine the future role of screening in HPV-vaccinated women.

What are some examples of efforts in this area?

- The incidence of cervical cancer peaks during women's reproductive years.[56] Based on this fact, Canadian cervical cancer screening guidelines put forth by the Canadian Task Force on Preventive Health Care recommend routine screening (every three years) starting at age 25 for asymptomatic women who are or have ever been sexually active.

- The Pan-Canadian Cervical Screening Initiative (PCCSI) is a national network that works to maximize cervical cancer control. Assembled in June 2009 to optimize the use and impact of cervical screening programs, the PCCSI serves as a national forum for provinces and territories to share experiences and review new evidence and technologies. The network measures a range of quality indicators to help monitor and evaluate progress and identify opportunities for improvement.

- The cervical cancer screening landscape is changing with the availability of a vaccination against HPV, the virus that can lead to cervical cancer. Vaccination will result in a growing number of young women and men with increased — though not complete — protection against cervical and some other types of cancer. There are also new tests to detect early disease, including ones that detect infection with high-risk HPV types. With these important developments, new opportunities and methods for cervical cancer control are being investigated across Canada and internationally. In the future, the routine Pap test may be replaced by tests that detect HPV infection.

Breast Cancer Screening

What are we measuring?

This indicator measures the percentage of eligible women aged 50 to 69 reporting having had a screening mammogram in the past two years. The indicator is presented for both 2008 and 2012.

- Breast cancer is the most common cancer among Canadian women, accounting for over an estimated one-quarter (26.1%) of new female cancer cases and an estimated 13.9% of female cancer deaths in 2013.[96] Evidence from clinical trials shows a significant reduction in deaths from breast cancer among women who had been randomized to a screening intervention relative to those receiving usual care.[81-83] Widespread adoption of mammography screening has contributed to a decline in mortality from breast cancer.[97] Organized breast cancer screening programs were established across Canada with the goal of identifying the disease early in asymptomatic women. To date, organized breast cancer screening programs are offered in all provinces and territories except Nunavut.

What are the results?

- Data from 2012 show much variation across the country in the percentage of women reporting having had a screening mammogram in the past two years, with rates ranging from 57.4% in Yukon to 74.9% in Quebec (Figure 2.2). Between 2008 and 2012, breast cancer screening rates remained relatively stable in most provinces and territories. The data show a notable decrease in the breast cancer screening rate in Saskatchewan, however, which dropped from 73.0% in 2008 to 63.3% in 2012. The screening rate in Yukon also decreased (from 64.7% to 57.4%), but this change may reflect natural fluctuations resulting from small survey sample sizes.

Data and measurement considerations:

- The indicator excludes women who had mammograms to investigate a lump or other breast problem or as follow-up to breast cancer treatment.

- A 2011 study compared participation in programmatic (i.e., organized) breast cancer screening and screening conducted outside an organized program with self-reported screening rates from the Canadian Community Health Survey (CCHS). The analysis showed that self-reported breast cancer screening rates in the CCHS closely approximate the total rate of screening taking place both inside and outside organized programs.[98]

- Detailed indicator methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 2.2

Percentage of eligible[†] women (aged 50 to 69) reporting a screening[††] mammogram in the last two years, by province/territory – 2008 and 2012 reporting years

Percent (%)

Province/Territory	2008	2012
BC	67.7	70.2
AB	73.6	73.6
SK	73.0	63.3
MB	70.5	74.1
ON	73.0	73.5
QC	74.0	74.9
NB	74.7	72.1
NS	71.0	68.1
PE	57.6	59.5
NL	70.3	72.6
YT	64.7	57.4
NT	67.2	66.8
NU	*	*
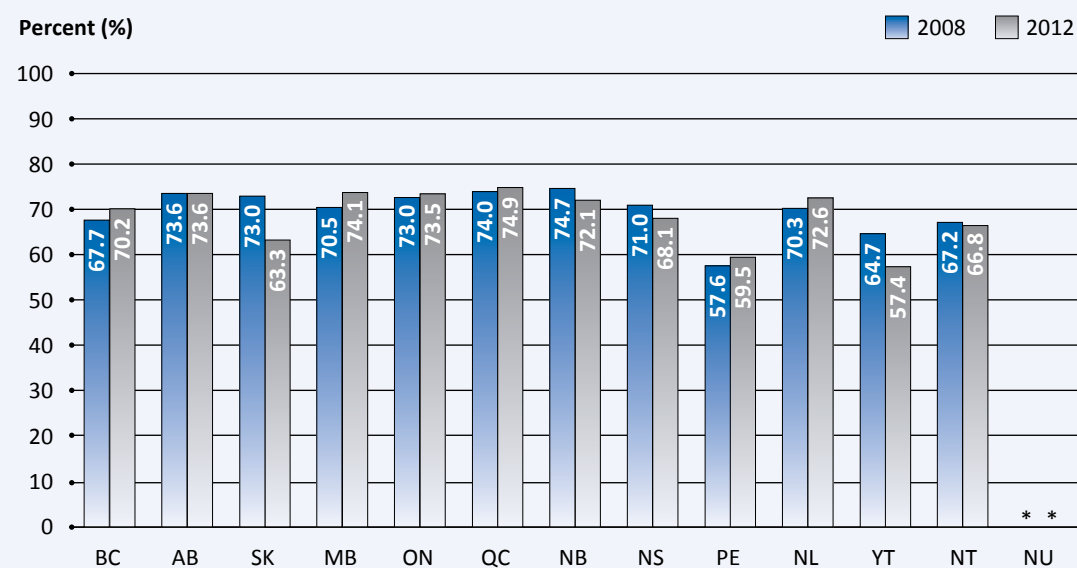
* Suppressed due to statistical unreliability caused by small numbers.

† A woman is deemed eligible for screening mammography if her reason for undergoing a mammogram is *not* to investigate previously detected lumps or breast problems, or as follow-up to breast cancer treatment.

†† Excludes tests done to investigate symptoms.

Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- A recent review of the evidence showed that regular screening with mammography resulted in a 21% reduction in breast cancer mortality in women aged 50 to 69.[99] Finding breast cancer earlier can therefore help in the delivery of more effective treatments and lead to better outcomes and survival for women.

- A recent report from the Canadian Partnership Against Cancer (the Partnership) showed that not all women are equally likely to get screened for breast cancer. Canada-wide data from 2008 show lower breast cancer screening rates for women living in low-income households and for recent immigrants.[94] Efforts should focus on more equitable access to and increased use of breast cancer screening among these never- or under-screened populations. Previous efforts in increasing access to screening for women living in rural and remote communities demonstrate that interventions have been successful in making screening access and use more equitable.[100]

What are some examples of efforts in this area?

- National breast screening guidelines disseminated by the Canadian Task Force on Preventive Health Care recommend that women aged 50 to 74 at average risk for breast cancer be routinely screened with mammography every two to three years.[99]

- The Monitoring and Evaluation Working Group of the Partnership's Breast Cancer Screening Network systematically evaluates organized breast cancer screening programs across the country to support high-quality screening for women. *Organized Breast Cancer Screening Programs in Canada: Report on Program Performance in 2007 and 2008* was released in 2013 and presents an evaluation of the performance of organized breast cancer screening programs in Canada. Data were obtained through the Canadian Breast Cancer Screening Database. The report introduces several new or modified measures of breast cancer screening performance, including the proportion of women screened annually, sensitivity of the screening mammography program, biopsy with non-malignant result and a more comprehensive description of diagnostic intervals.

Colorectal Cancer Screening

What are we measuring?

This indicator measures the percentage of the population aged 50 to 74 reporting being up to date on colorectal cancer screening. This includes having undergone a fecal test in the past two years or colonoscopy or sigmoidoscopy in the past five years. The indicator is presented for both 2008 and 2012.

- In 2013, it was estimated that 13,300 men and 10,600 women in Canada would be diagnosed with colorectal cancer and about 9,200 would die of the disease, making colorectal cancer the second-leading cause of cancer death in Canada behind lung cancer.[96] Screening using fecal tests[iii] reduces mortality from colorectal cancer as well as its overall incidence through detection of pre-cancerous polyps.[77-80]

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iii Randomized controlled trials have investigated annual and biennial screening with the guaiac fecal occult blood test (FTg).

- This section reports on the percentage of Canadians who are up to date on their colorectal cancer screening based on self-reported data from the Canadian Community Health Survey. "Up to date" is defined as having had a fecal test within the previous two years or colonoscopy or sigmoidoscopy within the previous five years.[iv]

- A fecal occult blood test (FOBT) can be either a guaiac test (FTg) or an immunochemical test (FTi or FIT).

What are the results?

- Data for colorectal cancer screening show much variability across the country in the percentage of Canadians who report being up to date with their screening, ranging from 28.3% in Quebec to 59.2% in Manitoba (Figure 2.3). This variation likely reflects different stages of screening program roll-out in the provinces and primary care initiatives to increase opportunistic colorectal cancer screening in some provinces. Ontario, Manitoba and Alberta, which were the first provinces to launch colorectal screening programs (in 2007 and 2008), have achieved programs with screening available for 80% to 100% of their populations and have the highest screening rates.[101]

- Between 2008 and 2012, all provinces and two territories had an increase in the percentage of residents who reported being up to date with their colorectal cancer screening. A notable increase was observed in Alberta, where 50.3% reported being up to date in 2012, compared with 28.6% in 2008.

- For 2012, colorectal screening rates tended to be lower in the youngest age group (those aged 50 to 59) than in the oldest age group (60 to 74). Rates were similar for men and women (Figure 2.4).

- When screening rates were examined by test type (i.e., FOBT in the past two years versus endoscopy in the past five years), in 2012, sigmoidoscopy or colonoscopy use was highest in Ontario and FOBT use was highest in Manitoba. Trends in colorectal cancer screening rates by type of test show increases in both sigmoidoscopy/colonoscopy and FOBT between 2008 and 2012 (Figures 2.5 and 2.6).

Data and measurement considerations

- The indicator includes respondents who reported having had a colorectal cancer screening test for any of the following reasons: family history, regular check-up, routine screening, age or race. The indicator excludes screening for any of the following reasons: follow-up of a problem, follow-up of colorectal cancer treatment and any other reason.

- "Fecal test" includes both FTg and FTi. Colonoscopy and sigmoidoscopy are also acceptable as screening tests and thus are captured in the indicator's definition of being up to date.

- Since the survey does not distinguish between the time interval for sigmoidoscopy and colonoscopy, the five-year timeframe was used for both modalities. This indicator may therefore underestimate the true population that is up to date.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

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iv The recommended screening interval is five years for sigmoidoscopy and 10 years for colonoscopy. Because the survey data do not distinguish between the two modalities, the five-year timeframe was used for both.

FIGURE 2.3

Percentage of population (aged 50 to 74) reporting a screening[†] fecal test in the last two years and/or screening[†] sigmoidoscopy/colonoscopy in the last five years, by province/territory – 2008 and 2012 reporting years

Percent (%)

2008 2012
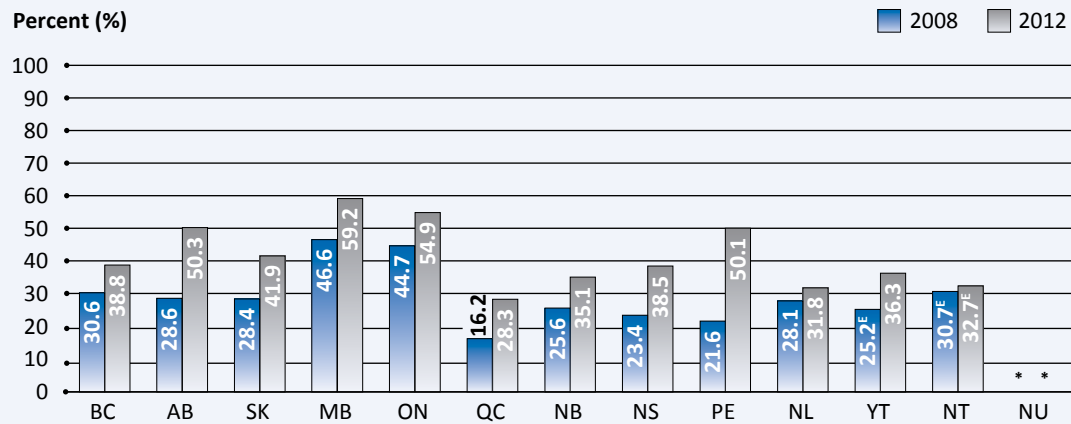
* Suppressed due to statistical unreliability caused by small numbers.

[E] Interpret with caution owing to large variability in the estimate.

† Excludes tests done to investigate symptoms.

Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 2.4

Percentage of population (aged 50 to 74) reporting a screening[†] fecal test in the last two years and/or screening[†] sigmoidoscopy/ colonoscopy in the last five years, by age group and sex, Canada – 2012 reporting year
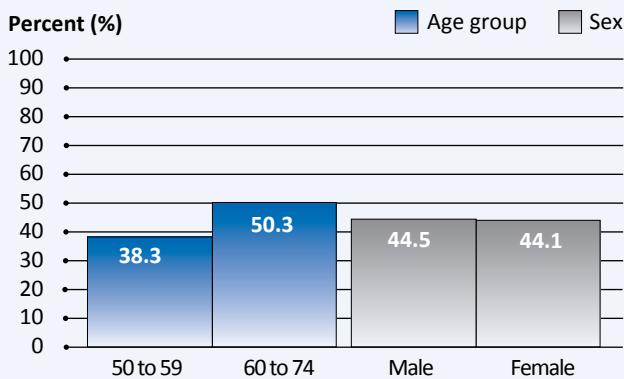
Percent (%)

Age group Sex

† Excludes tests done to investigate symptoms.

Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 2.5

Percentage of population (aged 50 to 74) reporting screening† sigmoidoscopy/colonoscopy in the last five years, by province/territory – 2008 and 2012 reporting years

Percent (%)

■ 2008 ■ 2012
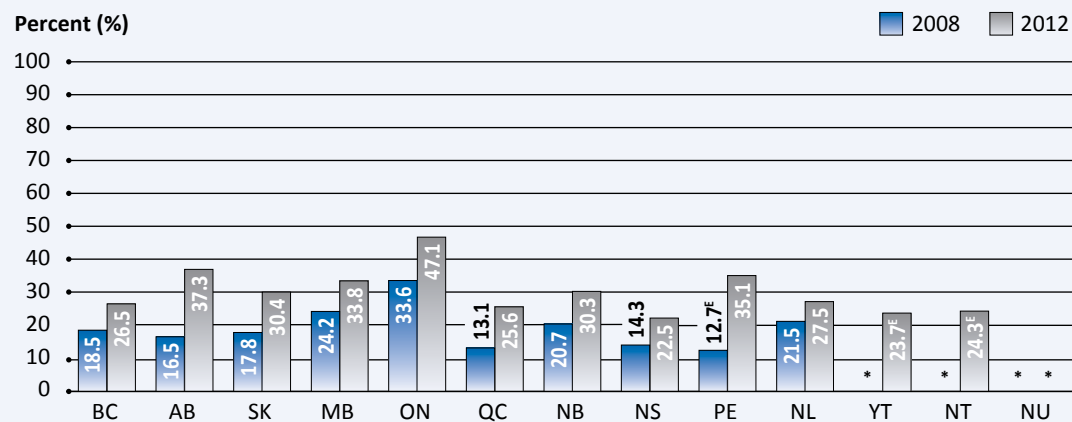
* Suppressed due to statistical unreliability caused by small numbers.

E Interpret with caution owing to large variability in the estimate.

† Excludes tests done to investigate symptoms.

Data source: Statistics Canada, Canadian Community Health Survey

FIGURE 2.6

Percentage of population (aged 50 to 74) reporting a screening† fecal test in the last two years, by province/territory – 2008 and 2012 reporting years

Percent (%)

■ 2008 ■ 2012
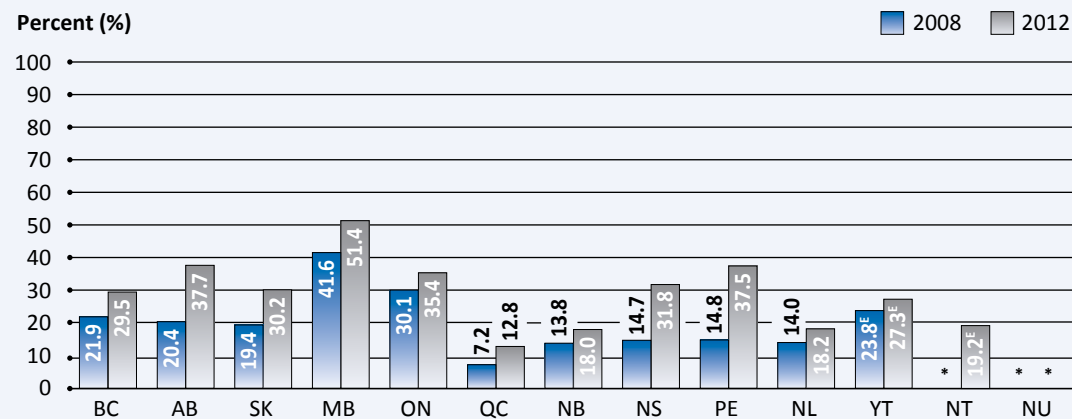
* Suppressed due to statistical unreliability caused by small numbers.

E Interpret with caution owing to large variability in the estimate.

† Excludes tests done to investigate symptoms.

Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- Studies show that regular screening using an FOBT among those aged 50 and older, followed by a colonoscopy for those with an abnormal FOBT result, can reduce deaths from colorectal cancer.[77]

- While self-reported screening rates for colorectal cancer have increased in Canada, rates are still lower than those for breast and cervical cancer. This is not surprising, however, because screening guidelines for colorectal cancer have been in place for a much shorter time than those for cervical and breast cancer.

- Future work should focus on increasing colorectal cancer screening among those aged 50 to 59, as well as in other populations in which colorectal cancer screening rates remain low, particularly people from low-income households, Canadians living in rural and remote areas and new immigrants to Canada.[94]

What are some examples of efforts in this area?

- The National Colorectal Cancer Screening Network, composed of representatives of the provinces and territories, has worked to develop a set of quality indicators for colorectal cancer screening of average-risk Canadians, with targets set for six of the 22 indicators. In a recently released report, *Colorectal Cancer Screening in Canada – Program Performance Results Report January 2009–December 2011*, short-term quality indicator results from five provinces (British Columbia, Saskatchewan, Manitoba, Nova Scotia and Prince Edward Island) were presented for evaluation of colorectal screening programs. These initial data provide, for the first time, a summary picture of the performance of colorectal screening programs in Canada.

3. Diagnosis

3. Diagnosis

A timely and effective diagnostic process can lead to improved outcomes, such as early resolution for people without cancer and effective treatment for those who are diagnosed with cancer. Given that, any measures that lead to improvements in the diagnostic process could contribute to more appropriate and timely disease treatment, management or both and to less anxiety during a cancer patient's experience with the disease.

In this section, indicators are provided pertaining to the diagnostic process: wait time from abnormal breast screen to resolution and wait time from abnormal fecal test result to colonoscopy. Both of these indicators are measures of timely access to diagnostic services and of availability of stage data as a key input for guiding and evaluating cancer control and stage distribution.

Indicator	Summary of results
Breast cancer diagnosis wait time from abnormal breast screen to resolution	While none of the reporting provinces achieved the wait time targets for this indicator in 2011, for women requiring a tissue biopsy, the Northwest Territories has met the target. Trends show improvements in wait times in Saskatchewan, New Brunswick and Alberta.
Colorectal cancer diagnosis wait time from abnormal fecal test to colonoscopy	Median wait times among those screened through organized colorectal cancer screening programs (between 2009 and 2011) ranged from 35 days in British Columbia to 96 days in Saskatchewan. Of the five reporting provinces, only Nova Scotia and British Columbia reported median wait times below the 60-day benchmark.
Capture of stage	For 2011, nine of 10 provincial registries had stage data on at least 90% of cases for the four most common cancer sites.
Stage distribution	For the first time, population-level stage data are available for the four most common disease sites from nine of 10 provinces. Approximately 68% of invasive breast cancer cases diagnosed in 2010 and 2011 were early stage (Stage I or II). Colorectal cancer cases were evenly distributed among the four cancer stages. For lung cancer, Stage IV had the highest proportion of cancer cases; almost 50% of prostate cancer cases were Stage II.

Special Feature: Use of the Canadian Global Rating Scale by endoscopy services

The Canadian Global Rating Scale (C-GRS) is a patient-centred quality improvement tool created by the Canadian Association of Gastroenterology (CAG) that measures gastrointestinal endoscopy services. Gastrointestinal endoscopy is a test that uses a flexible fibre-optic tube to allow direct visualization of the gastrointestinal tract. The technique is increasingly being used to screen for colorectal cancer. The C-GRS tool measures the quality of endoscopy services provided to patients in 12 distinct areas related to clinical quality and quality of the patient experience, such as patient safety and comfort, the quality of the procedure and the appropriateness of its use.

Use of the C-GRS has been steadily increasing since 2007. As of February 2014, there were 75 sites signed up to complete the rating scale (Figure 3.i). The C-GRS is intended to improve

endoscopic services by providing units with a process to review the quality of the service they provide. Over the past two years, at least 35% of endoscopy units that completed the C-GRS at least twice achieved improvements in scoring in eight of 12 domains, with improvements in areas of comfort and privacy. These results suggest that there is growing uptake of the C-GRS among Canadian endoscopy units and that improvement is possible. Several simple interventions by the CAG's quality group, such as providing access to a standardized patient satisfaction survey, may accelerate units' progress. Consequently, future short-term plans for the CAG's quality program will focus on increasing awareness of the C-GRS to engage more endoscopy units and on promoting access to standardized reporting forms and survey tools.

FIGURE 3.i

Number of endoscopy units participating in the Canadian Global Rating Scale, by province – 2014

NL 12
BC 21
AB 18
SK 3
MB 2
ON 10
QC 3
NS 6
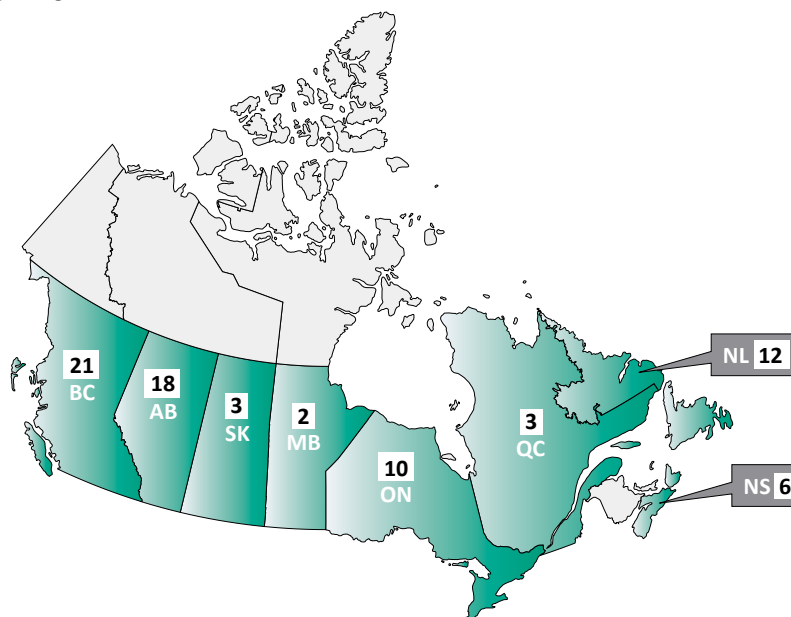
Data as of February 13, 2014.

Data source: Canadian Association of Gastroenterology's Quality Affairs

Breast Cancer Diagnosis Wait Time

What are we measuring?

This indicator measures the time elapsed between an abnormal breast screen result and resolution, with or without biopsy, and compares wait times to current Canadian targets. The indicator shows the median and 90th percentile wait times for asymptomatic women aged 50 to 69 screened by provincial breast screening programs in 2011.

- Timely resolution of an abnormal screen through clinical investigation and a definitive biopsy if required, facilitates prompt initiation of treatment and potentially improves patient outcomes. Measuring and comparing provincial wait times from abnormal screening result to resolution allows for the identification of gaps, which could be addressed through quality improvement strategies.

- Guidelines identifying target wait times for abnormal breast screen to resolution were established by the Canadian Breast Cancer Screening Initiative's Working Group on the Integration of Screening and Diagnosis in 2000.[102] The target set for this indicator was that 90% of women should receive resolution within seven weeks for those requiring a biopsy and five weeks for women not requiring a biopsy. These guidelines apply to asymptomatic women aged 50 to 69 with no prior diagnosis of breast cancer.

What are the results?

- Data for 2011 show that the provincial wait times for receiving a resolution following an abnormal screen ranged from 2.1 to 4.0 weeks (median) and from 5.3 to 10.9 weeks (90th percentile) for women not requiring a tissue biopsy to resolve diagnosis (Figure 3.1).

For women requiring a biopsy, the provincial median and 90th percentile wait times ranged between 3.0 and 8.1 weeks and between 9.6 and 17.6 weeks, respectively (Figure 3.2).

- The percentage of women undergoing screening whose diagnosis was resolved following an abnormal screen within the target timeframes ranges from 64.4% to 89.0% when a biopsy is not required and from 40.5% to 100% when a biopsy is required.

- None of the provinces reporting data for this indicator achieved the wait time targets of 90% of women waiting five weeks or less (without biopsy) or seven weeks or less (with biopsy) between an abnormal screening result and resolution. Two provinces, Saskatchewan and New Brunswick, are close to the target wait time for women not undergoing a biopsy. For women requiring a tissue biopsy, the Northwest Territories has met the target.

- Trends show improvements in wait times for women not undergoing biopsy in several provinces, including Saskatchewan, New Brunswick and Alberta (Figure 3.3).

Data and measurement considerations

- Alberta's data come from the Screen Test program, which accounts for approximately 10% of all screening mammograms in the province.

- Quebec's data are available for 2010 only.

- Data for this indicator represent wait times for women receiving mammograms or clinical breast exams through organized provincial breast screening programs.

- For detailed definitions and information on rates of participation in organized breast screening programs, please see the Technical Appendix, available at systemperformance.ca.

Median and 90th percentile wait times for resolution of abnormal breast screen without tissue biopsy for women (aged 50 to 69), by province/territory – 2011

Percentage within target   ■ Median wait time   □ 90th percentile wait time

	Percentage within target	Median wait time	90th percentile wait time
BC	80.6%	2.7	8.0
AB	70.9%	3.9	8.1
SK	88.0%	2.5	5.8
MB	82.0%	2.4	7.6
ON	84.6%	–	
QC	64.4%	3.9	10.9
NB	89.0%	2.1	5.3
NS	84.3%	3.1	6.0
PE	68.1%	4.0	7.5
NL	76.0%	3.0	10.0
YT	–	–	
NT	70.0%	4.0	10.0

0   < 5 Target   10   15

Weeks

"–" Data not available for YT. Data for ON not available for median and 90th percentile wait times.

AB data were based on screening mammograms done by Screen Test, which is part of Alberta Breast Cancer Screening Programs (accounting for about 10% of screening mammograms in AB).

ON percentage within target is for women aged 50 to 74.

QC data are for 2010.

NT data include one site (Stanton) only.

Data source: Provincial breast cancer screening programs

FIGURE 3.2

Median and 90th percentile wait times for resolution of abnormal breast screen through tissue biopsy for women (aged 50 to 69), by province/territory – 2011

	Percentage within target	Median wait time	90th percentile wait time
BC	59.6%	6.0	14.9
AB	74.2%	4.9	12.1
SK	75.0%	4.5	12.8
MB	40.5%	8.0	16.4
ON	64.1%	–	
QC	41.2%	8.1	17.6
NB	63.7%	5.3	12.0
NS	57.4%	6.6	13.7
PE	62.4%	6.0	9.6
NL	57.0%	7.0	17.0
YT	–	–	
NT	100.0%	3.0	

0   < 7 Target   14   21

Weeks

"–" Data not available for YT. Data for ON not available for median and 90th percentile wait times.

AB data were based on screening mammograms done by Screen Test, which is part of Alberta Breast Cancer Screening Programs (accounting for about 10% of screening mammograms in AB).

ON percentage within target is for women aged 50 to 74.

QC data are for 2010.

NT data include one site (Stanton) only.

Data source: Provincial breast cancer screening programs

FIGURE 3.3

Median wait time for resolution of abnormal breast screen without tissue biopsy for women (aged 50 to 69), by province/territory – from 2004 to 2011

Weeks

BC   AB   SK   MB   ON   QC   NB   NS   NL

16
14
12
10
8
6
4
2
0

2004   2005   2006   2007   2008   2009   2010   2011

AB data were based on screening mammograms done by Screen Test, which is part of Alberta Breast Cancer Screening Programs (accounting for about 10% of screening mammograms in AB).

PE and NT data are for 2011 only, therefore, not included.

ON data not available from 2009 onward.

QC data not available for 2004, 2009 and 2011.
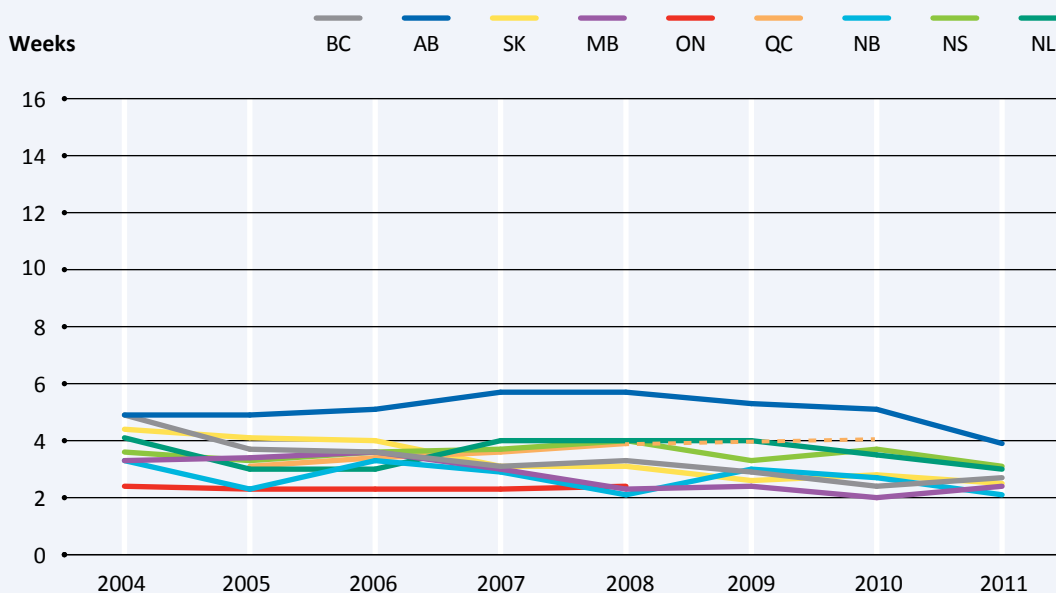
Data source: Provincial breast cancer screening programs

FIGURE 3.4

Median wait time for resolution of abnormal breast screen through tissue biopsy for women (aged 50 to 69), by province/territory – from 2004 to 2011

AB data were based on screening mammograms done by Screen Test, which is part of Alberta Breast Cancer Screening Programs (accounting for about 10% of screening mammograms in AB).

PE and NT data are for 2011 only, therefore, not included.

ON data not available from 2009 onward.

QC data not available for 2004, 2009 and 2011.
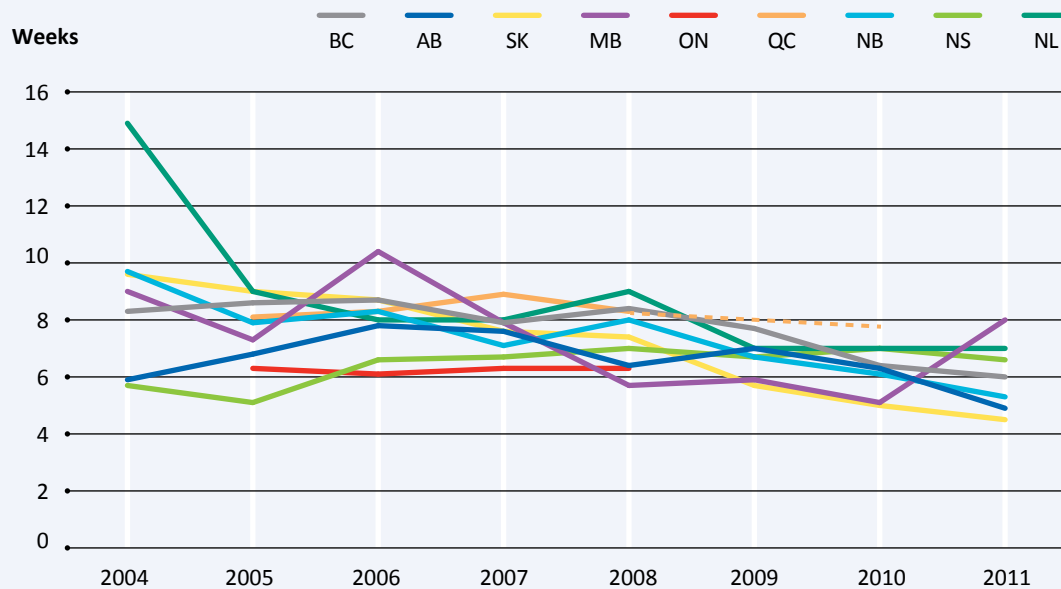
Data source: Provincial breast cancer screening programs

What do the results mean?

- For women requiring a tissue biopsy, the Northwest Territories has met the wait time target. However, because none of the provinces met the wait time target of resolving 90% of abnormal results within five or seven weeks – and this has been the situation for a number of years – a thorough examination of barriers to reducing wait times is needed.

- Disparities in time between receipt of an abnormal screening result and definitive diagnosis have been noted for those residing in low-income neighbourhoods and in rural and remote areas.[94] More efforts are needed to ensure all Canadian women have equitable access to timely resolution of abnormal breast screens.

What are some examples of efforts in this area?

- The National Committee of the Canadian Breast Cancer Screening Initiative (CBCSI) monitors and assesses the performance of screening in Canada every two years. A working group of the CBCSI has been formed to create strategies to reduce wait times from abnormal breast screen to resolution. Initial steps have been taken to scan practices and assessment programs across the country as well as to analyze more current data in relation to those activities. Key lessons will be shared so that all provinces and territories can benefit from successful strategies.

- Diagnostic intervals are affected by a number of locally controlled factors, such as human and other resource shortages. Cancer Care Ontario works closely with the regional cancer programs and partners to identify local opportunities for improvement on this indicator, disseminate best practices and implement local strategies to improve performance.

Colorectal Cancer Diagnosis Wait Time

What are we measuring?

This indicator measures the time elapsed between an abnormal result on a fecal test for colorectal cancer screening and follow-up colonoscopy among those screened through organized colorectal cancer screening programs. The median and 90th percentile wait times are for fecal test follow-up conducted between January 2009 and December 2011.

- Timely resolution of an abnormal cancer screening result leads to peace of mind for people with a negative diagnosis (no cancer) and to early detection and improved treatment outcomes for people with a positive diagnosis (cancer).

- As of 2012, all provinces had developed or are developing organized colorectal cancer screening programs using fecal tests (either guaiac or immunochemical) as the entry screening test. All programs recommend screening for average-risk people age 50 to 74 (see Screening chapter). Early detection of colorectal cancers through timely and accurate screening using the guaiac fecal occult blood test and removal of polyps during follow-up colonoscopy has been shown in a number of major studies to reduce colorectal cancer mortality.[77]

- Colonoscopy is the recommended diagnostic test for follow-up of an abnormal fecal test result. The Canadian Association of Gastroenterology (CAG) recommends that a colonoscopy be completed within 60 days of an abnormal fecal test based on pan-Canadian consensus on medically acceptable wait times.

What are the results?

- For 2009 to 2011, five provinces provided data with adequate numbers to report wait times. Median wait times from an abnormal fecal test to follow-up colonoscopy range from 35 days in British Columbia to 96 days in Saskatchewan. Of the five reporting provinces, only two (Nova Scotia and British Columbia) reported median wait times below the 60-day benchmark recommended by the CAG and none reported 90th percentile wait times below the benchmark (although British Columbia came close to reaching the target). The 90th percentile wait times ranged from 63 to 160 days (Figure 3.5).

Data and measurement considerations

- Only colonoscopies done within 180 days of the abnormal fecal test result are included in this analysis.

- The period analyzed varies somewhat by province (see notes, Figure 3.5).

- Programs are currently at the early stages of development and data are therefore preliminary; however, the data provide an indication of colorectal cancer diagnosis wait times across Canada.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 3.5

Median and 90th percentile wait times from abnormal fecal test to follow-up colonoscopy, by province – first-round screening tests conducted between Jan. 1, 2009 and Dec. 31, 2011
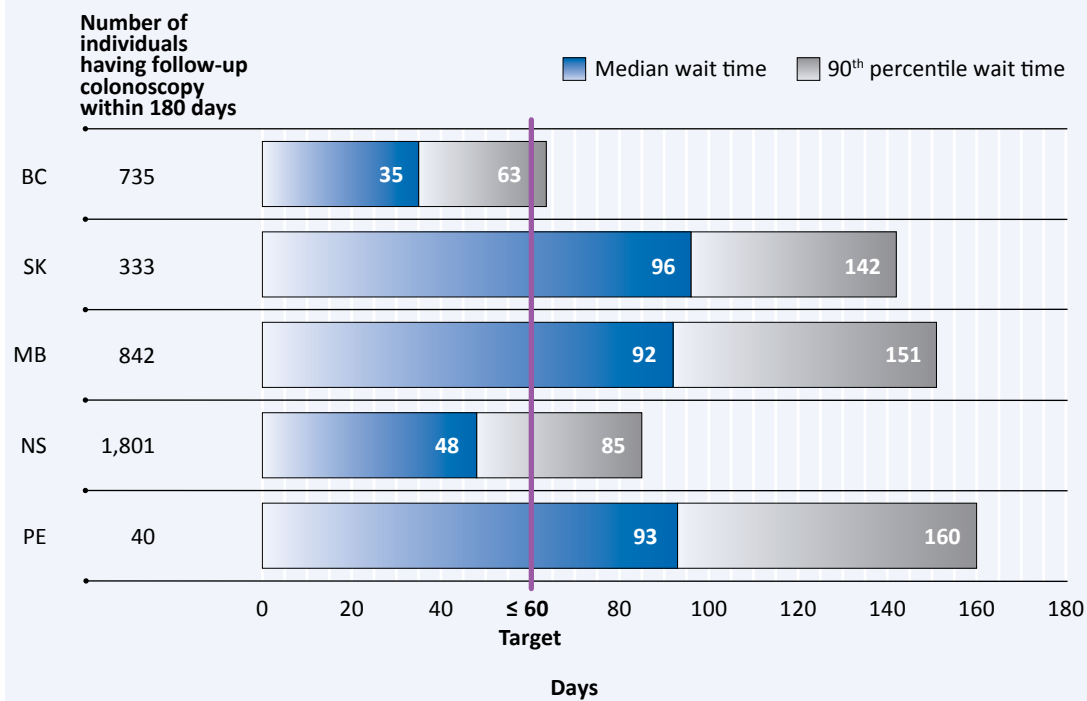
Data include colonoscopies performed within 180 days of abnormal fecal test result.

SK data include one health region where the screening program started Oct. 1, 2009.

NS data are from Apr. 1, 2009, to Dec. 31, 2011.

PE data reflect only patients who participated in the screening program between May 1, 2011, and Dec. 31, 2011.

Data source: National Colorectal Cancer Screening Network

What do the results mean?

- Previous work has demonstrated a reduction in mortality from colorectal cancer with regular fecal test screening and appropriate follow-up of early-stage cancers or pre-cancers.[77] However, to achieve these benefits, individuals with an abnormal fecal test should have timely follow-up of abnormal results with colonoscopy.

- Colorectal cancer screening programs are still in the early stages of implementation in most provinces; that was particularly true during the measurement timeframe for this indicator. Strategies and processes for reducing follow-up colonoscopy wait times are in place in many of the screening programs. One example is the use of patient navigators.

What are some examples of efforts in this area?

- These results represent early measurement of the timeframes for colonoscopy following abnormal fecal tests. The target of 60 days has been set by the CAG. The timeframes covered by the results presented here are associated with the early stages of implementation of the colorectal cancer screening programs, which at least partially explains the substantial interprovincial variation in the results. Future efforts will focus on including data from all provinces, standardizing the measurement timeframes and reporting on progress toward achieving the target.

Capture of Stage

What are we measuring?

This indicator assesses the completeness of stage data collection by reporting on the percentage of provincial cancer incident cases for which valid data on stage at diagnosis are available and collected by the provincial cancer agencies, for the 2011 diagnosis year. The data are reported for the four most common disease sites (breast, prostate, colorectal and lung) and for all cancers combined. As well, the percentage of cases with stage unknown is reported by province for the 2010 and 2011 diagnosis years for the four most common disease sites and for all cancers (in situ and invasive) in the 2011 diagnosis year.

- Stage at diagnosis is a critical prognostic factor with important clinical value. The availability of population-level staging at the provincial level allows for better interpretation of long-term outcome measures such as incidence, mortality and survival, and of treatment pattern indicators such as guideline concordance. These measures, when available by stage, are critical for the evaluation of screening programs, understanding treatment delivery, predicting patient outcomes and driving improvements in cancer control.

- The Canadian Partnership Against Cancer's National Staging Initiative had set a 90% goal of capture of stage data for patients diagnosed in 2010 and beyond for the four most common disease sites (breast, colorectal, lung and prostate). This goal has been largely achieved. For the first time, population-level stage data are available for the four most common disease sites from nine of 10 provinces. According to *2013 Canadian Cancer Statistics*, these four cancers account for more than half of the cancers that will be diagnosed in Canada in 2014.[72]

- Cases are designated as stage unknown if the information from all available patient records does not provide the minimal data required to assign stage. An unusually high percentage of stage unknown cases may indicate problems with access to the patient record information needed for staging.

What are the results?

- For the 2011 diagnosis year, nine reporting provinces had stage data on at least 90% of cases for the four most common cancer sites (Figure 3.6). As of the 2010 diagnosis year, nine provinces met the Partnership's collaborative staging initiative goal of having stage information available in the provincial registry for at least 90% of breast cancer cases (the same goal applies to colorectal, prostate and lung cancer; data not shown), compared with only five provinces in 2007 (data not shown). Six of the eight provinces reporting data for all cancers reported having stage data for over 90% of 2011 incident cases (Figure 3.6).

- The percentage of staged cases for which the final stage is unknown for colorectal, lung and prostate cancer was less than 6% for eight of the nine reporting provinces, but was higher for British Columbia (Table 3.1). For breast cancer, the percentage of staged cases for which the final stage is unknown was below 4% for the nine reporting provinces in 2011. The cancer type with the highest number of unstaged cases was prostate cancer in British Columbia (32.9% and 19.7% in the 2010 and 2011 diagnosis years, respectively). For all other cancers, the percentage of cases with stage unknown in the 2011 diagnosis year ranged from 1.7% for Ontario to 5.6% for Alberta (British Columbia's percentage of

cases with unknown stage for all other cancers includes only cervical cancer and therefore does not truly represent the province's unknown stage cases) (Table 3.1).

Data and measurement considerations

- While it is acknowledged that virtually all clinicians stage patients as part of their prognostic assessment and treatment planning, what is being measured in this indicator is the collection and centralized retention of stage data by cancer registries.

- The stage capture rate includes staging collected through collaborative staging. Note that some cancers may have been staged by American Joint Committee on Cancer tumour-node-metastasis (AJCC TNM) classification for certain provinces or years.

- The "unknown stage" group is assigned in collaborative staging when the data elements abstracted from the available patient chart information are not adequate for ascertaining a definitive stage in the provincial cancer registry – for example, when an accessible site has no lymph node assessment indicated in the documentation, causing a missing nodal status (Nx) value to be assigned, or in cases identified only through death certificates. This is different from unstaged cases for which an attempt to collect the staging data elements was not made or where coders do not have access to all documentation because of logistical limitations (e.g., charts not available outside cancer centres or clinics). Unstaged cases are included in the denominator but excluded from the numerator.

- Several provinces retroactively augment their staging for prior years, so the stage rate for measured years may improve in subsequent measurement.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

What do the results mean?

- The advent of population-based stage data will enable a deeper understanding of cancer in Canada, including monitoring trends, observing outcomes and making decisions that enable better patient outcomes. Through the Partnership's National Staging Initiative, nine of 10 provinces now collect and analyze population-based stage data for the four most common cancer sites, which were the focus of the initiative. While provinces did begin expanding to stage other cancer sites (beyond the four most common sites) during the implementation of the collaborative stage initiative, there is still a need to better capture stage data for all cancer sites at the population level.

- The Surveillance Epidemiology and End Results (SEER) program from the United States reports stage unknown for 2% of breast, 5% of colorectal and 3% of prostate cancer cases, which is similar to the percentage of stage unknown cases presented here (excluding British Columbia's data).[103] In contrast, the Canadian percentage of stage unknown cases for lung cancer is significantly lower (excluding British Columbia's data) than what is reported in the SEER database (6%).[103] The SEER data are based on a sample of cancer treatment facilities from 18 geographical areas (including 10 states) across the United States.

What are some examples of efforts in this area?

- In Quebec, work is underway to capture stage data in the forthcoming Registre québécois du cancer.

- The Canadian Council of Cancer Registries continues to work toward improving the quality of registry data, including stage, and to reduce the prevalence of unknown stage cases.

FIGURE 3.6

Percentage of incident cases for which stage data are available in provincial registries, four most common cancers and all cancers, by province – 2011 diagnosis year

Percent (%)

Legend: ■ Four most common cancers ■ All cancers

Province	Four most common cancers	All cancers
BC	99.9	–
AB	99.9	99.7
SK	100.0	90.8
MB	100.0	100.0
ON	90.4	79.6
QC	–	–
NB	96.3	51.7
NS	99.8	92.8
PE	100.0	100.0
NL	100.0	92.9
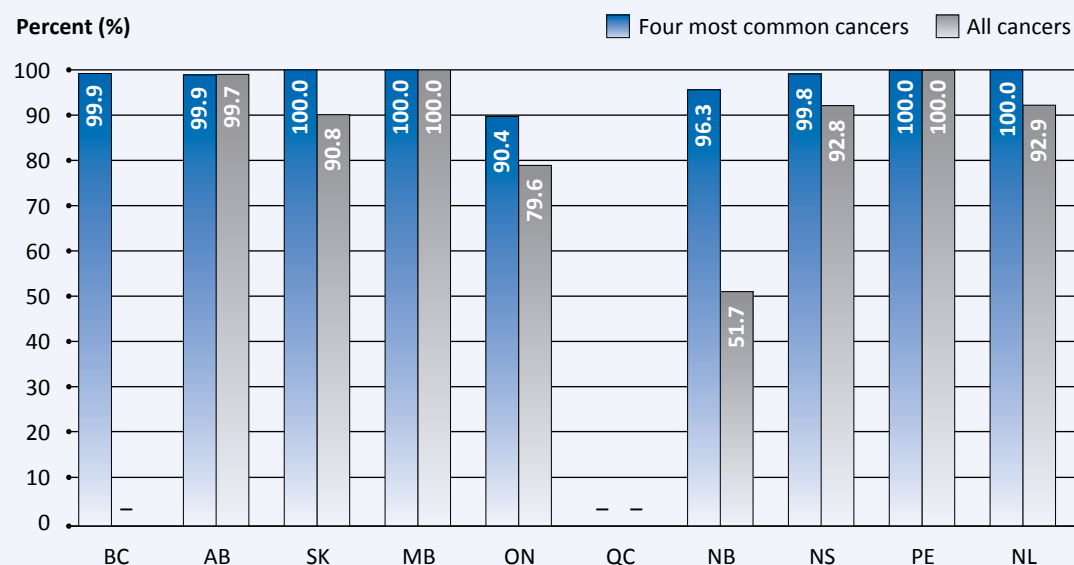
"–" Data not available for BC (all cancers) and QC (four most common cancers and all cancers).

Four most common cancers: breast, prostate, colorectal and lung.

ON data exclude in situ cases.

Data source: Provincial cancer agencies

TABLE 3.1

Percentage of cases for which stage is unknown, by disease site and province – in 2010 and 2011

Disease site	Year	Province									
		BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Breast	2010	5.3	1.6	1.6	1.7	2.2	–	0.9	2.9	1.9	1.4
	2011	3.6	1.6	1.5	1.3	1.7	–	1.6	2.9	1.6	1.5
Colorectal	2010	13.2	4.1	2.8	3.2	2.6	–	3.6	3.4	3.8	5.8
	2011	13.9	3.4	2.9	4.3	4.3	–	4.6	3.9	4.5	3.6
Lung	2010	7.7	1.3	1.6	1.1	0.9	–	1.0	2.0	1.6	4.7
	2011	9.1	1.5	0.6	1.9	1.9	–	2.1	1.4	1.7	3.5
Prostate	2010	32.9	5.4	4.1	5.1	0.8	–	0.9	6.2	0.8	2.3
	2011	19.7	3.2	2.5	5.8	1.4	–	2.3	4.3	2.5	3.7
All other cancers	2010	–	–	–	–	1.7	–	–	–	–	–
	2011	–	5.6	3.8	3.6	1.7	–	–	2.5	3.4	5.0

"–" Data not available for BC (2010 and 2011, all other cancers), AB (2010, all other cancers), SK (2010, all other cancers), MB (2010, all other cancers), QC (2010 and 2011, by disease site breakdown), NB (2010 and 2011, all other cancers), NS (2010, all other cancers), PE (2010, all other cancers) and NL (2010, all other cancers).

BC data include stage only for breast, colorectal, lung, prostate and cervical cancer.

ON data exclude in situ cases.

NB data include stage only for breast, colorectal, lung and prostate cancer.

Data source: Provincial cancer agencies

Stage Distribution

What are we measuring?

This indicator reports on the percentage breakdown of incident cases by stage at diagnosis for breast, lung, colorectal and prostate cancer. The data are presented by province for the 2010 and 2011 diagnosis years combined, which allows for more stability in the results, particularly for smaller provinces.

- Stage distribution is an often-reported indicator across the literature, particularly in cancer publications. It is commonly used to assess the impact of screening programs on reducing late-stage incidence of disease. It can also be useful for system planning because different stages of disease have different resource and service delivery implications.

- Stage distribution results should always be interpreted with caution. The main concern with stage distribution relates to types of cancers for which there can be a high rate of early detection testing and screening activity, such as prostate and breast cancer. Therefore, a high rate of detection for early-stage cancers could manifest in a lower *percentage* of late-stage cancers reported in the stage distribution without this necessarily indicating a lower *incidence rate* for late-stage cancers, which is the objective of population-based cancer screening programs.

What are the results?

- Figure 3.7 shows the distribution of breast cancer cases for all eight reporting provinces in 2010 and 2011 combined, by detailed stage, including Stage 0 and stage unknown: 13.3% of breast cancer cases were Stage 0 (which includes in situ carcinomas such as ductal carcinoma in situ) in the eight reporting provinces. In all, 2.7% of cases were stage unknown.

- When examining Canada's stage distribution for the eight reporting provinces, 6.8% of colorectal cancer cases were stage unknown. The highest proportion of cases were Stage IIA (19.2%) (Figure 3.8).

- For lung cancer, 3.9% of cases were stage unknown and over half of cases (52.0%) were Stage IV (Figure 3.9).

- A high percentage of prostate cancer cases were stage unknown (11.9%, Figure 3.10) relative to the other most common cancer sites (Figures 3.7, 3.8 and 3.9). The greatest proportion of cases (27.8%) was Stage IIB (Figure 3.10).

Data and measurement considerations

- The stage data reported here are obtained directly from the provincial cancer agencies and are based on collaborative stage data for the 2010 and 2011 diagnosis years. Quebec does not currently have population-based staging and is therefore excluded. While Ontario reports staging, it excludes Stage 0 and is therefore not included in the data presented.

FIGURE 3.7

Distribution of cases by stage at diagnosis for breast cancer (women only) – in 2010 and 2011 combined
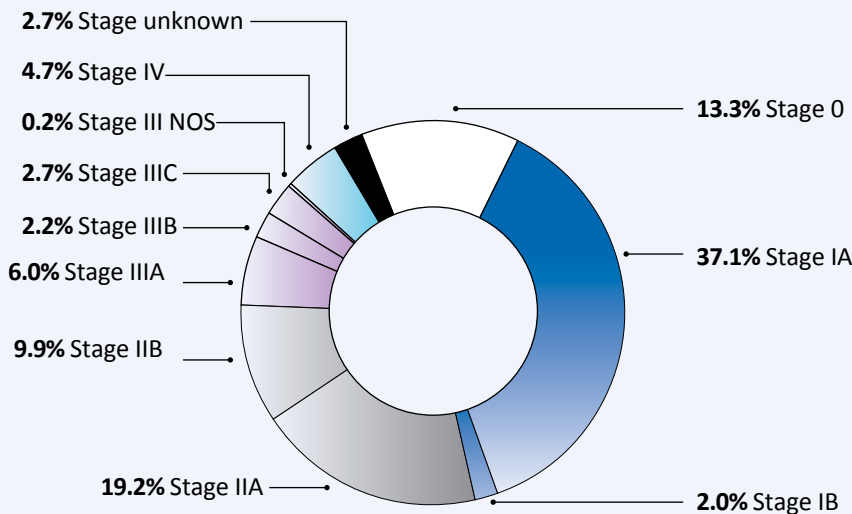
2.7% Stage unknown

4.7% Stage IV

0.2% Stage III NOS

2.7% Stage IIIC

2.2% Stage IIIB

6.0% Stage IIIA

9.9% Stage IIB

19.2% Stage IIA

13.3% Stage 0

37.1% Stage IA

2.0% Stage IB

Stage 0 includes in situ.

NOS = stage not otherwise specified.

Data include AB, BC, MB, NB, NL, NS, PE and SK.

ON reports staging but excludes Stage 0; therefore, data not included.

Data source: Provincial cancer agencies

FIGURE 3.8

Distribution of cases by stage at diagnosis for colorectal cancer – in 2010 and 2011 combined
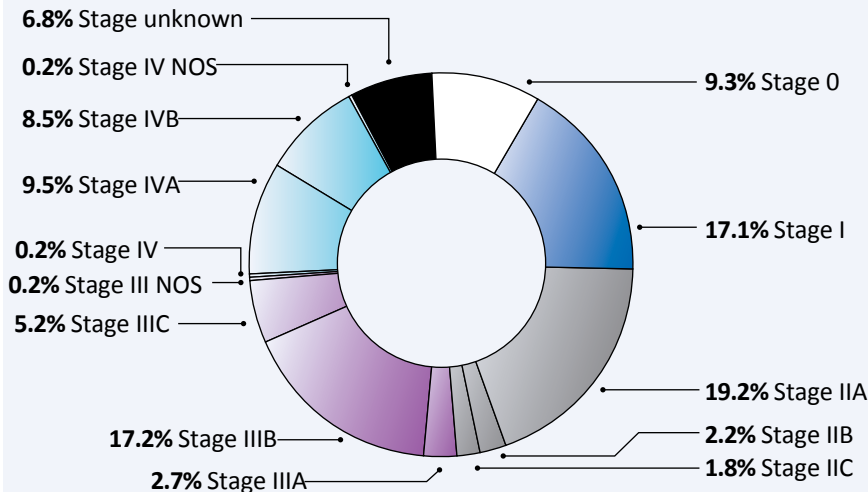
6.8% Stage unknown

0.2% Stage IV NOS

8.5% Stage IVB

9.5% Stage IVA

0.2% Stage IV

0.2% Stage III NOS

5.2% Stage IIIC

17.2% Stage IIIB

2.7% Stage IIIA

9.3% Stage 0

17.1% Stage I

19.2% Stage IIA

2.2% Stage IIB

1.8% Stage IIC

Stage 0 includes in situ.

NOS = stage not otherwise specified.

Data include AB, BC, MB, NB, NL, NS, PE and SK.

ON reports staging but excludes Stage 0; therefore, data not included.

Data source: Provincial cancer agencies

FIGURE 3.9

Distribution of cases by stage at diagnosis for lung cancer – in 2010 and 2011 combined

0.4% Stage occult
0.2% Stage 0
3.9% Stage unknown

9.4% Stage IA
7.2% Stage IB
0.1% Stage II
4.2% Stage IIA
3.7% Stage IIB
0.7% Stage III
12.4% Stage IIIA

52.0% Stage IV

5.7% Stage IIIB
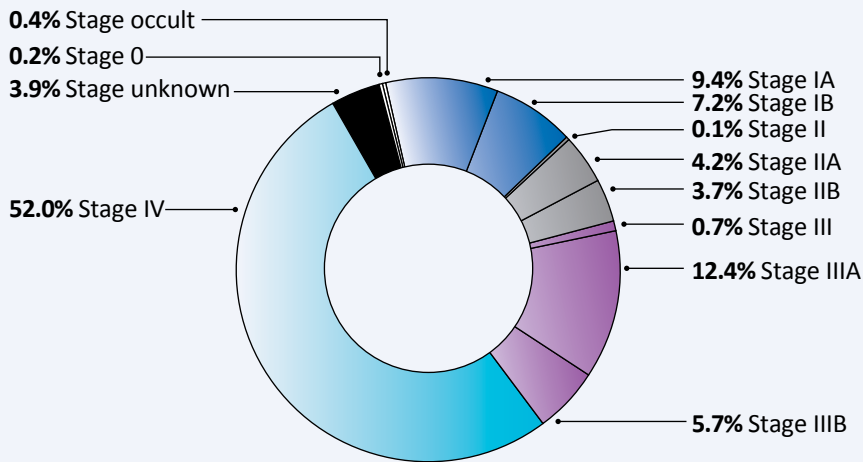
Stage 0 includes in situ.

In occult stage, malignant cells are present in bronchopulmonary secretions, but no tumour is seen radiographically or during bronchoscopy.

Data include AB, BC, MB, NB, NL, NS, PE and SK.

ON reports staging but excludes Stage 0; therefore, data not included.

Data source: Provincial cancer agencies

FIGURE 3.10

Distribution of cases by stage at diagnosis for prostate cancer – in 2010 and 2011 combined

11.9% Stage unknown

18.4% Stage I

21.5% Stage IIA

9.4% Stage IV

10.9% Stage III

27.8% Stage IIB
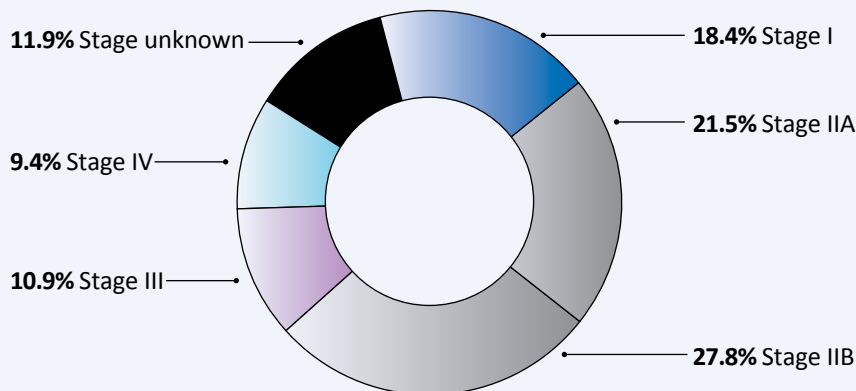
Data include AB, BC, MB, NB, NL, NS, PE and SK.

Excluding BC, the percentage of stage unknown is 4.0%.

Data source: Provincial cancer agencies

What do the results mean?

- It is important to note that variations among provinces in stage distribution exist and can mean a number of things (data not shown):

  - In the case of lung cancer, for which there is currently no organized early detection program anywhere in Canada, variations could reflect different levels of integration between the primary care and specialty care systems, including diagnostic services. Early detection of lung cancer requires a vigilant patient, an alert primary care physician and responsive diagnostic radiology and/or laboratory services, among other factors. The extent to which these or other factors explain the 10 percentage point difference between the lowest and highest ranked province in the percent of lung cancer cases that are Stage III or IV requires much further analysis.

  - For colorectal cancer, organized screening programs were still in their infancy in 2010 and 2011 in most provinces, so it is premature to use the interprovincial stage variations as evidence of different levels of screening program uptake, although these levels are useful as a baseline for future assessment.

  - For breast cancer, in contrast, it is tempting to view differences among provinces in stage distribution as an indication of relative effectiveness of screening programs that have been in place for decades. But as described earlier in this section, a complete assessment requires an examination of stage-specific incidence rates, not just stage distribution.

  - Provincial variations are specifically relevant for prostate cancer, in which high rates of prostate-specific antigen testing in one province may result in a lower percent of cases reported as Stage III and IV, even though the incidence rate for late-stage cases may not be lower.

- Few large developed countries have population-level stage data centrally collected for all cancers. In Australia, a population staging feasibility study conducted in 2004 identified barriers to central collection of comprehensive stage data.[104] In Europe, the EUROCARE database project collects stage data from European cancer registries through a sampling study but it is not population based.[105] Currently, the database includes more than 21 million cancer diagnoses provided by 116 cancer registries in 30 European countries.

What are some examples of efforts in this area?

- As of 2013, stage-based analysis is possible for nine of 10 provinces (compared with only a few in previous years). With the achievement of population-based staging, the epidemiology of cancer in Canada can be described more precisely (for example, survival by stage can be calculated). In addition, interprovincial comparisons can be made for indicators related to practice patterns (e.g., guideline concordance). For example, the Treatment section of this report describes indicators measuring the percentage of people with Stage I or II breast cancer diagnosed in 2010 receiving breast-conserving therapy – this would not be possible without population-based staging.

- While population-level stage data from the Canadian Cancer Registry for 2010 were not available in time to produce stage-based incidence rates for this report, future system performance reports will present indicators comparing incidence by stage as a more reliable measure of the impact of screening and early detection activities.

4. Treatment

4. Treatment

Cancer treatment accounts for the majority of resources consumed in the cancer control system and involves a broad range of modalities, including surgery, systemic therapy and radiation therapy. Treatment goals include achieving complete cure, establishing remission and controlling symptoms. Factors influencing treatment goals include the type of cancer and stage at diagnosis, patient characteristics such as comorbidities and patient preferences.

This chapter includes a number of treatment indicators at the system level, including capacity and utilization, wait times and treatment patterns compared with evidence-based guidelines.

The chapter also provides an expanded discussion of the surgical resection rates by province for rectal cancer, colon cancer and non–small cell lung cancer (NSCLC). Resection rates are presented to allow for identification of variations among provinces, which may point to opportunities for further examination and analysis, and to provide more detail to facilitate understanding of the related guideline concordance indicator results. Also for the first time, performance targets have been introduced for three treatment indicators: removal of 12 or more lymph nodes in colon resections, pre-operative radiation for Stage II or III rectal cancer and adjuvant chemotherapy for Stage II or IIIA NSCLC patients aged 70 to 79.

Some indicators are available only for a subset of provinces that were able to provide required data that conformed materially to the agreed-upon definitions and specifications.

Indicator	Summary of results
Surgery	
Removal and examination of 12 or more lymph nodes in colon resections	There was interprovincial variation in the percentage of colon resections with 12 or more lymph nodes removed. Rates ranged from 61.7% in New Brunswick to 88.8% in Ontario in 2010. There were slight variations by age and sex. The target for this indicator is 90%; most provinces are moving toward the target, with Ontario closest to achieving it.
Resection rate for Stage II or III rectal cancer patients	There was interprovincial variation in the percentage of patients who had a surgical resection, ranging from 70.3% to 100% in 2010. Patients 70 and older were less likely to have a surgical resection than those younger than 70.
Resection rate for Stage III colon cancer patients	In 2010, the percent of patients who underwent a resection was in the 84.4% to 88.8% range for four of the six reporting provinces; the fifth and sixth provinces were Alberta and New Brunswick at 99.3% and 100%, respectively. Resection rates were similar by age group and sex.
Resection rate for Stage II or IIA non–small cell lung cancer patients	There were large differences among provinces in the resection rate for lung cancer, ranging from the low 20%s to the high 40%s in 2010. The resection rate for patients over 70 was half that for patients under 70 and was higher across age groups for women than for men.

Indicator	Summary of results
Radiation therapy	
Radiation therapy wait time: from ready-to-treat to treatment	In 2012, nine of 10 provinces with available data had achieved the target of 90% of patients treated within the national wait time target of 28 days. Saskatchewan and Ontario had the shortest 90th percentile wait time at 15 days.
Radiation therapy utilization and capacity	The percentage of cancer patients who received radiation therapy within two years of diagnosis ranged between 29.1% and 35.9% in 2010.
Pre-operative radiation therapy for Stage II or III rectal cancer patients	The percentage of Stage II or III rectal cancer cases undergoing pre-operative radiation therapy as per guidelines has increased over time but is still well below the 70% target. The province with the highest guideline treatment rate for 2010 was Manitoba at 48.0%. The treatment rate drops from around 45% for patients under age 70 to 20% for patients over 80 years of age.
Post-operative radiation therapy for Stage I or II breast cancer patients	There was some interprovincial variation in the percentage of early-stage breast cancer cases for women treated with radiation therapy. The province with the highest guideline treatment rate for 2010 was Alberta at 87.9%. The treatment rate drops from approximately 85% for patients under age 70 to 40% for patients 80 and older.
Systemic therapy	
Post-operative chemotherapy for Stage III colon cancer patients	Post-operative chemotherapy rates for Stage III colon cancer patients ranged from 50.6% to 80.0% in 2010 (Prince Edward Island had the highest rate). There is a steep downward trend in chemotherapy rates with increasing patient age from 86% for patients under 60 to 18% for patients 80 and older in 2010.
Post-operative chemotherapy for Stage II or IIIA non–small cell lung cancer patients	The percentage of patients with non–small cell lung cancer receiving adjuvant chemotherapy decreased between 2007 and 2010. Provincial rates range from the mid-30%s to the high 50%s for 2010. Women were slightly more likely to receive chemotherapy following surgery. Rates are 20 percentage points lower for patents aged 70 or more than for those under 70. The target treatment rate for patients 70 or older is 45%.

4.1   Surgery

Removal and Examination of 12 or More Lymph Nodes in Colon Resections

What are we measuring?

This indicator measures the percentage of resections for colon cancer in which 12 or more lymph nodes were removed and examined for cancer spread. Clinical trial evidence has shown 12 to be the minimum number needed to ascertain nodal spread.[106] Results are presented for resected colon cancer cases diagnosed each year from 2007 through 2010 and compare rates by province, age group and sex. The number of lymph nodes removed and examined was obtained from the collaborative staging data elements.

- The number of lymph nodes removed and examined in resection specimens has been shown to be critical for proper staging and subsequent treatment planning.[106]

- Most clinical guidelines recommend that a minimum of 12 nodes be removed and examined to more definitively establish N stage[107] (which indicates the extent of cancer spread to lymph nodes). This recommendation is based on the fact that the chance of false negative nodal staging is reduced to acceptable levels beyond the threshold of 12 nodes examined.

- The Canadian Partnership Against Cancer's System Performance Targets and Benchmarks Working Group recently established a national evidence-informed benchmark indicating that 90% of colon cancer patients who undergo resection within one year of diagnosis should have 12 or more lymph nodes removed and examined.

- Measuring provincial treatment patterns relative to this guideline can help identify variations and inform opportunities for quality improvements at the provincial level.

What are the results?

- There was substantial interprovincial variation in the percentage of colon resections with 12 or more nodes removed and examined. Results for the eight participating provinces for 2010 ranged from 61.7% in New Brunswick to 88.8% in Ontario (Figure 4.1). A system performance target of 90% was set in 2014 for this indicator (more on the target is provided under "What do the results mean?").

- There was relatively little variation across age groups and no obvious trends in results from 2007 to 2010 (Figure 4.2).

- Colon cancer resection rates with 12 or more lymph nodes removed were slightly higher in 2010 for women than for men, and for patients less than 70 years of age than for patients 70 and over (Figure 4.3).

Data and measurement considerations

- The source of information for this indicator is the collaborative staging system, in which information on the number of lymph nodes removed and examined is abstracted from patient charts in standardized collaborative staging data elements.

- Cases with an unknown number of nodes removed and examined were excluded from both numerator and dominator for comparison purposes.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 4.1

Percentage of colon resections with 12 or more lymph nodes removed and examined, by province – patients diagnosed from 2007 to 2010

Percent (%)

Legend: 2007 | 2008 | 2009 | 2010

Target 90%

Province	2007	2008	2009	2010
BC	–	–	–	–
AB	75.7	75.5	79.2	80.4
SK	62.4	67.8	62.1	69.2
MB	68.9	75.9	75.8	79.4
ON				88.8
QC	–	–	–	–
NB		56.1	58.7	61.7
NS	68.6	70.9	69.9	72.5
PE	50.0	52.2	61.8	64.7
NL	71.1	–	75.5	82.5
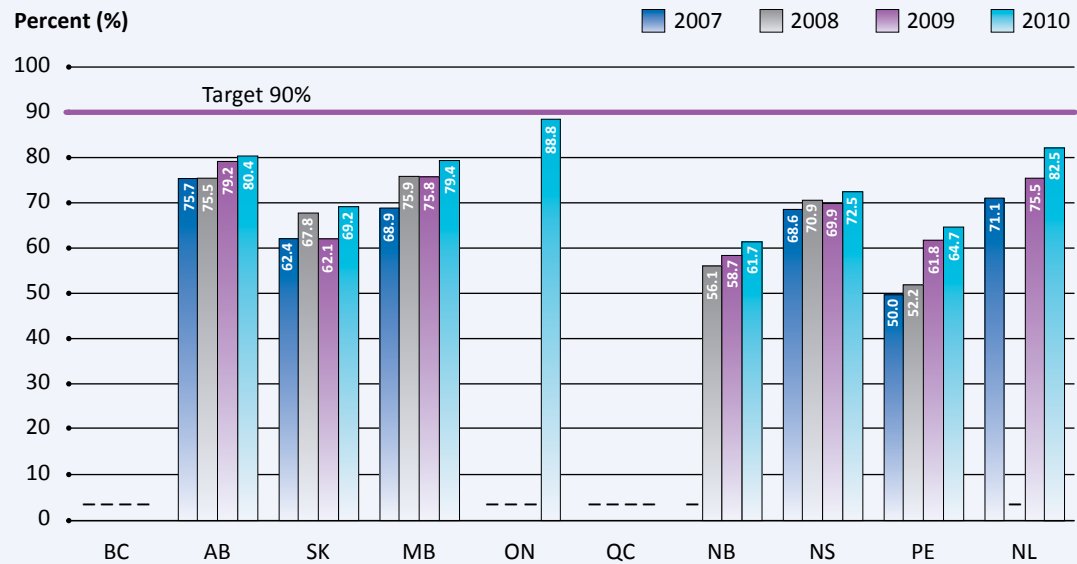
"–" Data not available for BC (2007 to 2010), ON (2007 to 2009), QC (2007 to 2010), NB (2007) and NL (2008).

ON data are for colon cases with 12 or more nodes examined in 2010 rather than colon cancer cases diagnosed in 2010.

Data source: Provincial cancer agencies

FIGURE 4.2

Percentage of colon resections with 12 or more lymph nodes removed and examined, by patient age group – patients diagnosed from 2007 to 2010

Percent (%)

Legend: 2007 | 2008 | 2009 | 2010

Patient Age Group: 18 to 59 | 60 to 69 | 70 to 79 | 80+
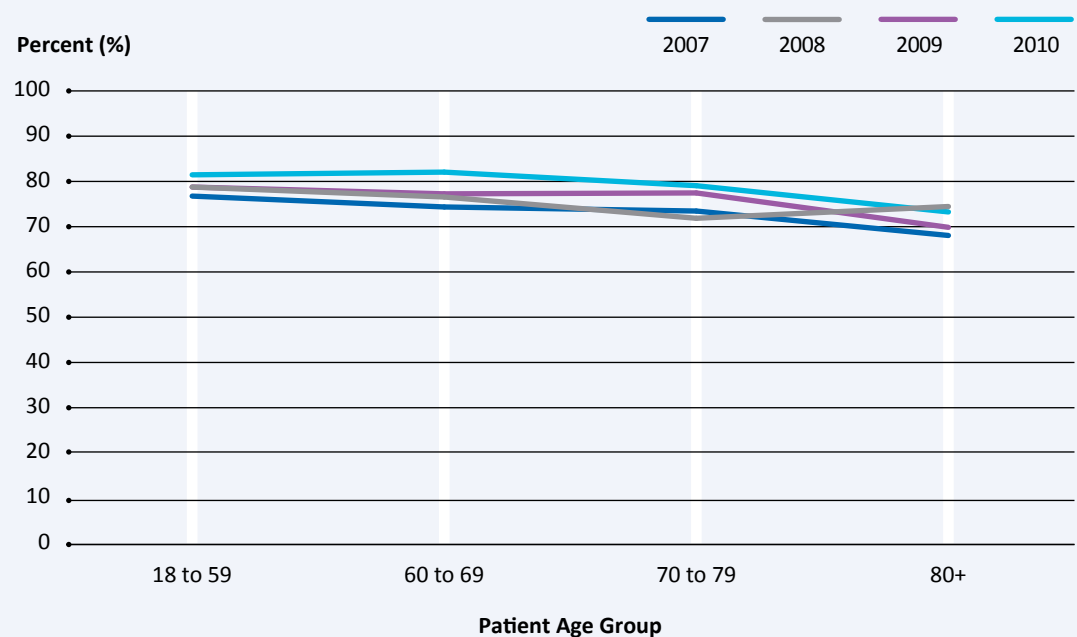
Data include AB, MB, NS, PE and SK (provinces that submitted comparable data for four years).

Data source: Provincial cancer agencies

FIGURE 4.3

Percentage of colon resections with 12 or more lymph nodes removed and examined, by patient age group, by sex – patients diagnosed in 2010

Percent (%)   ■ Male   ■ Female

Patient Age Group
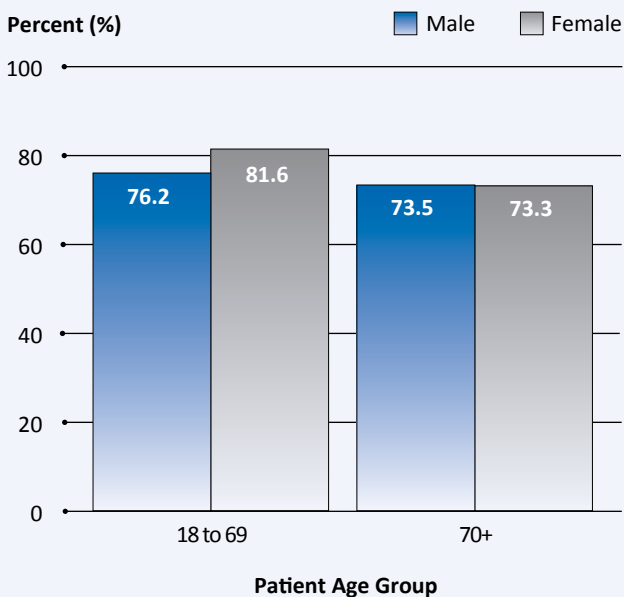
Data include AB, MB, NB, NL, NS, PE and SK.

Data source: Provincial cancer agencies

What do the results mean?

- In 2014, for the first time, a system performance target has been set for the indicator of examining 12 lymph nodes in colon cancer resection. The target was set by experts from the Partnership's System Performance Targets and Benchmarks Working Group, who recommended the Ontario benchmark of 90% as the target for all provinces.

- Four provinces (Ontario, Newfoundland and Labrador, Alberta and Manitoba) are within

10% of the target. The four-year trend for all provinces is upward toward the target.

- Overall rates are slightly higher than those that have been reported in other jurisdictions and studies, where reported rates range from 65% to 77%.[108-110]

- The lack of variation across age and sex is largely consistent with the findings of other jurisdictions, although a stronger age trend (older patients with lower rates than younger patients) has been cited in recent studies from the United States.[111,112]

What are some examples of efforts in this area?

- This indicator was one of three for which a system performance target was set. The indicator was prioritized because of the strength of the evidence for the guideline and the variation observed among provinces. The setting of a performance target is intended to signal the importance of evidence-based practice and to help motivate local strategies aimed at increasing adherence.

- A study in the United States found an increase in concordance with the 12 or more lymph node guidelines from 34% in the period before the guideline was released (1988 to 1990) to 75% by 2009 following release of the guideline and setting of local targets.[113] The implementation of synoptic surgery and pathology reporting based on a standardized template, two national initiatives supported by the Partnership, may also help yield additional information useful in understanding surgical and pathological practices.

Resection Rates for Stage II or III Rectal Cancer, Stage III Colon Cancer and Stage II or IIIA Non–Small Cell Lung Cancer Patients

What are we measuring?

This indicator measures the percentage of patients with Stage II or III rectal cancer, Stage III colon cancer or Stage II or IIIA non–small cell lung cancer who had a surgical resection. It includes patients diagnosed in 2009 and 2010 and resected within a year of diagnosis and presents rates by province, age group and sex.

- Surgery is the first-line treatment for non-metastatic rectal cancer, colon cancer and non–small cell lung cancer (NSCLC). Various surgical techniques are used as the primary treatment modality for these cancers. Because of the complexity of these resections, treatment guidelines recommend combination neo-adjuvant therapy, including chemotherapy and radiation, in the treatment of Stage II or III rectal cancer and combination adjuvant chemotherapy in the treatment of Stage III colon and Stage II or IIIA NSCLC for improving surgical and overall outcomes.

- Because surgery is the definitive treatment for rectal, colon and lung cancer, it is important to measure and report on provincial resection rates to identify any variations that may point to a need for examining practice patterns for opportunities for improvement. Examining the resection rates by age and sex also helps identify any demographic inequities in access to surgery.

What are the results?

- Provincial rectal resection rates are generally in the range of 80% to 95%, with some exceptions. Ontario reported a resection rate of 73.5% in 2009 (but did not report in 2010) (Figure 4.4). Small case volumes are likely causing year-to-year fluctuations in smaller provinces (i.e., Prince Edward Island and Newfoundland and Labrador) (Figures 4.4, 4.5 and 4.6). Older patients are less likely to receive rectal surgery than younger patients. This is especially the case for women, for whom the difference in resection rates for rectal cancer is about 15 percentage points between those under and over 70 years of age (Figure 4.7).

- There was little interprovincial variation in colon resection rates among four of the six reporting provinces (in the range of 84.4% to 88.8%). In New Brunswick the resection rate was 100% while in Alberta it was 99.3% in 2010 (Figure 4.5). Colon resection rates were similar in the 18 to 69 and the 70 and older age groups as well as between sexes (Figure 4.7).

- Wide variation exists in lung resection rates across provinces, from a low of 25% to a high of 42% in 2010 (Figure 4.6). Lung resection rates were approximately 50% lower for patients over age 70 than for those under 70 and were higher in both age groups for women than for men (Figure 4.7).

Data and measurement considerations

- Some of the provinces are not shown owing to deviations from the indicator specifications that affect their comparability with other provinces. British Columbia includes data only for cases referred to provincial cancer centres (through the 2010 diagnosis year).

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperfomance.ca.

FIGURE 4.4

Percentage of Stage II or III rectal cancer patients who had a surgical resection within one year of diagnosis, by province – patients diagnosed in 2009 and 2010

Percent (%)

Legend: 2009, 2010

Values by province:
- BC: – – (2009), – – (2010)
- AB: 91.2 (2009), 92.2 (2010)
- SK: 80.5 (2009), 95.0 (2010)
- MB: 83.8 (2009), 81.4 (2010)
- ON: 73.5 (2009), – (2010)
- QC: – – (2009), – – (2010)
- NB: 90.9 (2009), 90.0 (2010)
- NS: 93.9 (2009), 85.7 (2010)
- PE: 90.0 (2009), 100.0 (2010)
- NL: 92.9 (2009), 70.3 (2010)
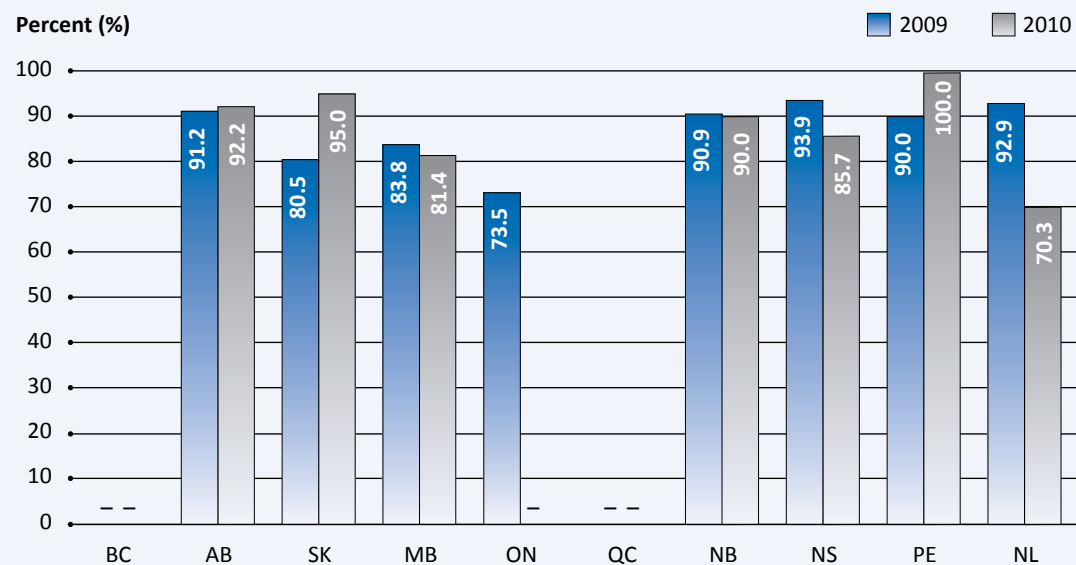
"–" Data not available for BC (2009 and 2010), ON (2010) and QC (2009 and 2010).

Data source: Provincial cancer agencies

FIGURE 4.5

Percentage of Stage III colon cancer patients who had a surgical resection within one year of diagnosis, by province – patients diagnosed in 2009 and 2010

Percent (%)

■ 2009   ■ 2010

Province	2009	2010
BC	–	–
AB	98.6	99.3
SK	43.1	88.8
MB	87.1	84.8
ON	–	–
QC	–	–
NB	96.7	100.0
NS	–	–
PE	93.8	88.2
NL	100.0	84.4
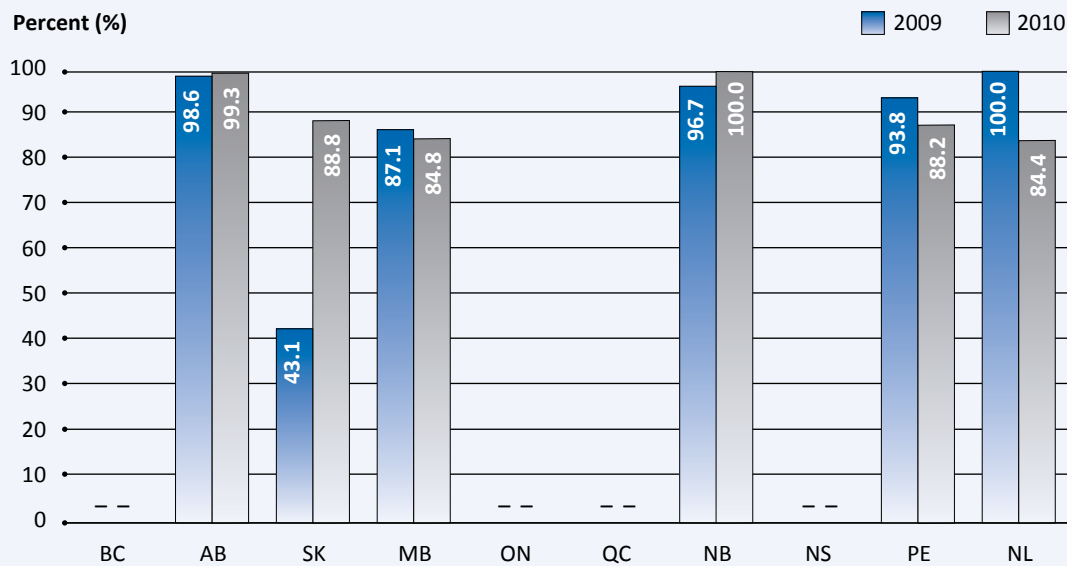
"–" Data not available for BC (2009 and 2010), ON (2009 and 2010), QC (2009 and 2010) and NS (2009 and 2010).

Data source: Provincial cancer agencies

FIGURE 4.6

Percentage of Stage II or IIIA non–small cell lung cancer patients who had a surgical resection within one year of diagnosis, by province – patients diagnosed in 2009 and 2010

Percent (%)

■ 2009   ■ 2010   ■ 2009–2010

Province	2009	2010	2009–2010
BC	–	–	
AB	36.0	39.8	
SK	26.9	25.0	
MB	47.1	42.2	
ON	36.2	–	
QC	–	–	
NB	–	34.6	
NS	–	38.4	
PE			21.6
NL	–	–	
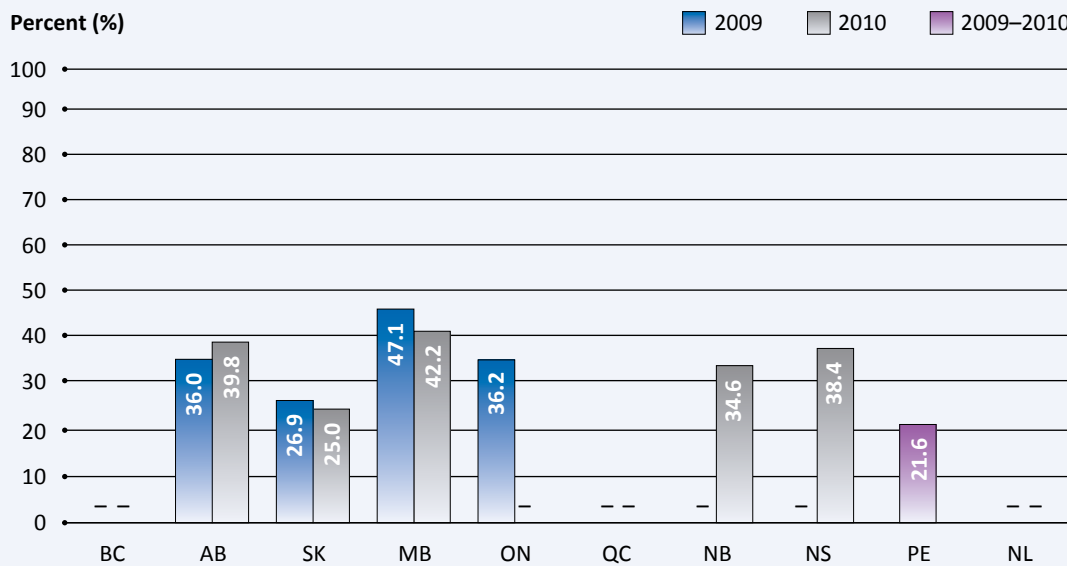
"–" Data not available for BC (2009 and 2010), ON (2010), QC (2009 and 2010), NB (2009), NS (2009) and NL (2009 and 2010)

PE data are for 2009 and 2010 combined.

Data source: Provincial cancer agencies

Percentage of patients with Stage II or III rectal cancer, Stage III colon cancer or Stage II or IIIA non–small cell lung cancer who had a surgical resection within one year of diagnosis, by patient age group, by sex – patients diagnosed in 2010
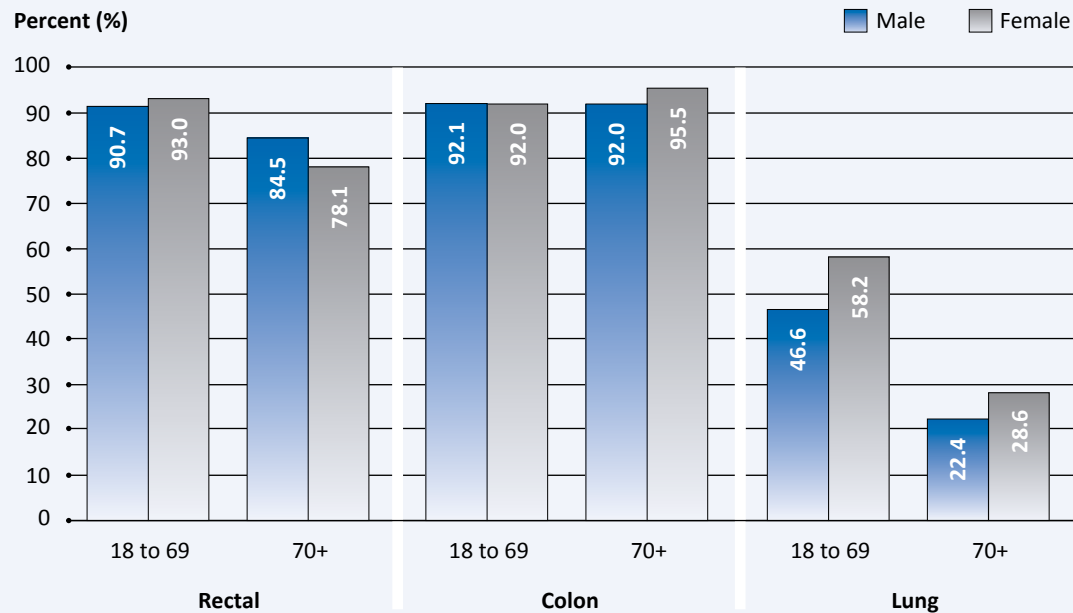
Data include AB, MB, NB, NL, NS, PE and SK for rectal; AB, MB, NB, NL, PE and SK for colon; and AB, MB, NB, NS, PE and SK for lung.

Data source: Provincial cancer agencies

What do the results mean?

- Reporting on the resection rates is intended to prompt review of the extent to which differences are a result of data quality or variations in practice patterns. It is possible that in Ontario, for example, the capture of surgery information is not complete, reflected in a lower-than-expected rectal resection rate. In Saskatchewan, the colon resection rate increased by 46% from 2009 to 2010, which may reflect an improvement in capturing surgery information. Interprovincial comparisons allow for identification of these potential anomalies. If the quality of the data is not a concern, then attention should turn to examining reasons for practice variations.

- Surgical resection data for Stage II or III rectal cancer are comparable between Canada and the United States (approximately 80%).[114] Consistent with findings reported here, a population-based study in the United States reported lower resection rates for Stage II or III rectal cancer patients 75 and older than for younger patients.[111,112,115]

- The lack of variation in colon resection rates between sexes is consistent with Surveillance Epidemiology and End Results data from the United States, which report that 80% of patients with non-metastatic colon cancer aged 80 and older undergo surgery, with improved outcomes compared with those who did not undergo surgery.[116]

- While older patients are significantly less likely to have a lung resection, evidence supports the use of lung resections in both older and younger age groups, as both respond equally well to treatment.[117] A study in the United Kingdom found that older patients and men are less likely to undergo surgery for NSCLC than are younger patients and women.[118]

- Patterns of care may reflect the patient's preference in combination with the judgment of the attending physician, based on factors such as comorbidities and complications that are not accounted for in the indicator calculations.

What are some examples of efforts in this area?

- The results presented here will help inform provincial oncology programs, clinicians and policy-makers about the impact of surgical patterns across the country. Increased efforts will ensure optimal access to care for cancer patients across Canada.

- Further work is needed to evaluate the patterns seen, potentially by examining regional patterns and by investigating resection rates by type of surgery performed. Multiple factors are involved in the process of deciding whether surgery can be performed. These factors, which should be examined in the future, include patient, physician and hospital setting variables such as health status, comorbidities and expertise of the attending physician. Examining these intricacies will help to identify health-care delivery gaps and improve practice across the country.

- The Canadian Partnership Against Cancer's System Performance Initiative is working on reporting the margin status of resections; patients with margins free of residual tumour have better outcomes.

Emerging evidence and studies

- Surgical techniques used for colorectal cancer include colectomy, laparoscopy and hand-assisted laparoscopy; regional variations exist in the use of these techniques.[119] Because of their efficacy and safety, and because these techniques are linked to faster recovery times and shorter hospital stays, laparascopic techniques are being adopted by more surgeons across Canada. However, adoption disparities exist across the country for myriad reasons, including lack of formal training, age and sex of surgeon and university affiliation.

- Approximately 50% of practising Canadian surgeons offer laparoscopic surgery, with surgeons in Ontario, Quebec and British Columbia more likely to use this technique than those in other provinces.[119] It is important to note that not all patients with Stage II or III colon cancer will be candidates for this form of treatment.

- A cross-sectional study found that approximately 48% of members of the American Society of Colon and Rectal Surgeons and the Society of American Gastrointestinal Endoscopic Surgeons perform laparoscopic surgery for colorectal diseases.[120]

4.2   Radiation Therapy

Radiation Therapy Wait Time

What are we measuring?

This indicator measures radiation therapy wait times from the time the patient is ready to be treated to the start of treatment (for 2012). This measure is expressed as the percentage of patients treated within the target timeframe (28 days) as well as the median and 90th percentile wait times in days.

- Timely access to radiation therapy is a key component of a high-quality cancer control system.

- Reducing radiation therapy wait times for cancer patients is a national health-care priority. National wait time targets have been set and provincial initiatives to reduce wait times have been implemented.

What are the results?

- In 2012, nine of the 10 reporting provinces had achieved the target of 90% of patients treated within the national wait time benchmark (Figure 4.8). Nova Scotia's wait times are moving toward the target (based on trends from previously reported results). The shortest wait times were in Saskatchewan and Ontario at 15 days.

- Of the four most common disease sites, the highest interprovincial variability in the 90th percentile wait times was for prostate cancer (33 days between shortest and longest provincial 90th percentile wait time) while lung and colorectal cancer showed the least variability (13 days) (Figure 4.9).

- The percentage of patients treated within the target for all cancer sites ranged from 86.8% to 99.2%, with eight of the 10 provinces reporting over 95% (Table 4.1). The wait time from being ready to be treated to the start of treatment was longest for prostrate cancer in all nine reporting provinces.

Data and measurement considerations

- "Ready to treat" is the starting point for the wait time measurement. While considerable effort has gone into the development and adoption of standardized definitions for this term, interprovincial variations may persist.

- Detailed definitions and calculation methodology are provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 4.8

Median and 90th percentile wait times for radiation therapy, all cancers, by province – 2012 treatment year

Percentage below target

Province	%	Median wait time	90th percentile wait time
BC	95.1%	8	22
AB	95.3%	7	23
SK	97.7%	4	15
MB	99.2%	7	22
ON	97.9%	7	15
QC	97.6%	–	
NB	92.8%	8	26
NS	86.8%	12	31
PE	97.6%	13	22
NL	97.1%	4	19

Days axis: 0, 7, < 14 CARO Target, 21, < 28 Current National Target, 35

Days
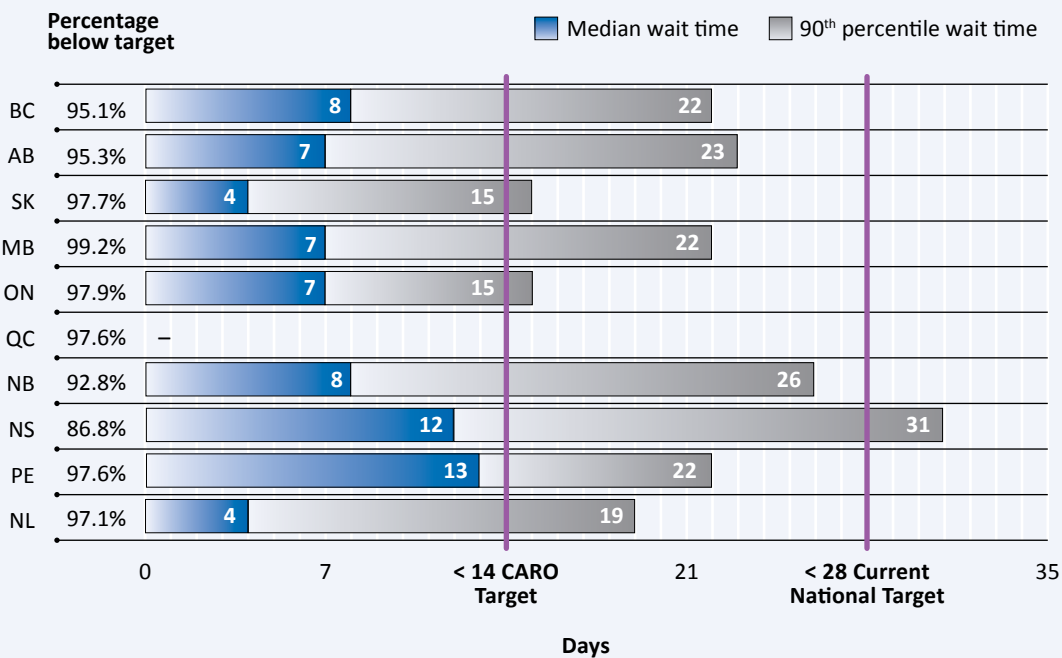
"–" Data for QC are from April 1, 2012 to March 31, 2013, and are not available for the median and 90th percentile wait times.

Wait time is from ready-to-treat to start of radiation.

CARO target reflects the timeframe recommended by the Canadian Association of Radiation Oncology (CARO).

Data source: Provincial cancer agencies

FIGURE 4.9

90th percentile wait time for radiation therapy, by disease site, by province – 2012 treatment year

Legend: ■ All cancers ■ Breast ■ Colorectal ■ Lung ■ Prostate

BC
- All cancers: 22
- Breast: 21
- Colorectal: 21
- Lung: 15
- Prostate: 36

AB
- All cancers: 23
- Breast: 21
- Colorectal: 21
- Lung: 18
- Prostate: 53

SK
- All cancers: 15
- Breast: 16
- Colorectal: 13
- Lung: 12
- Prostate: 40

MB
- All cancers: 22
- Breast: 22
- Colorectal: 22
- Lung: 19
- Prostate: 28

ON
- All cancers: 15
- Breast: 14
- Colorectal: 14
- Lung: 14
- Prostate: 20

QC
- (data not available)

NB
- All cancers: 26
- Breast: 26
- Colorectal: 26
- Lung: 18
- Prostate: 39

NS
- All cancers: 31
- Breast: 30
- Colorectal: 26
- Lung: 25
- Prostate: 35

PE
- All cancers: 22
- Breast: 23
- Colorectal: 22
- Lung: 20
- Prostate: 28

NL
- All cancers: 19
- Breast: 17
- Colorectal: 17
- Lung: 17
- Prostate: 26

Days axis: 0, 7, < 14 (CARO Target), 21, < 28 (Current National Target), 35, 42, 49, 56, 63

Days

"–" Data not available for QC.

Wait time is from ready-to-treat to start of radiation.

CARO target reflects the timeframe recommended by the Canadian Association of Radiation Oncology (CARO).

Data source: Provincial cancer agencies

TABLE 4.1

Percentage of patients treated within the radiation therapy wait time target, four most common cancers and all cancers, by province – 2012 treatment year

Province	Disease site				
	Breast	**Colorectal**	**Lung**	**Prostate**	**All cancers**
British Columbia	96.7	97.9	99.4	82.9	95.1
Alberta	99.5	99.0	98.4	80.1	95.3
Saskatchewan	99.7	100.0	100.0	84.4	97.7
Manitoba	100.0	100.0	99.3	95.7	99.2
Ontario	98.9	99.2	98.9	95.7	97.9
Quebec	–	–	–	–	97.6
New Brunswick	93.1	93.8	98.2	80.5	92.8
Nova Scotia	87.8	93.1	91.8	83.6	86.8
Prince Edward Island	97.8	96.0	100.0	91.3	97.6
Newfoundland & Labrador	99.6	100.0	97.9	93.3	97.1

"–" Data not available for QC by disease site breakdown.

Wait time target is four weeks between ready-to-treat and start of treatment.

Data source: Provincial cancer agencies

What do the results mean?

- Examining wait times interprovincially can help to identify regions where improvements can be made and best practices can be applied. For example, historic wait time information demonstrates that residents of Manitoba continue to receive timely access to radiation therapy, as reported by high percentage of patients treated within wait time targets from 2009 through 2012.[32] Although Nova Scotia's waits continue to improve (from 80.0% treated within the target in 2009 to 86.8% in 2012), wait times are still below the target of 90%. Further work is needed to understand why longer waits are occurring and to develop strategies to improve health-care delivery and shorten system-driven waits.

- Prostate cancer patients have the longest waits for radiation therapy. Patient age, stage of disease and patient-driven delays are risk factors that can contribute significantly to radiation therapy wait times; this is particularly true in prostate cancer.[121]

What are some examples of efforts in this area?

- In December 2005, provincial and territorial health ministers established a benchmark for radiation therapy wait times for cancer. All provinces have implemented initiatives to measure and improve their wait times through monitoring intra-provincial variations.[122]

- Informed by system performance monitoring, Nova Scotia has been working through a multi-year strategy to enhance radiation treatment capacity at its provincial treatment facilities and continues to improve access and reduce wait times.

- It has been recognized that moving to a more patient-centred wait time measurement is preferred, in addition to just measuring the time between ready-to-treat and start of treatment. Two possibilities are to measure the time between consultation with an oncologist and the start of treatment, and the time from diagnosis to the start of treatment. This would allow for capturing a larger section of the patient journey and identify opportunities for process improvement. This issue may be examined in future System Performance work.

Radiation Therapy Utilization and Capacity

What are we measuring?

This indicator measures the percentage of incident cases that receive radiation therapy for any reason within two years of diagnosis. Radiation utilization rates are compared by province for the 2010 diagnosis year. Also presented is the capacity of radiation therapy services by province. Capacity is measured as the number of linear accelerators per million people.

- Along with surgery and systemic therapy, radiation therapy forms part of the backbone of cancer treatment services. A patient may receive radiation therapy pre-operatively (neo-adjuvant), post-operatively (adjuvant) or alone without surgery or other treatments, or in combination with chemotherapy (chemo-radiation).[124]

- Ensuring access to radiation therapy services for all cancer patients who need it is a critical priority in cancer treatment service planning. Relatively low radiation therapy utilization rates in a province, coupled with relatively low linear accelerator capacity, may indicate potential access limitations.

What are the results?

- Radiation therapy use varied only slightly by province for the 2010 diagnosis year. Rates of radiation therapy use within two years of diagnosis ranged from 29.1% to 35.9% in 2010 (Figure 4.10). Generally, rates remained fairly stable between 2007 and 2010.[32]

- The average number of linear accelerators per capita in Canada has increased over the four-year timeframe. In 2012, the number ranged from 4.5 per million people in Alberta to 13.8 per million in Prince Edward Island, with a Canadian average of 7.2 per million (Figure 4.11).

Data and measurement considerations

- The two-year timeframe for radiation therapy utilization (from diagnosis to start of treatment) incorporates mainly curative-intent treatment.

- Owing to methodological and data limitations, lifetime radiation therapy rates could not be calculated for this report. Models to calculate lifetime rates will be developed for future reports.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 4.10

Percentage of cancer patients receiving radiation therapy within two years of diagnosis, by province – patients diagnosed in 2010

Percent (%)
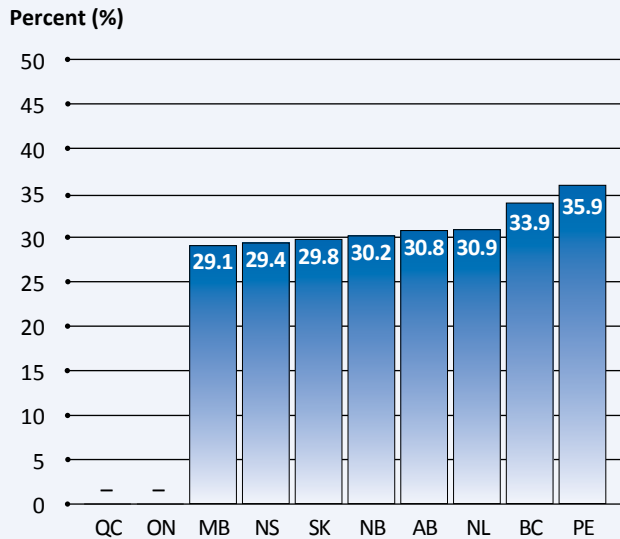
"–" Data not available for ON and QC.

Data include radiation delivered to any site, not necessarily the primary disease site.

Data source: Provincial cancer agencies

FIGURE 4.11

Number of linear accelerators per million people, by province – 2012 reporting year

Linear accelerators per million people
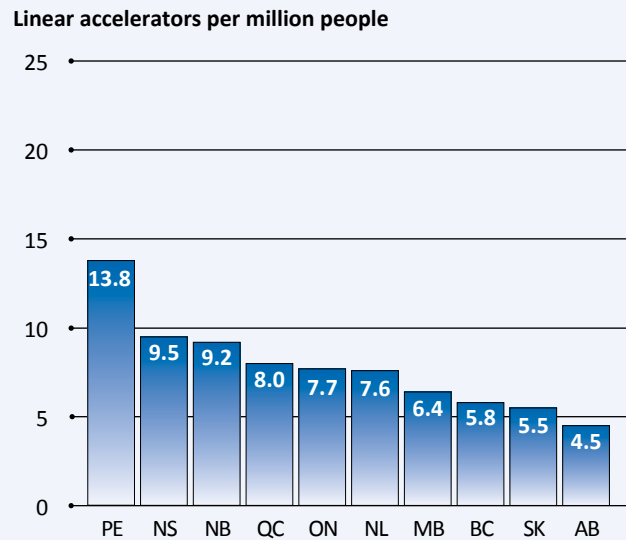
Data source: Provincial cancer agencies, Statistics Canada

What do the results mean?

- While the majority of provinces reported consistent radiation therapy utilization rates from 2007 to 2010, notable changes occurred in Prince Edward Island from 2009 to 2010 as a result of the addition of a second linear accelerator in the province.[32]

- The more commonly cited international benchmark for radiation therapy use in cancer examines radiation therapy over the lifetime of patients.[125,126] Since this method has been developed and validated elsewhere,[127] there are plans in place to develop a methodology for calculating a (modelled) lifetime utilization rate. The results will then be reported in future system performance reports so that comparisons can be made to the international benchmarks. This use will include all treatment intents, including second- and third-line therapy as well as symptom management.

What are some examples of efforts in this area?

- The Canadian Partnership Against Cancer's Quality Implementation Initiative uses results of the system performance indicators, among other inputs, to identify opportunities for launching strategies to improve the quality of clinical practice. The Canadian Partnership for Quality Radiotherapy has been funded by this initiative to implement a national quality program in radiotherapy.[128] This program includes developing the following:

  - National programmatic quality assurance indicators and recommendations that will be incorporated into the existing hospital and cancer centre accreditation process

  - National technical quality assurance indicators and recommendations for radiation treatment equipment

- A national radiation treatment incident reporting and learning database

- National patient-centred indicators for personal quality of care while receiving radiation treatment.

- The Organisation for Economic Co-operation and Development (OECD) reported an average of 6.2 linear accelerators per million population for OECD member countries.[129] This average is lower than the 2012 Canadian average of 7.2 per million.

Pre-Operative Radiation Therapy for Stage II or III Rectal Cancer Patients

What are we measuring?

This indicator measures the percentage of patients with Stage II or III rectal cancer who had resections and who received pre-operative radiation therapy as per widely published treatment guidelines.[130,131] This year's indicator compares results for patients diagnosed in 2007 through 2010, examines age and sex patterns and makes interprovincial comparisons.

- Approximately 9,200 people in Canada die from colorectal cancer each year.[96] Around 20% of cases are tumours of the rectum.[132] According to pooled analyses from three North American trials, five-year relative survival in Stage II or III rectal cancer ranges from 78% for Stage IIA to 31% for Stage IIIC; local recurrence rates can be as high as 22% for Stage III.[133]

- The delivery of radiation therapy preceding surgical resection (i.e., pre-operatively) has been shown to improve outcomes and local control for patients with Stage II or III rectal cancer.[133] This is particularly the case among patients who have a large malignancy that is difficult to remove.[108] There is also clinical trial evidence to suggest that pre-operative short-course radiation leads to improved disease-free survival relative to post-operative radiation.[134]

- This is the fourth year that concordance with these guidelines has been measured in system performance reports. This year (2014), a target treatment rate of 70% was established for this indicator. The objective of setting the target is to drive increased uptake of guideline-recommended therapies for Stage II or III rectal cancer.

What are the results?

- Pre-operative radiation therapy rates consistent with guidelines generally increased steadily over the four-year period. The rates for the six provinces submitting data for this indicator in 2010 varied from 38.1% to 48.0% of patients treated according to guidelines, suggesting an opportunity for improvement (for 2009, Ontario and Prince Edward Island reported rates of 51.7% and 50.0%, respectively) (Figure 4.12). A system performance target of 70% was set in 2014 for this indicator (more on the target is provided under "What do the results mean?").

- The use of pre-operative radiation treatment for Stage II or III rectal cancer varied significantly by age but not by sex (Figures 4.13 and 4.14). The treatment rate dropped substantially for older patients, from 50% for patients under age 60 to 20% for patients aged 80 and older in 2010 (Figure 4.13).

Data and measurement considerations

- Results for British Columbia are not shown as in previous reports because British Columbia includes data only for cases referred to the provincial cancer centres (through the 2010 diagnosis year).

- In the past, it has been noted that several provinces reported substantial increases in the number of Stage II or III rectal cancer cases included in the indicator calculation from year to year. This may reflect improvements in the ability to identify the target cases in the administrative data but may also reflect real trends.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 4.12

Percentage of Stage II or III rectal cancer patients who received radiation therapy before surgery, by province – patients diagnosed from 2007 to 2010

Percent (%)
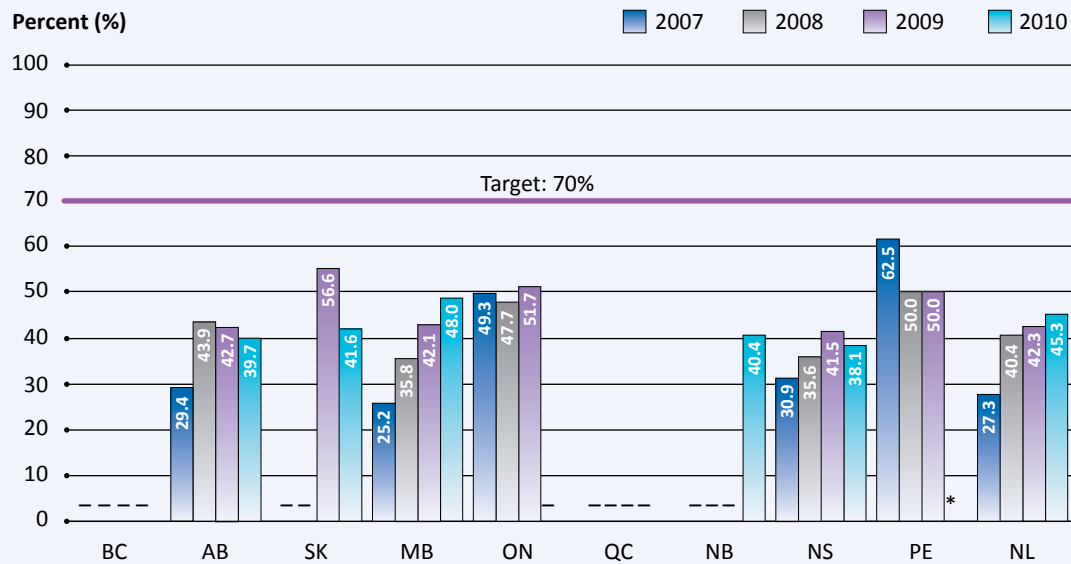
* Suppressed due to small numbers.

"–" Data not available for BC (2007 to 2010), SK (2007 and 2008), ON (2010), QC (2007 to 2010) and NB (2007 to 2009).

Data include radiation therapy started up to 120 days prior to surgery.

Data source: Provincial cancer agencies

FIGURE 4.13

Percentage of Stage II or III rectal cancer patients who received radiation therapy before surgery, by patient age group – patients diagnosed from 2007 to 2010

Percent (%)

Patient Age Group
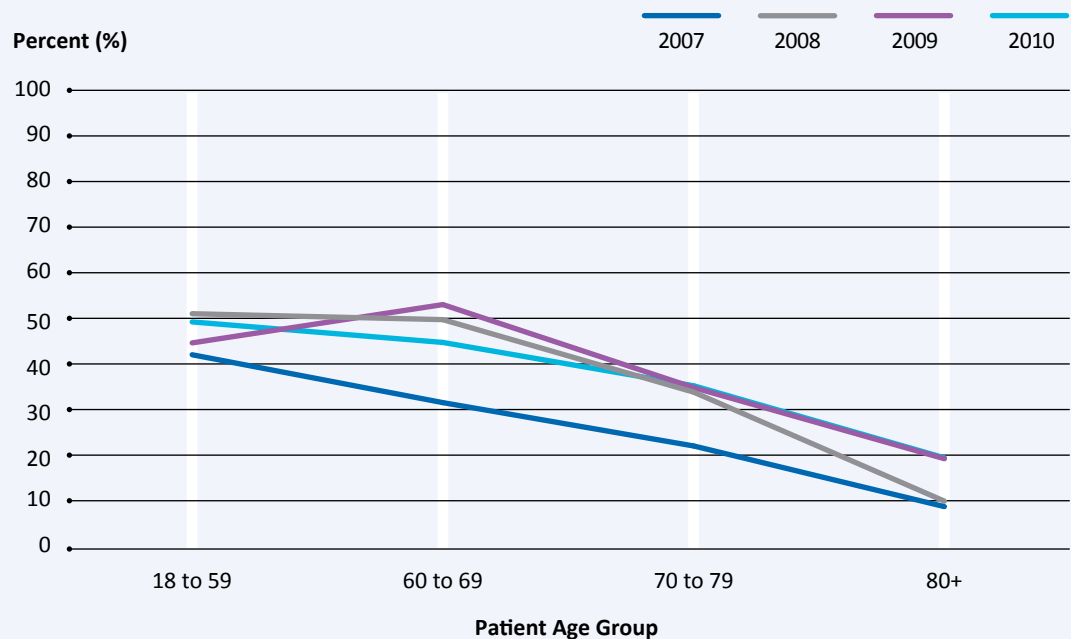
Data include AB, MB, NL, NS and PE (provinces that submitted comparable data for all four years).

Data include radiation therapy started up to 120 days prior to surgery.

Data source: Provincial cancer agencies

FIGURE 4.14

Percentage of Stage II or III rectal cancer patients who received radiation therapy before surgery, by patient age group, by sex – patients diagnosed in 2010

Percent (%)

Male   Female

	18 to 69	70+
Male	48.0	31.8
Female	47.1	30.4

Patient Age Group
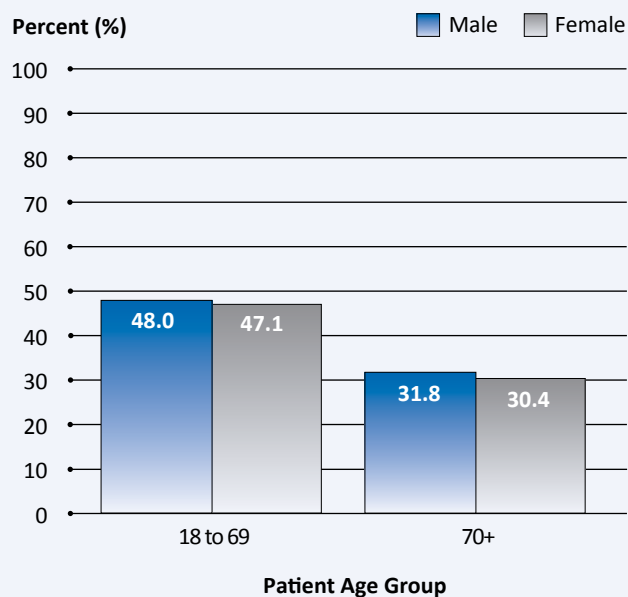
Data include AB, MB, NB, NL, NS, PE and SK.

Data include radiation therapy started up to 120 days prior to surgery.

Data source: Provincial cancer agencies

What do the results mean?

- This is the first year for reporting a target for this indicator. The target treatment rate (shown in Figure 4.12) has been set at 70% by the System Performance Targets and Benchmarks Working Group. While none of the provinces reporting data for this indicator achieved the treatment target in 2010, it is important to continue to report on this target as a signal for changing practice in line with changing guidelines. The target is supported by chart review data and represents an improvement to be achieved based on the treatment rate in the best-performing province in 2009. Also, this target is comparable to the performance achieved in Sweden in 2009.[108]

- There may be cases in which pre-operative radiation therapy is not provided for a variety of reasons; in these cases post-operative radiation is strongly recommended.[135] While the frequency of cases with contraindications for pre-operative radiation therapy is not known, it is not expected to vary significantly among provinces. The chart review study results included in the Canadian Partnership Against Cancer's *2012 Cancer System Performance Report* shed some light on these issues. In the five participating provinces, 88% of patients diagnosed with Stage II or III rectal cancer were referred to a medical or radiation oncologist by a surgeon; the remaining 12% were not.[32] The most common reason for non-referral for radiation therapy among Stage II or III rectal cancer cases was the presence of comorbidities. The most common reason for non-treatment was the patient not being referred to a radiation oncologist for consultation.

What are some examples of efforts in this area?

- The retrospective chart review of resected rectal cancer patients helped to better understand referral and treatment patterns and to identify the decision rationale for radiation therapy.[24] The results have led to identification of gaps, which may be addressed through a change in clinical practice and quality improvement strategies.

- There is a need to better understand the drop in treatment rates in those aged 70 and older. Future system performance reports will continue to monitor treatment rates in this age group. Additional target-setting may be warranted if the shift toward the current target is age-specific.

Emerging evidence and studies

- The management of rectal cancer has evolved over the past few decades as a result of major advances in large randomized controlled trials, which have led to supporting or refuting previously established guidelines. Before 1980, the sole modality for treating rectal cancer patients was surgery.[136] In 1990, the National Institutes of Health Consensus Conference prepared a statement about new data from clinical studies supporting the use of combination post-operative chemotherapy and radiation therapy for rectal cancer because it was demonstrated to delay tumour recurrence and increase survival.[137] A meta-analysis of 14 clinical trials later showed evidence (improved overall mortality) to support pre-operative radiation therapy.[138] Pre-operative radiation remains the currently accepted evidence-based guideline. The management of rectal cancer may shift in the future to ensure patients receive the most effective evidence-based treatment regimen.

Post-Operative Radiation Therapy for Stage I or II Breast Cancer Patients

What are we measuring?

This indicator measures the percentage of Stage I or II breast cancer patients who receive adjuvant radiation therapy following breast-conserving surgery as per widely published treatment guidelines. This year's indicator compares results for patients diagnosed in 2009 and 2010, examines age patterns and makes interprovincial comparisons.

- The five-year recurrence rate for early (Stage I or II) breast cancer has been shown to exceed 25% in the absence of standard treatment.[139]

- Most women diagnosed with non-metastatic breast cancer are candidates for surgery, either breast-conserving surgery (BCS) or mastectomy.[140] BCS followed by radiation therapy (referred to as breast-conserving therapy) is less invasive than mastectomy and is associated with lower morbidity and better cosmesis and psychological outcomes, but has comparable recurrence and survival.[141]

What are the results?

- Seven provinces provided data for 2010 (i.e., post-BCS); the treatment rates in those provinces ranged from 75.8% in Manitoba to 87.9% in Alberta (Figure 4.15). There was a reduction in radiation therapy following BCS from 2009 to 2010 for five of the six reporting provinces.

- In all years, the average adjuvant radiation rate dropped for patients over age 70, particularly after age 80 (Figure 4.16).

Data and measurement considerations

- Results for British Columbia are not presented given that the data include only cases referred to the provincial cancer centres (through the 2010 diagnosis year).

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperfomance.ca.

FIGURE 4.15

Percentage of Stage I or II breast cancer patients receiving radiation therapy following breast conserving surgery, by province – patients diagnosed in 2009 and 2010
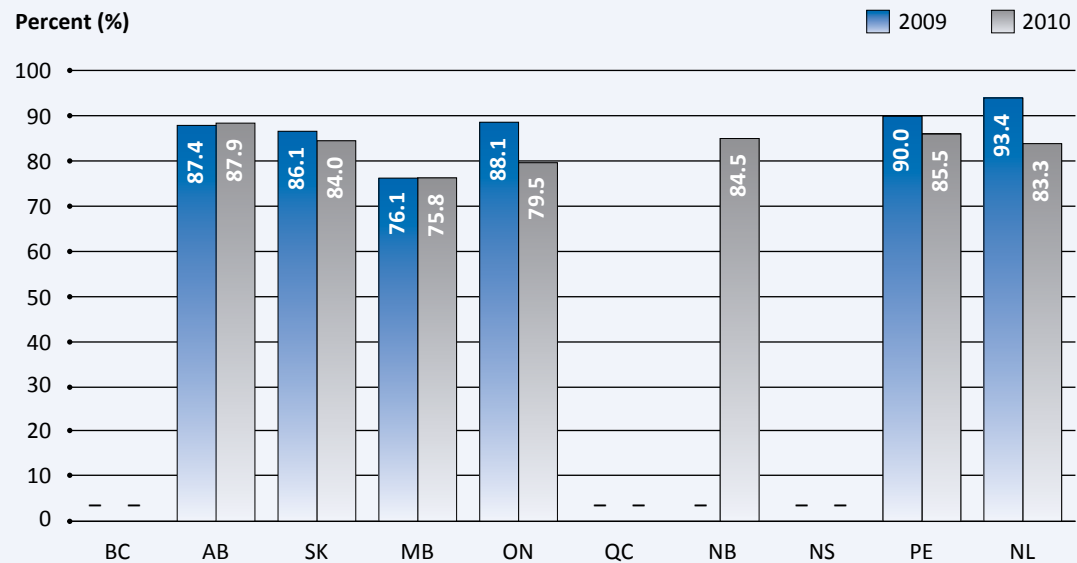
"–" Data not available for BC (2009 and 2010), QC (2009 and 2010), NB (2009) and NS (2009 and 2010).

Data include radiation therapy started within 270 days following surgery.

Data source: Provincial cancer agencies

Percentage of Stage I or II breast cancer patients receiving radiation therapy following breast conserving surgery, by patient age group – patients diagnosed from 2007 to 2010

Percent (%)

2007   2008   2009   2010

Patient Age Group
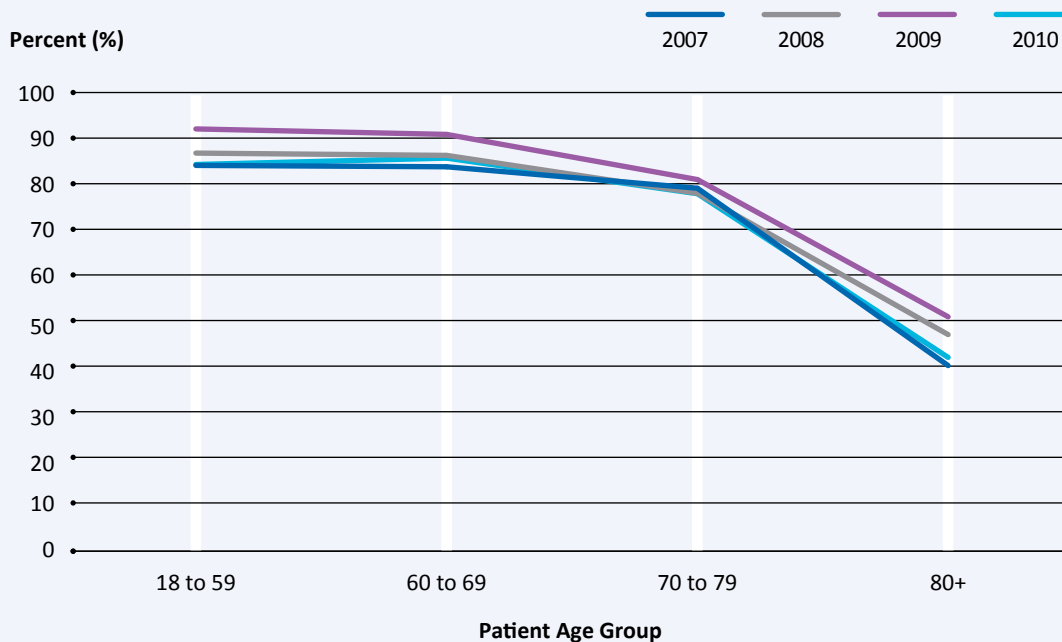
Data include AB, MB and ON (provinces that submitted comparable data for all four years).

Data include radiation therapy started within 270 days following surgery.

Data source: Provincial cancer agencies

What do the results mean?

- Population-based studies can help put these Canadian findings into context. According to a study from the United States, 94% of women age 66 to 70 received adjuvant radiation therapy for early-stage breast cancer following BCS from 2000 to 2002.[142] A national Swiss study reported an adjuvant radiation treatment rate of 92% for women under age 80 with Stage I to III breast cancer.[143] Some provincial rates reported here are slightly lower than these published results; however, the years of analysis and study methods (particularly age exclusions) differ, making precise comparisons difficult.

- Some reduction in use of guideline-recommended therapy in older patients might be evidence-based. Several clinical trials suggest that radiation therapy following BCS for Stage I estrogen-receptor-positive women over age 70 has limited benefits for recurrence and survival.[144]

- While adjuvant radiation therapy should be considered for most patients with early-stage breast cancer who undergo BCS, there are no formal Canadian performance targets for the actual treatment rate. In some patients, the risks associated with radiation therapy may outweigh the benefits (e.g., patients with connective tissue disease or those who have previously received radiation at the same site),[145] although for those patients, mastectomy may be the better treatment option.

What are some examples of efforts in this area?

- Work is underway through the Canadian Partnership Against Cancer (the Partnership) System Performance Initiative to develop benchmarks and targets for this and other indicators for future reports.

- In October 2012, the Partnership collaborated with the Canadian Institute for Health Information and released a Special Focus Report on breast cancer surgery patterns across the country.[146] The report compared radiation therapy and BCS rates by province, highlighting their correlation, which largely explains the interprovincial variations noted in radiation therapy utilization.

4.3 Systemic Therapy

Post-Operative Chemotherapy for Stage III Colon Cancer Patients

What are we measuring?

This indicator measures the percentage of Stage III colon cancer patients who received adjuvant (post-operative) chemotherapy following resection. This year's indicator compares results for patients diagnosed each year from 2007 to 2010, examines age and sex patterns and makes interprovincial comparisons.

- The role of adjuvant chemotherapy in patients with surgically resected Stage III colon cancer has been clearly established. Several large randomized trials have demonstrated that treatment with chemotherapy following surgery improves outcomes.[147-149]

- Treatment practice guidelines recommend that adjuvant chemotherapy should follow surgery for patients with Stage III colon cancer.[150]

- Measuring national practice patterns relative to this treatment guideline allows for the identification of gaps and other variations, which could be addressed through quality improvement strategies. This is the fourth year this indicator has been reported on in

system performance reports. Reporting allows for the identification of any trends in practice patterns but multiple years of data also allow for better ascertainment of treatment rates for provinces with small numbers of annual cases.

What are the results?

- There was variation in the percentage of resected Stage III colon cancer cases treated with adjuvant chemotherapy for the five provinces reporting results. Data for 2010 show that the percentage of resected Stage III colon cancer cases treated with adjuvant chemotherapy ranged from 50.6% in Newfoundland and Labrador to 80.0% in Prince Edward Island (Figure 4.17). Taking into account year-to-year fluctuations resulting from small case volumes, the inferred treatment rate more likely ranges between the mid-50%s and mid-70%s. This still represents an interprovincial variation that is larger than can be attributed to differences in case mix.

- As with other guideline concordance indicators presented in this report, adjuvant chemotherapy treatment rates dropped for older patients with Stage III colon cancer, from 86% for patients aged younger than 60 years to 18% for patients aged 80 and older in 2010 (Figure 4.18).

- The treatment rate for patients 70 and older was 40.8% for women and 46.3% for men, although this difference may not be significant (Figure 4.19).

Data and measurement considerations

- This indicator looks at chemotherapy delivered within 120 days of surgery. Both intravenous and oral chemotherapy are included, although oral chemotherapy data capture may be incomplete in some provinces. The extent to which oral chemotherapy is not fully captured may have

more of an impact on measured treatment rates for older patients, who are more likely to be placed on an oral regimen.

- Results for British Columbia, Ontario and Nova Scotia are not shown owing to deviations from the indicator specifications that affect their comparability with other provinces. British Columbia includes data only for cases referred to the provincial cancer centres, while Ontario and Nova Scotia do not capture all chemotherapy delivered province-wide.

- Prince Edward Island's results were derived from patient chart reviews (whereas results from other provinces were based on analysis of administrative data).

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 4.17

Percentage of Stage III colon cancer patients receiving chemotherapy following surgical resection, by province – patients diagnosed from 2007 to 2010
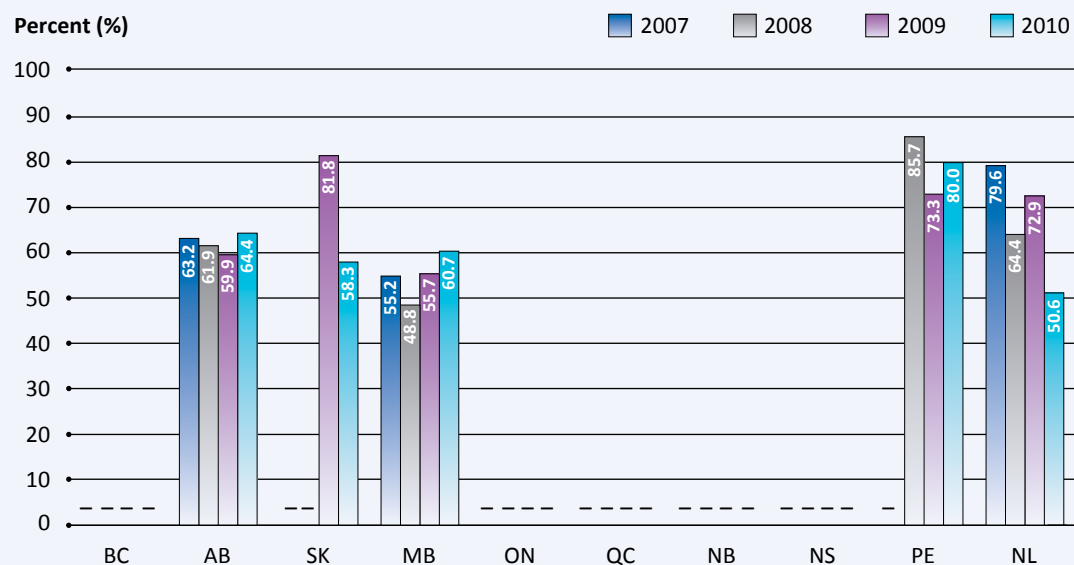
"–" Data not available for BC (2007 to 2010), SK (2007 and 2008), ON (2007 to 2010), QC (2007 to 2010), NB (2007 to 2010), NS (2007 to 2010) and PE (2007).

Data include chemotherapy started within 120 days following surgery.

Data source: Provincial cancer agencies

FIGURE 4.18

Percentage of Stage III colon cancer patients receiving chemotherapy following surgical resection, by patient age group – patients diagnosed from 2007 to 2010
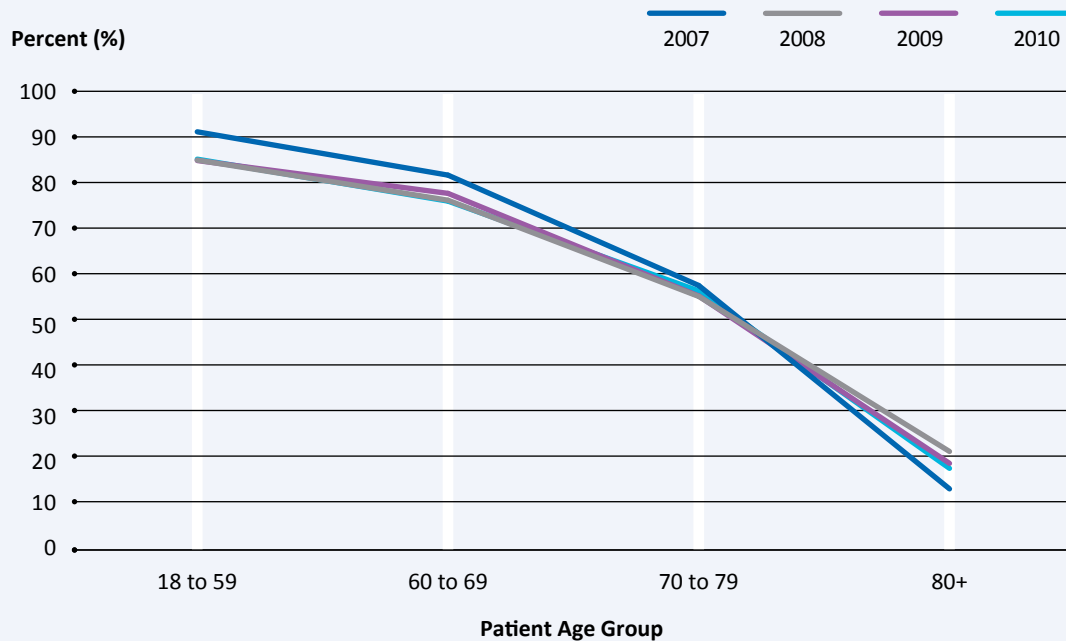
Data include AB, MB and NL (provinces that submitted comparable data for all four years).

Data include chemotherapy started within 120 days following surgery.

Data source: Provincial cancer agencies

FIGURE 4.19

Percentage of Stage III colon cancer patients receiving chemotherapy following surgical resection, by patient age group, by sex – patients diagnosed in 2010
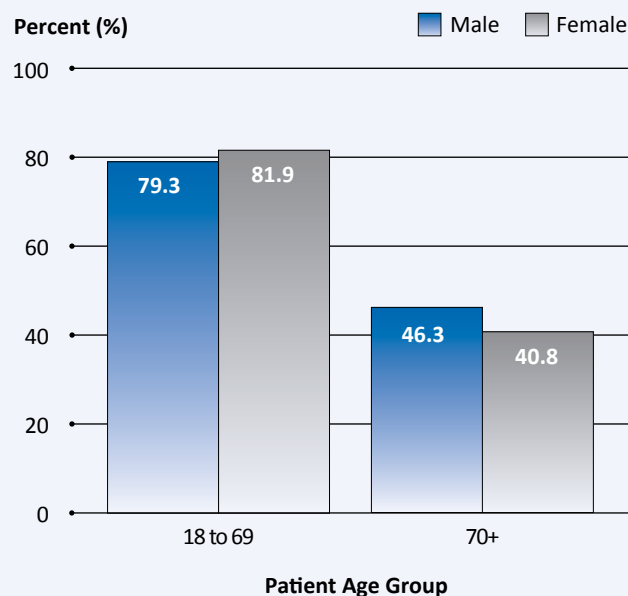
Data include AB, MB, NL, PE and SK.

Data include chemotherapy started within 120 days following surgery.

Data source: Provincial cancer agencies

What do the results mean?

- Although adjuvant chemotherapy following resection should be considered for most patients with Stage III colon cancer, there are no formal Canadian performance targets yet for the actual treatment rate. In some patients, especially the elderly, the negative effects of chemotherapy may outweigh the benefits. While the frequency of these cases is not known, it is not expected to vary significantly among provinces. It is likely that at least some of the interprovincial variations presented here reflect differences in clinical practice patterns.

- Also worth noting is the significantly lower treatment rates for older patients. While older patients are more likely to have contraindications to treatment, studies have suggested that many older patients could benefit from adjuvant chemotherapy. They are still, however, less likely to receive it even when accounting for higher rates of comorbidities and other contraindications. A large study from the United States, for example, found that patients older than 75 with surgically resected colon cancer may gain a survival benefit from chemotherapy comparable to that of younger patients.[151] However, competing risks of death and overall life expectancy come into play when determining treatment for the older age groups. For comparison, rates of chemotherapy after resection of Stage III colon cancer based on analysis of Surveillance Epidemiology and End Results data from the United States were 78% for patients aged 65 to 69, 74% for those aged 70 to 74, 58% for those aged 75 to 79, 34% for those aged 80 to 84 and 11% for those aged 85 to 89.[152]

- It is possible that part of the drop-off in treatment rates for older patients measured in this report may be due to incomplete capture of oral chemotherapy in some provinces. A recent study from the United States showed that the oral chemotherapy agent capecitabine represented 20% of adjuvant chemotherapy given to Stage III colon cancer patients aged 75 and older.[153]

What are some examples of efforts in this area?

- The data results derived from this indicator will be shared with medical oncologists and provincial oncology drug programs and equivalents to try to identify factors contributing to measured variations. Additional analyses may be warranted to identify influencing factors. These might include the use of oral chemotherapy and the extent to which this could be captured in the data.

Post-Operative Chemotherapy for Stage II or IIIA Non–Small Cell Lung Cancer Patients

What are we measuring?

This indicator measures the percentage of patients with resected Stage II or IIIA non–small cell lung cancer receiving adjuvant (post-operative) chemotherapy, as per widely published treatment guidelines.

- This year, the report on this indicator includes treatment rates for patients diagnosed from 2007 to 2010 by province, age group and sex.

- Over 20,000 people in Canada die from lung cancer each year; this is more than the next four highest-mortality cancer sites combined.[72]

- As per the data presented in Figure 3.9, 21% of lung cancer patients are diagnosed with Stage II or IIIA disease. This rate corresponds to 5,200 lung cancer cases, including roughly 4,000 non–small cell lung cancer (NSCLC) cases.

- Median survival for NSCLC patients is 47, 24 and 17 months for Stage IIA, IIB and IIIA, respectively (based on international data from the International Association for the Study of Lung Cancer database).[154]

- The delivery of chemotherapy following resection has been shown to improve disease-free and overall survival for patients with locally advanced (Stage II or IIIA) NSCLC (by around 4% to 5% for five-year survival).[155]

- Measuring national practice patterns relative to this treatment guideline allows for the identification of gaps and other variations, which could be addressed through quality improvement strategies. This is the fourth year this indicator has been reported on in system performance reports. Reporting allows for the identification of any trends in practice patterns but multiple years of data also allow for better ascertainment of treatment rates for provinces with small numbers of annual cases.

What are the results?

- Adjuvant chemotherapy rates among Stage II or IIIA NSCLC patients for the five provinces submitting data compliant with the indicator specifications ranged from 56.7% to 36.8% for 2010 (Figure 4.20).

- The results suggest that the adjuvant chemotherapy rate has been decreasing between 2007 and 2010. By age group, in 2010 the treatment rate dropped from 55% for patients under age 60 to 32% for patients aged 70 to 79. The treatment rate was near 0% for patients 80 years and older in the data available (Figure 4.21).

FIGURE 4.20

Percentage of Stage II or IIIA non–small cell lung cancer patients who received chemotherapy following surgical resection, by province – patients diagnosed from 2007 to 2010

Percent (%)

Legend: 2007 | 2008 | 2009 | 2010 | 2008–2010

Province	2007	2008	2009	2010	2008–2010
BC	–	–	–	–	
AB	51.9	60.3	45.8	50.0	
SK	66.7	64.0	50.0	36.8	
MB	65.9	41.2	43.8	40.4	
ON	58.8	53.7	58.0	56.7	
QC	–	–	–	–	
NB	–	–	–	–	
NS				41.0	
PE	–				61.5
NL	–	–	–	–	
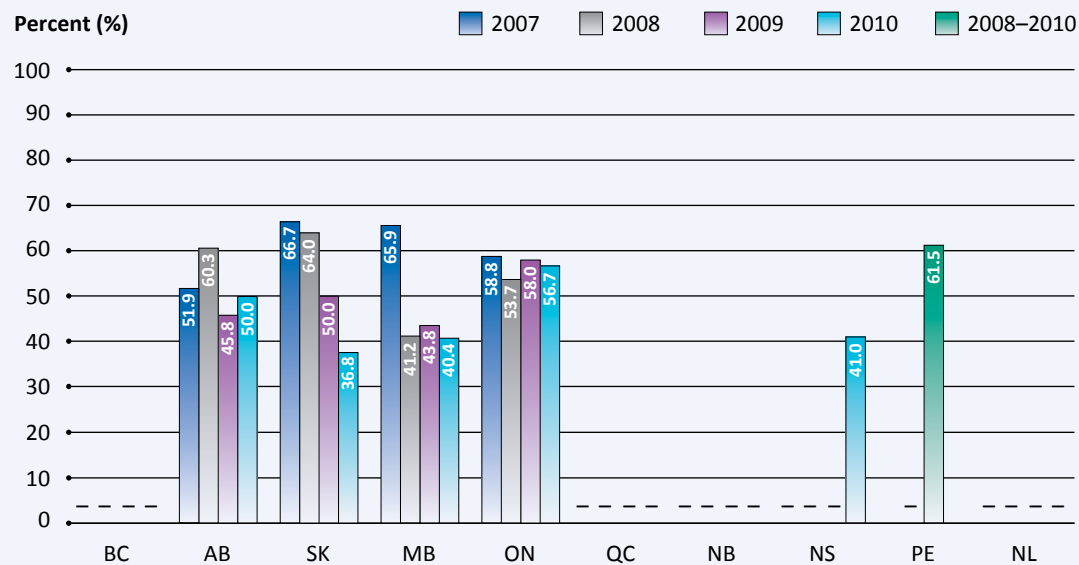
"–" Data not available for BC (2007 to 2010), QC (2007 to 2010), NB (2007 to 2010), NS (2007 to 2009), PE (2007) and NL (2007 to 2010).

ON 2010 data are for 2010/2011 fiscal year.

PE data are for 2008 to 2010 combined.

Data include chemotherapy started within 120 days following surgery.

Data source: Provincial cancer agencies

Data and measurement considerations

- Nova Scotia began submitting data in 2010. Prince Edward Island data are combined for 2008 to 2010 to avoid suppression owing to small case volumes.

- Chemotherapy started within 120 days of surgery is included.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

What do the results mean?

- While adjuvant chemotherapy should be considered for most patients with resected Stage II or IIIA NSCLC, factors such as the

patient's performance status and comorbidity, among others, play a part in the decision to treat with chemotherapy. A detailed chart review study conducted by the Canadian Partnership Against Cancer (the Partnership) in 2011 in collaboration with a number of provinces validated the results of the administrative data-based indicators presented here and identified reasons for non-treatment.

- Meaningful country-level data on the percentage of patients with Stage II or III NSCLC receiving adjuvant chemotherapy are scarce. Most utilization studies based in the United States are either out-dated (Surveillance Epidemiology and End Results data are from the 1990s) or are one-centre studies. However, one study used data from the Netherlands

FIGURE 4.21

Percentage of Stage II or IIIA non–small cell lung cancer patients who received chemotherapy following surgical resection, by patient age group – patients diagnosed from 2007 to 2010
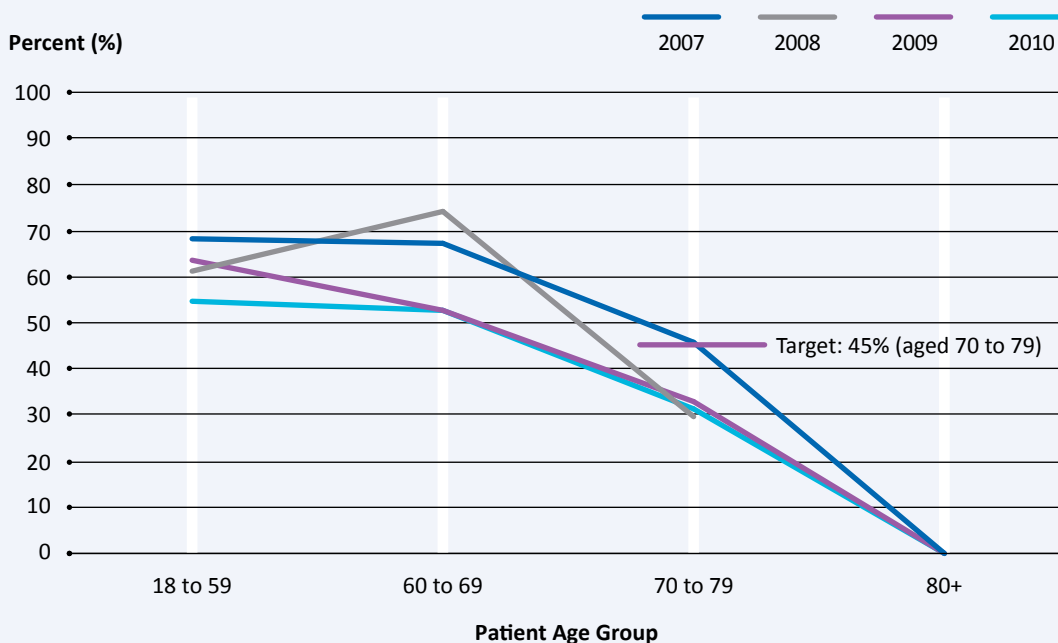
Data suppressed due to small numbers for the 80+ age group in 2008.

Data include AB, MB and SK (provinces that submitted comparable data for all four years).

Data include chemotherapy started within 120 days following surgery.

Data source: Provincial cancer agencies

FIGURE 4.22

Percentage of Stage II or IIIA non–small cell lung cancer patients who received chemotherapy following surgical resection, by patient age group, by sex – patients diagnosed in 2010

Percent (%)

Male   Female

Patient Age Group	Male	Female
18 to 69	46.8	54.3
70+	29.7	32.6

Patient Age Group
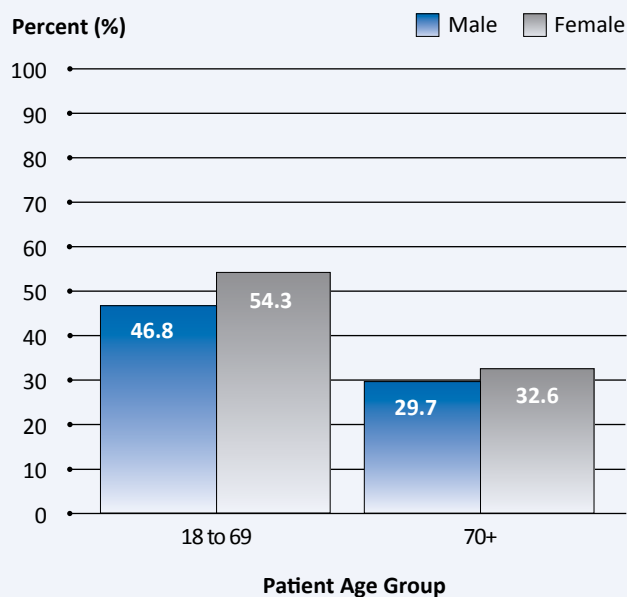
Data include AB, MB, NS, PE and SK.

Data include chemotherapy started within 120 days following surgery.

Data source: Provincial cancer agencies

Cancer Registry to show that 24% of patients with Stage II NSCLC who were under age 75 received this guideline-recommended treatment.[156]

What are some examples of efforts in this area?

- As of 2014, the Partnership's System Performance Targets and Benchmarks Working Group has recommended that a target performance level be assigned for this indicator. In this case, the target is assigned at an age group level to promote higher levels of adjuvant chemotherapy in the treatment of patients over age 70, which is the median age for lung cancer incidence. The target treatment rate (shown in Figure 4.21) has been set at 45% for patients aged 75 to 79. This target was set by the Working Group such that it brings the rate halfway to that for patients under age 70 (recognizing from chart review studies previously conducted by System Performance and other evidence that twice as many patients aged 70 to 79 would have contraindications for chemotherapy as those younger than 70). The rationale for the target is based on multiple studies that have shown survival benefit for patients between 70 and 79 comparable to those of the younger cohort.[157] Upcoming reports will assess treatment rates relative to this target.

5. Person-Centred Perspective

5. Person-Centred Perspective

This section presents three indicators for which national data or data from a majority of provinces are currently available. They address a person-centred perspective and end-of-life care for people with cancer, and review the following: the availability of screening-for-distress tools, patient satisfaction with selected dimensions of care and place of death measures.

The breadth of patient satisfaction results has expanded in 2014 to include the primary type of cancer, first-time versus repeat cancer diagnosis, time elapsed since diagnosis, rating of overall health and socio-demographic variables (education, sex and age group). The patient satisfaction survey results focus on the unmet needs of people with cancer (where respondents reported a negative rating), as opposed to areas that received positive ratings, to more clearly identify and focus on where the opportunities are for improving the patient experience.

Throughout the cancer journey, people who have cancer experience a range of physical, social, emotional and practical challenges. An important measure of the quality of a cancer control system is the degree to which it provides patients and their families and loved ones with person-centred care and support as they deal with those challenges. The person-centred perspective involves planning and delivering care based on and driven by the individual needs, values and priorities of the person

receiving care, within the parameters of evidence and quality.

The cancer care community recognizes the need to develop standardized measures to assess the patient's experience across the cancer journey and to help accelerate improvement in care and outcomes. Identifying survivorship and end-of-life care needs and the extent to which the system is responding to those needs is also essential. This domain continues to be an emerging area of research, and work still needs to be done to collect meaningful pan-Canadian data.

The three indicators presented here provide some understanding of the experience of people with cancer and are another step forward in addressing this under-measured domain in the cancer control continuum. The plan is for future system performance reports to include progressively more detailed indicators on patient-reported outcomes, survivorship and end-of-life and palliative care as they become available.

Indicator	Summary of results
Screening for distress	The implementation of standardized screening tools varies across the country. In 2013, eight provinces used a standardized symptom screening tool for at least a portion of patients at some or all provincial cancer centres; screening tools may be used in other provinces but data on their use are not available.
Patient satisfaction	Of the patient satisfaction domains reported on the Ambulatory Oncology Patient Satisfaction Survey, emotional support received by far the strongest negative rating (ranging from 19.4% to 30.7% provincially). Looking more closely at the negative response rates by socio-demographic, disease site and phase, health status and other factors can help point to specific opportunities for improving the patient experience.
Place of death	In 2009, 70.7% of cancer deaths in Canada occurred in hospitals. The percentage of cancer patients dying outside of hospital ranged from 11.2% to 47.0% by province. Most patients who know they are dying from cancer prefer to die at home or in a home-like setting.

Screening for Distress

What are we measuring?

This indicator measures the extent to which provinces and their cancer programs have implemented standardized tools to screen for patient-reported symptoms such as emotional and physical distress (including pain) as of 2013.

- People who have cancer face myriad concerns and challenges, including emotional, physical, practical, informational, social and spiritual concerns.[158] The degree (mild to severe) and nature of distress vary by individual and cancer type and span the cancer continuum from diagnosis to survivorship or palliation. Significant degrees of distress across all phases of the cancer journey have been reported by 35% to 45% of respondents in North American studies.[159,160] Similar rates of distress have been reported in many European countries, the Middle East, South America and Asia.[161] While an overwhelming majority of oncologists reported screening for distress in the United States and the United Kingdom, only 14.3% and 10%, respectively, used a standardized tool.[162,163]

- Screening for distress is required to customize interventions beyond standard care, which aim to offer professional support services to address a patient's changing needs and specific concerns and to improve quality of life. However, routine screening alone is insufficient for addressing the needs of the individual. The response to distress (psychosocial intervention, further assessment, referral or a combination) is pivotal for facilitating evidence-based interventions and programmatic responses in clinical settings based on patient needs.

- Late identification of distress in cancer patients is associated with negative outcomes, including poorer adherence to treatment recommendations,[164,165] lower levels of satisfaction with care[165,166] and worse quality of life.[165,167] Providing early psychosocial

intervention can effectively minimize distress.[168] The use of psychosocial services varies when examined by socio-economic variables, and the use of one service typically leads to the use of other psychosocial and supportive care services, suggesting positive experiences with the use of such services.[169]

- The Edmonton Symptom Assessment System (ESAS) is the most frequently used self-reporting screening instrument in Canada. It measures nine commonly reported symptoms (pain, tiredness, nausea, depression, anxiety, drowsiness, appetite, well-being and shortness of breath) reported by cancer patients on a scale from 0 to 10.[170] Another commonly used tool is the Canadian Problem Checklist (CPC), designed by the Canadian Partnership Against Cancer's Cancer Journey Advisory Group. The CPC was adapted from the list published by the National Comprehensive Cancer Network, which screens for emotional and physical problems and practical concerns not captured on the ESAS.[170] Other standardized instruments are used across the country to screen for distress and other physical symptoms of cancer, such as the Calgary Symptoms of Stress Inventory and the Profile of Mood-States Short Form.[171] While there is a wide range of quality of life and psychosocial measures, the ESAS and the CPC are becoming the most commonly accepted first step to identifying cancer patient needs. Figure 5.1 shows a sample image of the ESAS and CPC tools.

What are the results?

- The implementation and use of standardized symptom screening tools varies substantially among the country's cancer centres (Table 5.1). British Columbia, Alberta, Saskatchewan,

Manitoba, Ontario, Nova Scotia and Prince Edward Island use a standardized symptom tool for at least a portion of patients in all provincial cancer centres and report results centrally. While most new patients are screened, the proportion varies by province.

- Quebec has undertaken standardized symptom screening for at least a portion of patients at selected provincial cancer centres and is in the process of rolling out a standardized screening tool across the province.

- In Newfoundland and Labrador, there is no provincially implemented standard tool and data are not centrally collected; however, some cancer centres may use symptom screening tools locally. Newfoundland and Labrador is at an early stage of development in this area and is focusing on examining patient experiences through the development of a Screening for Distress program, which includes the use of algorithms and tracking the recommended response to patient distress. The Partnership will support these efforts through the Improved Patient-Reported Outcomes Initiative.

- New Brunswick is in the early stages of planning province-wide use of a standardized screening tool, although no standardized symptom screening is undertaken at provincial cancer centres currently and data are not provincially centralized.

Data and measurement considerations

- Detailed information is provided in the Technical Appendix, available at systemperformance.ca.

TABLE 5.1

Level of implementation of standardized symptom assessment tools, by province – 2013

Province	Province-wide implementation (provincially co-ordinated and centrally reported)	Partial implementation (provincially co-ordinated)	Not provincially co-ordinated (some local use possible)
British Columbia	✓		
Alberta	✓		
Saskatchewan	✓		
Manitoba	✓		
Ontario	✓		
Quebec		✓	
New Brunswick			✓
Nova Scotia	✓		
Prince Edward Island	✓		
Newfoundland & Labrador			✓

BC data are collected but not electronically.

NB is in early stages of planning province-wide use of a standardized symptom screening tool; no standardized symptom screening is currently undertaken at provincial cancer centres and data are not provincially centralized.

PE undertakes standardized province-wide symptom screening but only upon initial patient consultation.

Data source: Provincial cancer agencies

FIGURE 5.1

Edmonton Symptom Assessment System Screening Tool and the Canadian Problem Checklist

Edmonton Symptom Assessment System Screening Tool

Patient's Name: _____

Date of Completion: _____

Time: _____

Completed by:
- ☐ Patient
- ☐ Family
- ☐ Health professional
- ☐ Assisted by family or health professional

Please circle the number that best describes:

No pain	0 1 2 3 4 5 6 7 8 9 10	Worst possible pain
No tiredness *(tiredness = lack of energy)*	0 1 2 3 4 5 6 7 8 9 10	Worst possible tiredness
No drowsiness *(drowsiness = feeling sleepy)*	0 1 2 4 4 5 6 7 8 9 10	Worst possible drowsiness
No nausea	0 1 2 3 4 5 6 7 8 9 10	Worst possible nausea
No lack of appetite	0 1 2 3 4 5 6 7 8 9 10	Worst possible lack of appetite
No shortness of breath	0 1 2 3 4 5 6 7 8 9 10	Worst possible shortness of breath
No depression *(depression = feeling sad)*	0 1 2 3 4 5 6 7 8 9 10	Worst possible depression
No anxiety *(anxiety = feeling nervous)*	0 1 2 3 4 5 6 7 8 9 10	Worst possible anxiety
Best well-being *(well-being = how you feel overall)*	0 1 2 3 4 5 6 7 8 9 10	Worst possible well-being
No _____ (other problem) *(for example, constipation)*	0 1 2 3 4 5 6 7 8 9 10	Worst possible _____

Source: Regional Palliative Care Program in Edmonton, Alberta.

Canadian Problem Checklist

Please check all of the following items that have been a concern or problem for you in the past week, including today:

Practical
- ☐ Work/School
- ☐ Finances
- ☐ Getting to and from appointments
- ☐ Accommodation

Emotional
- ☐ Fears/Worries
- ☐ Sadness
- ☐ Frustration/Anger
- ☐ Changes in appearance
- ☐ Intimacy/Sexuality

Social/Family
- ☐ Feeling a burden to others
- ☐ Worry about family/Friends
- ☐ Feeling alone

Informational
- ☐ Understanding my illness and/or treatment
- ☐ Talking with the health-care team
- ☐ Making treatment decisions
- ☐ Knowing about available resources

Spiritual
- ☐ Meaning/Purpose of life
- ☐ Faith

Physical
- ☐ Concentration/Memory
- ☐ Sleep
- ☐ Weight

Source: Canadian Partnership Against Cancer, Cancer Journey Action Group Guide to Implementing Screening for Distress, the 6th Vital Sign: Moving Towards Person-Centered Care. Part A. Background, recommendations and implementation. Toronto, ON: The Partnership; 2009.

What do the results mean?

- Although many provinces have moved to province-wide implementation, most do not have formal targets for symptom and emotional distress screening rates; however, in 2009 the Screening for Distress National Implementation Group, representing eight provinces, agreed to a target of 90% of patients screened.[172] The provincial target for screening for symptom severity for all patients visiting a regional cancer centre is 70% in Ontario,[173] 100% in Saskatchewan[174] and 80% of newly diagnosed cancer patients in Nova Scotia. Once pan-Canadian consensus data are collected, national targets and benchmarks can be developed.

- While the majority of provinces have implemented this tool for at least a portion of patients in all provincial cancer centres, some jurisdictions have reported that the use of this tool has increased over time. In Ontario, the proportion of cancer patients using the ESAS increased from 11% in 2008 to 53% in 2012.[175] In Saskatchewan, the proportion of patients screened for distress was 57% in 2011 and 59% in 2012.[174]

What are some examples of efforts in this area?

- The Partnership's Person-Centred Perspective portfolio is currently supporting multi-jurisdictional initiatives designed to establish consistent standardized measurement of patient-reported outcomes and uptake of best practices to improve patient experience outcomes. Results of this work will enhance the ability to report on improvements in patient-reported outcomes related to the use of the various tools and resources on a pan-Canadian scale.

- While guidelines for screening for distress have been implemented in several jurisdictions, it has been recognized that practical training – to better understand how to translate this knowledge into clinical practice – is needed to improve the patient experience. In 2011, a national workshop was held in Quebec, with representatives of seven provinces attending. The goal was to develop an approach for implementing guidelines in clinical practice as part of established screening for distress programs.[176]

Patient Satisfaction

What are we measuring?

This indicator examines comparative patient satisfaction scores from five provinces that have implemented the Ambulatory Oncology Patient Satisfaction Survey developed and maintained by the National Research Corporation Canada and that consented to providing data for inclusion in this report.

- Ensuring that patients with cancer feel they are well supported and cared for throughout their cancer care journey is a crucial requirement of a high-quality cancer control system.[177,178]

- The Ambulatory Oncology Patient Satisfaction Survey (AOPSS) was launched in 2002 and has been employed by a number of provinces in Canada. The retrospective survey is used to assess the patient experience among those who received cancer care services at

participating cancer centres or hospitals, usually in the last three to six months. While there are variations among provinces in the timing and frequency of the survey application and in the inclusion criteria for determining the patient survey sample, the AOPSS is currently the only standardized tool for assessing overall cancer patient experience that is in use in multiple provinces.

- The AOPSS survey results are organized into several dimensions of the patient experience. Previous system performance reports have shown overall provincial satisfaction results by dimension of care and provincial results by sub-dimensions/characteristics of care within the co-ordination and continuity of care, emotional support and physical comfort dimensions. This report provides more detailed results by each dimension of the patient experience, including the primary type of cancer, first-time versus repeat cancer diagnosis, time elapsed since diagnosis, rating of overall health status and socio-demographic variables (educational attainment, sex and age group). Examining results by these variables will make it easier to assess whether there are any patterns in patient satisfaction that may help inform quality improvement initiatives.

- To more clearly identify the areas of opportunity for improving patient experience and to better focus on those areas, the indicators present the *negative rating* as opposed to the positive rating or satisfaction rates. The rationale for examining negative ratings is that doing so promotes focus on the areas where most improvement may be warranted. The negative rating is derived from a mapping of the survey's multiple-choice answers to a "negative" category (as opposed to "neutral" and "positive" categories).

- Details on how the negative response rate was calculated are provided in the Technical Appendix, available at systemperformance.ca.

What are the results?

- There was some variation in the way patients from different provinces rated their experience with the dimensions of care covered in the survey. Among all dimensions covered in the survey, emotional support received the strongest negative rating in all reporting provinces, ranging from 19.4% in Nova Scotia to 30.7% in Saskatchewan (Figure 5.2). For most provinces, co-ordination and continuity of care and physical comfort received the weakest negative rating (or in other words, the most positive rating) among all dimensions of care. All provinces reported a relatively weakly negative rating on overall quality of care of less than 1.4%.

- A detailed analysis by socio-demographic and disease and health status factors was examined across all dimensions of care. However, because the emotional support dimension was identified as the area in which most improvement was needed, it is the focus of the results below.

- Satisfaction was not significantly related to age or sex in the emotional support dimension of care, with the youngest age group (less than 50 years) reporting slightly stronger negative ratings (Figure 5.3). Similar results were reported in a study using a different tool: younger cancer patients agreed and disagreed with the following statements, respectively, more strongly than older patients: "the doctor was too business-like and impersonal" and "the doctor I saw seemed sympathetic."[179] Women were somewhat more likely than men to report bigger gaps in care in the emotional support dimension. Patients with strong emotional supports not only from their family and caregivers but also from the attending physician have better psychological adjustment to their cancer diagnosis in the short and long term.[180,181]

- Figure 5.3 shows that educational attainment and satisfaction scores were moderately correlated in the emotional support dimension, with more education correlating with a perception that more improvement was needed. A stronger negative response rate in better-educated patients may reflect the extent to which their health-care experiences match their expectations with respect to quality of care received, as shown by previous studies.[182,183]

- There is variation in how patients reported their experiences based on self-reported health status at the time of the survey. Survey scores varied with the negative response rate, ranging from 32.7% for those who reported poor health to 21.3% for those who rated their health as excellent (Figure 5.3). Poorer perceived health may negatively affect one's view of the health-care system; this suggests that one's self-report of quality of life influences the degree to which one is satisfied with one's cancer care.

- The reason for treatment, be it a first-time cancer diagnosis or a repeat cancer diagnosis, did not significantly affect patient satisfaction. Compared with cancer patients re-entering the cancer system, people entering the system for the first time reported slightly smaller gaps in care for emotional support (Figure 5.3).

- Patients with gynecologic cancers (cervical, uterine or ovarian cancer) overwhelmingly reported negative rating scores in the emotional support dimensions of care compared with other disease sites (Figure 5.3). Negative ratings for emotional support by disease group ranged from 31.0% of women with gynecologic cancers to 19.8% of men with prostate or testicular cancer. Of women with breast cancer, 22.6% were dissatisfied with the emotional support they received. When disease site–specific populations evaluated their experience of emotional support in Ontario, over 70% of men with prostate or testicular cancer reported receiving information on changes related to sexual activity, while only 53% of women with gynecologic cancer say they received such information.[184] In the Quality Initiative of the Program in Evidence-Based

Care, the *Models of Care for Cancer Survivorship* report concluded that more research is required to build on models of follow-up care for women with various types of cancer, because the current evidence beyond women with breast cancer is limited.[185]

- Patients who were diagnosed with cancer more than five years before the survey were slightly more likely to score emotional support as needing improvement than were patients who were diagnosed more recently (Figure 5.3).

Data and measurement considerations

- While the provincial surveys used to produce the patient satisfaction results are all based on the AOPSS tool, inclusion criteria for patients may vary among provinces. As well, the results presented in this report are based on the latest surveys conducted in each province, but the years the surveys were conducted vary among provinces (from 2011 to 2013). While progress has been made, work is still needed to ensure that inclusion and exclusion criteria are consistent across all hospitals and jurisdictions to allow results to be compared within and among jurisdictions. Any deviation from these criteria is identified in the Technical Appendix and should be considered when interpreting results. The Technical Appendix is available at systemperformance.ca.

- In Nova Scotia, Manitoba and Prince Edward Island, surveyed patients had received disease-oriented treatment within three months of the survey period, whereas in Alberta and Saskatchewan, patients had had treatment within six months of the survey.

- The survey consistently captures data on patients receiving radiation treatment, but chemotherapy treatment data collection may vary by province (e.g., whether patients receiving oral chemotherapy alone were included rather than only those receiving intravenous chemotherapy). See the Technical Appendix for further details, available at systemperformance.ca.

- It is important to be cautious when interpreting results in this section given that individuals may not have recalled all facets of care that took place when they received disease-oriented treatment three to six months earlier.

FIGURE 5.2

Percentage of patients reporting negative rating across dimensions of care and for overall quality of care, by province – from 2011 to 2013
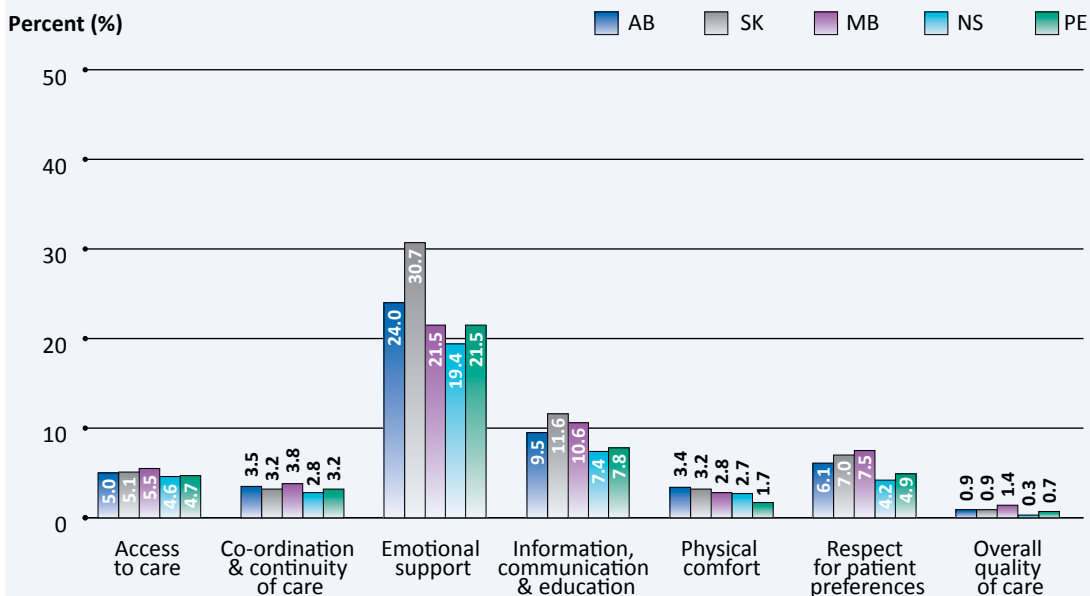
Percent (%)

Legend: AB SK MB NS PE

Dimension	AB	SK	MB	NS	PE
Access to care	5.0	5.1	5.5	4.6	4.7
Co-ordination & continuity of care	3.5	3.2	3.8	2.8	3.2
Emotional support	24.0	30.7	21.5	19.4	21.5
Information, communication & education	9.5	11.6	10.6	7.4	7.8
Physical comfort	3.4	3.2	2.8	2.7	1.7
Respect for patient preferences	6.1	7.0	7.5	4.2	4.9
Overall quality of care	0.9	0.9	1.4	0.3	0.7

Data provided by individual provincial cancer agencies.

Data source: National Research Corporation Canada's Ambulatory Oncology Patient Satisfaction Survey results

FIGURE 5.3

Emotional support dimension: Percentage of patients reporting negative rating, by age, sex, education, health status, reason for treatment, disease site and time since diagnosis – from 2011 to 2013

Legend: Disease site, Reason for treatment, Time since diagnosis, Education, Health status, Sex, Age

	% Negative Rating	Number of Respondents
Disease site		
Prostate/testicular	19.8	2,032
Breast	22.6	4,506
Cervical/uterine/ovarian	31.0	817
Colorectal/bowel	23.9	1,868
Lung	22.7	1,367
Reason for treatment		
First time cancer diagnosis	22.3	13,823
Repeat cancer diagnosis	25.3	6,335
Time since diagnosis		
Less than 6 months ago	22.8	1,547
Between 6 and 12 months ago	22.2	7,679
Between 1 and 2 years ago	22.9	4,882
Between 2 and 5 years ago	24.2	3,834
More than 5 years ago	25.6	2,846
Education		
Less than secondary school	20.5	6,189
Secondary school graduate	23.1	4,650
Post-secondary graduate	24.9	9,142
Health status		
Poor	32.7	1,158
Fair	26.8	3,945
Good	22.3	8,238
Very good	20.4	5,653
Excellent	21.3	1,464
Sex		
Female	24.4	11,348
Male	22.0	9,691
Age		
< 50	24.5	2,646
50 to 74	23.2	14,531
75+	22.9	3,869

% Negative Rating

Data include AB, SK, MB, NS and PE.

Data provided by individual provincial cancer agencies.

Data source: National Research Corporation Canada's Ambulatory Oncology Patient Satisfaction Survey results

What do the results mean?

- Among all the dimensions covered by the AOPSS, patients' negative rating of their experience was strongest for the emotional support dimension. A lack of access to supportive care services can add to cancer patients' distress and can compromise their ability to adjust to changes brought about by cancer.[186] The obvious prominence of emotional support as the domain of lowest patient satisfaction clearly points to where the greatest opportunities for improvement are. Opportunities arising from the breakdown of the results into socio-demographic and disease and health status categories are not as clear. Ascertaining which patterns reflect mutable aspects of the patient experience can therefore inform quality improvement initiatives and is a key follow-up step to this analysis.

- It appears that socio-demographic factors do not play a major role in determining a patient's rating of emotional support. Nonetheless, emotional support scores are lower than scores for other dimensions of care and require closer examination. It will be important to examine the individual questions within the emotional support dimension because previous analyses have shown that there is great variation in scores in this dimension.[24]

What are some examples of efforts in this area?

- The Canadian Partnership Against Cancer will continue to work to expand a set of indicators available to assess the domain of patient satisfaction, supportive care and other patient-focused outcomes.

- Jurisdictions across Canada continue to implement education and supportive care programs designed to connect cancer patients and their families to resources and to provide access to specially trained professionals or volunteers who offer proactive, practical help to aid in navigating the cancer journey. There is great variation in the level of access to and capacity for local and regional jurisdictions to support and respond to the broader psychosocial needs of people with cancer. The strategic focus on evidence-based care and patient-reported outcomes through agreement on a core set of measurement indicators is intended to drive improvements in overall patient experience. A Person-Centred Care toolkit is available on cancerview.ca that contains tools and resources for implementing screening for distress and navigation programs.

- Efforts are underway in several provinces to enhance and continue assessing the patient experience and satisfaction with care measures, specifically the emotional support area. British Columbia and Ontario performed validation studies of the AOPSS tool. The results of these studies suggested that additional questions and an "advanced emotional support" scale should be added to the emotional support dimension to better reflect this dimension of care.[187,188]

- The *Ontario Cancer Plan 2011–2015* has identified improving the patient experience as one of its key strategies by developing improved measurement in this domain. Cancer Care Ontario has launched several initiatives, such as the Psychosocial Oncology Program, which aims to standardize care in emotional support. British Columbia has also identified emotional support as having the most room for improvement and will address this gap through improvement initiatives.

- Internationally, the Cancer Control Council of New Zealand developed a national patient experience survey in 2009 to ensure the needs and expectations for cancer services are being met.[189] The results from the survey resembled results in Canada, with patients giving low scores for emotional support. In Australia, a cancer patient satisfaction survey was sent to cancer patients in 2007 and 2008.[190] This survey identified four main opportunities for improvement: communication between patients and clinicians, management of distress and pain, providing relevant information to patients and caregivers, and provision of basic care.

Emerging evidence and studies

• The National Quality Forum in the United States is exploring the long-term goal of integrating patient-reported outcome data into electronic health records by leveraging information technology.[191] This step will allow for more effective patient-centred care and improved clinical practice. However, there is concern about including certain data elements, based on the desire for anonymity. Further exploration of the needs of patients and physicians, as well as data standards, are required prior to incorporating patient-reported outcomes data into electronic health records; the feasibility of including these also needs to be investigated.

Place of Death

What are we measuring?

This indicator examines the percentage of cancer patients who die in hospital versus non-hospital locations based on the national vital statistics database.

• Several Canadian surveys have suggested that the majority of cancer patients prefer to die at home if they are well supported or at a hospice in the presence of loved ones, if they have a choice. Hospitals, however, remain the most common – though least preferred – place of death.[192]

• Statistics Canada data from 2003 to 2005 show more than 70% of cancer deaths occurred in hospital settings, emphasizing the disparity between end-of-life practice and patient preference. In its special topic on end-of-life care, the *2010 Canadian Cancer Statistics* publication confirmed that measures are still needed to refine end-of-life care systems and to address the uneven access to end-of-life services both within and among provinces.[192,193] A population-based survey conducted in the United Kingdom found that while 63% would prefer to die at home, only 27% felt that home would provide a pain-free experience during their final days, which was the main priority or concern identified for the final days.[194]

• Several provinces have palliative and end-of-life care as a focus of their provincial health system strategy. National efforts are integrating palliative and end-of-life care into health systems through increasing support and access to information and enhancing clinical delivery.

• An important limitation of this indicator is that it measures only location of patients at time of death; it does not take into account where they might have spent the majority of their days before death and how the health and emergency systems are used. It also does not account for hospices located in acute-care hospitals.

• While a crude measure, the indicator presented in this section allows for the identification of potential opportunities in this segment of the cancer control continuum that could be further investigated through more detailed data collection and analysis. For instance, we do know that the process of death from cancer, possibly combined with confounding comorbid health factors, can affect the overall process of palliation that may be required. Cancer deaths will more often follow the terminal illness trajectory. We know quality of life can be sustained for many patients for months or even years, allowing for flagging, tracking, quality care and appropriate advance care planning to be incorporated before the end

of life, wherever it may occur. Early identification of palliative needs and adoption of a simultaneous care model are needed to provide care that is person-centred and not driven by prognosis, if the outcome is to decrease undesired hospital deaths.

What are the results?

- Data suggest that a majority of cancer patients in all provinces are dying in hospital. Based on available vital statistics data from the 10 provinces, the percentage of cancer patients who die in hospitals ranged from 53.0% to 88.8% (Figure 5.4). Inconsistencies exist, however, in how provincial databases categorize the various locations of death, particularly the designation of hospital-based hospices.

- In Canada, from 2005 to 2009, approximately 65% to 71% of patients who died of cancer died in hospital (Figure 5.5). Fluctuations seen from 2005 to 2009 were more likely the result of year-to-year variations in reporting practice rather than actual trends in patient care.

- In Canada, from 2005 to 2009, approximately 10% to 13% of patients who died of cancer died at home (Figure 5.5).

Data and measurement considerations

- Data for this indicator were submitted by the provinces to Statistics Canada. The Canadian Vital Statistics Death Database includes a data element identifying cause of death and location of death grouped into the following categories: hospital, other health-care facility (e.g., long-term care or chronic-care facility), private home, other specified locality and unknown.

- It is important to note that there are various discrepancies in the vital statistics data used to calculate these indicators, particularly around interpretation of the location categories described above. For example, a hospice can be categorized as an "other health-care facility" or as an "other specified locality," but it could also be located in an acute-care hospital and therefore designated as a hospital setting. It is hoped that reporting on these results will provide an incentive to improve data quality and standardization so that appropriate comparisons can be made. Other regional and jurisdictional considerations include deaths in formal palliative care beds in hospitals, which are more accurately considered hospice deaths. Rural and remote residence may contribute to lack of access to home palliative care, and in some First Nations, Inuit and Métis communities there is no designated health-care funding for palliative care, resulting in the need for patients to stay in hospitals in urban centres.

- The Canadian Institute for Health Information (CIHI) reported that 45% of Canadian cancer deaths (excluding Quebec) occurred in acute-care hospitals in 2011 and 2012. This is markedly different from the results presented in this section (approximately 71% of cancer deaths occurring in hospitals). It is important to note that CIHI's study does not include Quebec, which had a higher proportion of in-hospital cancer deaths, and CIHI's study accounts only for cancer deaths occurring in acute-care hospitals. As well, CIHI's study captured acute-care cancer death abstracts from the administrative Discharge Abstract Database, whereas this study used Statistics Canada's Vital Statistics Death Database data.[195]

- For more detailed calculation methodology please refer to the Technical Appendix, available at systemperformance.ca.

FIGURE 5.4

Percentage of cancer patient deaths occurring in hospital or other, by province – 2009

Percent (%)

Hospital   Other

Province	Hospital	Other
MB	88.8	11.2
QC	82.1	17.9
NB	80.2	19.8
NL	80.2	19.8
NS	69.5	30.5
ON	67.7	32.3
SK	66.5	33.5
AB	62.7	37.3
PE	62.0	38.0
BC	53.0	47.0
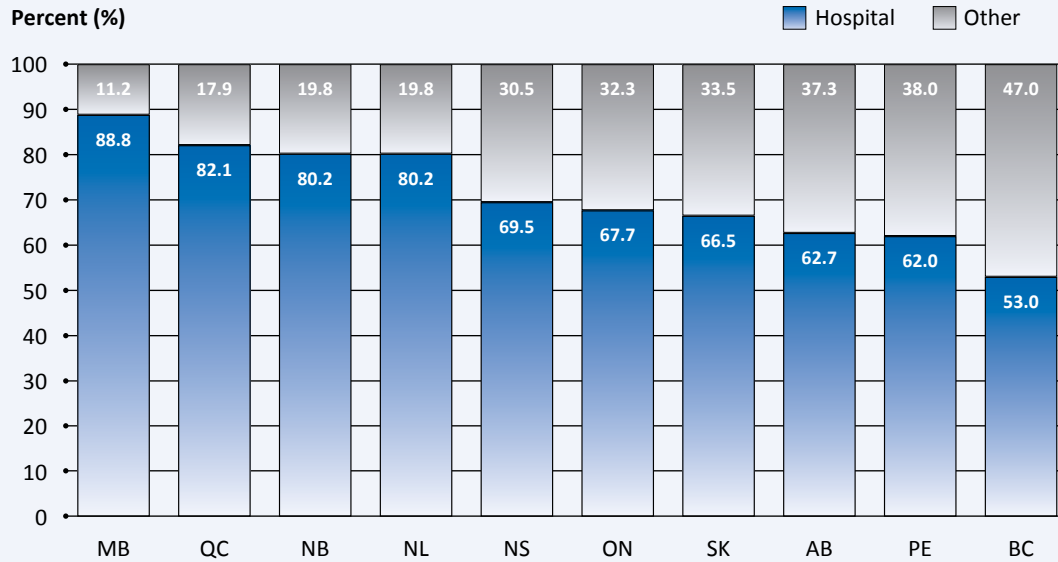
"Other" includes other specified locality, other health-care facilities or private homes (excludes unknown localities).

Data source: Statistics Canada, Vital Statistics Death Database

FIGURE 5.5

Percentage of cancer patient deaths occurring in hospital, private home or other, Canada – from 2005 to 2009

Percent (%)

2005   2006   2007   2008   2009

Location	2005	2006	2007	2008	2009
Hospital	65.4	65.9	71.5	71.6	70.7
Private Home	10.0	10.7	13.0	11.8	13.4
Other	24.6	23.4	15.5	16.6	15.9
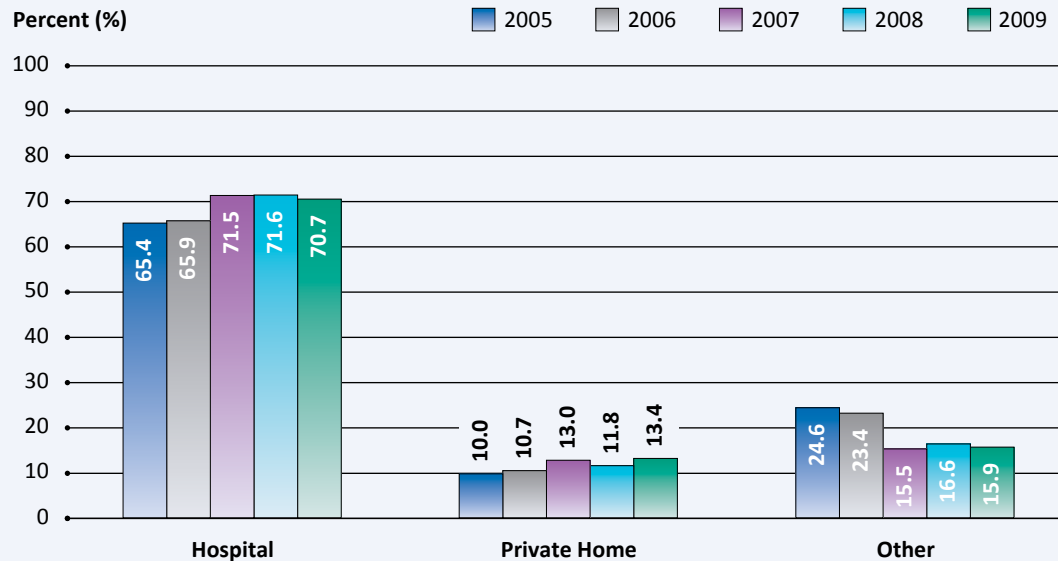
"Other" includes other health-care facilities, other specified localities, and unknown localities.

Data source: Statistics Canada, Vital Statistics Death Database

What do the results mean?

- In the United States, according to the *Dartmouth Atlas of Healthcare*, the average percentage of cancer deaths occurring in hospital was 28.8% from 2003 to 2007 and 24.7% in 2010,[196] which is much lower than percentages reported for Canada for that year; however, the United States has a formal hospice benefit program that provides terminally ill people with home-based hospice services.[197] The Medicare Hospice Benefits program is credited with the increase in the proportion of deaths occurring in homes and nursing homes in the United States.[198,199] In 2011, it is estimated that 44.6% of all deaths in the United States occurred under the care of the Hospice Benefits program.[200]

- Similarly, hospitals remain the most common location of death in Europe.[201] Cancer deaths in hospital ranged from 48% in England to 60% in Wales and 61% in Belgium.[202]

- While Canada's current rate of patients dying outside of hospitals is low, there is some evidence from studies suggesting a shift from hospital to out-of-hospital cancer-related deaths in several countries, including Canada, the United States and Britain.[203-205] In Nova Scotia, for example, out-of-hospital deaths among adults dying of cancer rose from 20% in 1992 to 30% in 1997 (a 52% increase).[206] In Ontario, however, the percentage of cancer-related deaths occurring out of hospital remained relatively constant from 2000 to 2006 (56% and 55%, respectively).[207]

- A recent study of place of death in six European countries showed that the percentage of cancer deaths occurring at home varied markedly: 13% in Norway, 22% in Wales, 28% in Belgium, 36% in Italy and 45% in the Netherlands, suggesting variation in countries' end-of-life practices and cultural, social and health-care determinants.[208] In Britain, the proportion of deaths at home increased from 18% in 2004 to 21% in 2010.[205]

What are some examples of efforts in this area?

- A collaborative effort, informed by the Quality End-of-Life Care Coalition of Canada's *Blueprint for Action 2010 to 2020*, has led to advancements in palliative and end-of-life care across Canada and across different health-care environments. The federal government funded the Strategy on Palliative and End-of-Life Care, which aims to increase the number of hospitals and long-term care facilities that offer high-quality end-of-life care.[209]

- The Canadian Partnership Against Cancer (the Partnership) has identified palliative and end-of-life care as one of its high-impact priorities for 2012 to 2017, which will help to advance and accelerate jurisdictional initiatives and support co-ordinated pan-Canadian planning in this important domain. Below is a list of areas that the Partnership will support to improve capacity to report on palliative care across the country:

  - There will be continued investments to support people in palliative and end-of-life care through the education and training of oncology professionals with the Education in Palliative and End-of-Life Care–Oncology Canada curriculum.

  - The Partnership collaborates on the Way Forward Project, which is dedicated to building a road map for an integrated palliative care approach and increasing the conversation that would incorporate patients' and families expressed wishes about end-of-life care.

  - Canadian Virtual Hospice, an online resource with information on palliative and end-of-life care for patient caregivers and health professionals, will continue to expand its services to create knowledge tools that are clinically relevant, patient-centred and evidence-informed.

- Enhancing the Quality of Palliative and End-of-Life Care for Children with Cancer is a collaborative project with The Hospital for Sick Children and the University of Toronto.

- Cancer Care Ontario, with partners in Quebec, is piloting integrated palliative care models that encourage primary care providers and oncology teams to take ownership of basic palliative care with support from partnering palliative care specialists.

- Emergency health services and palliative care are being integrated to enhance the end-of-life experience for Nova Scotia and Prince Edward Island cancer patients and their families.

Emerging evidence and studies

- The ACCEPT initiative was a multi-year prospective study examining processes related to advance care planning for people with serious illnesses and their family members across 12 acute-care facilities in Canada.[210] The study aimed to examine the extent to which critically ill patients were engaged in advance care planning, how well it was perceived and communicated and how it aided in their decisions for end-of-life care. Results showed that fewer than half of the participating patients reported having completed a written advance care plan. As well, barriers exist in the communication taking place between physicians and their patients. This may result in patients receiving unwanted treatment which is due largely to ineffective communication prior to hospitalization and/or to poor documentation of the patient's preferences.

- The *Canadian Medical Association Journal* recently released a "conversation guide" produced by the Canadian Researchers at the End-of-Life Network to help physicians walk through the steps of end-of-life discussions with patients, their families and caregivers.[211] A pocket card, "Just Ask," with important questions about advance care planning was produced for health-care professionals caring for people with serious illnesses.[212]

6. Research

6. Research

Although Canada has an active cancer research community, the ability to measure the performance and impact of cancer research activity (e.g., impact on clinical outcomes) is limited by the lack of readily available data measuring the process, output and outcome of clinical research activity at a pan-Canadian level. This chapter presents data on two indicators that can be considered proxy system performance indicators of cancer research activity: clinical trial participation ratios for adult and pediatric cancers, and the breakdown of cancer research funding by cancer site compared with the relative burden of those cancers. The latter uses information on research spending reported to the Canadian Cancer Research Alliance.[213]

Research that evaluates the safety and efficacy of emerging treatments paves the way for best practices. Clinical trials are essential for evaluating the safety and efficacy of emerging cancer therapies and protocols. Patient participation in clinical trials could therefore enable the development and evolution of best practice treatments and could present patients with enhanced treatment options, which in turn could improve outcomes for future patients. A number of studies have shown that treatment centres participating in clinical trials tend to have better patient outcomes (survival and quality of life) than those that do not, possibly as a result of a correlation between high clinical trial activity and high adherence to evidence-based treatment guidelines.[214-216]

Because data are not available to calculate the actual clinical trial participation or the percent of qualifying patients who are enrolled in a clinical trial, a proxy indictor is presented measuring the ratio of the number of adult patients newly enrolled in Phase 1 to 4 clinical trials (cancer-related therapeutic trials or clinical research studies) in 2012 to the number of cancer incident cases in the same year. A slightly different calculation is used for pediatric patients: the ratio is the number of pediatric patients newly enrolled in clinical trials in 2012 to the number of pediatric cancer patients referred to children's cancer treatment centres in the same year.

Adequate funding of research activity for various types of cancer is essential to a successful research environment. Another indicator estimates the level and breakdown of support for cancer research in 2010 according to information on research spending reported to the Canadian Cancer Research Alliance (CCRA). The CCRA, with the support of the Canadian Partnership Against Cancer, is working to guide co-ordination and continuation of cancer research funding across Canada.

Indicator	Summary of results
Adult clinical trial participation	The ratio of adult patients enrolled in clinical trials to cancer incident cases ranged from 0.007 to 0.055 across reporting provinces and from 0.014 to 0.064 across disease sites in 2012.
Pediatric clinical trial participation	The ratio of pediatric patients enrolled in clinical trials to newly registered cancer centre patients in 2012 ranged from 0.188 to 0.410 across the eight provinces that have pediatric cancer centres.
Cancer research investment	Breast cancer has a proportionally higher share of disease site–specific research funding (26.9%) relative to its burden of illness (7.0% of cancer deaths), while lung cancer has a proportionally lower share of funding (7.9%) relative to its burden of illness (26.9% of cancer deaths).

Clinical Trial Participation

What are we measuring?

This indicator examines both adult and pediatric clinical trial participation. The clinical trial participation rate for adults is measured as the ratio of cancer patients aged 19 years and older newly enrolled in cancer-related therapeutic clinical trials or clinical research studies in 2012, to the number of cancer incident cases in 2012. The pediatric clinical trial participation indicator is measured as the ratio of the number of patients aged 18 years and younger newly enrolled in cancer-related therapeutic trials or clinical research studies in 2011 and 2012 to the total number of cancer patients 18 and younger newly referred to children's cancer treatment centres in 2011 and 2012.

- Clinical trials are essential for the development of new evidence-based methods and treatments, as well as for placing novel effective therapies into clinical practice and reducing the use of therapies that are ineffective or cause undue adverse events, all of which could lead to improved outcomes.

- Over the past 10 years, the number of and accrual to cancer clinical trials has declined;[217] however, the rate of decline varied depending on the type of clinical trial. As a result of improved funding and shortened review times, the number of Phase 1 clinical trials in Canada has increased; the number of Phase 2 and 3 trials has remained steady, however, or has declined slightly from 2002 through 2007.[218] While all phases (1, 2, 3 and 4) of clinical trials are pivotal to improving health care, Phase 2 and higher trials are key to improving the health outcomes of enrolled patients. Phase 1 trials are more intended to measure safety and adverse effects.[219]

- Several population-based studies show that those treated in cancer centres that are active in trial programs have health outcome advantages, likely owing to better processes and delivery of care, including treatment guideline concordance.[214-216,220]

- Cancers affecting children, adolescents and young adults (aged 15 to 29) vary significantly from cancers affecting adults. Non-epithelial-type cancers, such as leukemias and lymphomas,

mainly affect children, while epithelial-type cancers account for the majority of adult cancers; cancers occurring in adolescents and young adults are a mix of the two types.[221] Cancers affecting each of these populations may have different biological behaviours and as such, findings from pediatric trials are crucial to identifying how these cancers develop and what causes them. Much improvement in the diagnosis, treatment and outcomes of childhood cancers is attributed to clinical trial research. Survival has increased by 70% since the 1950s.[222]

- Comparing clinical trial participation across the country may provide opportunities for action to enable more trial participation and to achieve the goals clinical trials set out to accomplish, including improved cancer outcomes and quality of life for people with cancer.

What are the results?

- There was interprovincial variation in adult and pediatric clinical trial participation. In 2012, the ratio of adult patients enrolled in clinical trials to cancer incident cases (for provinces submitting data) ranged from 0.007 in Newfoundland and Labrador and Nova Scotia to 0.055 in Alberta (Figure 6.1).

- In 2012 the adult clinical trial participation ratio for the top four disease sites ranged from a low of 0.014 for lung cancer to a high of 0.064 to breast cancer (Figure 6.2).

- For 2012, the ratio of pediatric patients enrolled in clinical trials to newly registered pediatric cancer centre patients ranged from 0.188 in Newfoundland and Labrador to 0.410 in Nova Scotia, among the eight provinces providing data (Figure 6.3).

- The pediatric cancer programs vary in size and certain programs are affiliated with larger, multi-centre, international pediatric clinical trial co-operative groups that co-ordinate the majority of oncology clinical trials for children within each province. This may explain the variation observed in pediatric clinical trial enrolment among provinces.

Data and measurement considerations

- Both the adult and pediatric indicators are ratios, not rates. As such, the numerator is not a complete subset of the denominator. Cases included in the numerator could have been diagnosed in previous years and could be recurrent cases.

- It is important to note when interpreting participation rates that many clinical trials have stringent enrolment inclusion and exclusion criteria for participant selection, such as demographics, certain disease and tumour types and stage of disease.

- Alberta had the highest ratio of adult patients enrolled in clinical trials in 2012, which may be a result of how patients are captured in the Alberta Cancer Clinical Trials (ACCT) database. If a patient enrolled in multiple clinical trials in a given year, the patient would be counted for each accrual. The ACCT database also includes patients who were living outside Alberta, as long as they were on a clinical trial in Alberta.

- For more detailed calculation methodology please refer to the Technical Appendix, available at systemperformance.ca.

Adult clinical trials

- For this indicator, the numerator is the total number of adult cancer patients (aged 19 or older) newly enrolled in all phases of therapeutic clinical trials or research studies (radiation, systemic and surgery trials only – curative, adjuvant/neo-adjuvant or palliative) at provincial cancer centres in 2012. The denominator is the number of cancer incident cases in 2012. The Canadian Cancer Society's projected 2012 cancer incident cases were used for the purpose of this proxy indicator only and should not be compared with the long-term outcomes incident cases.

- It is important to note that the denominator used to calculate adult clinical trial participation in previous system performance reports was the total number of cancer cases newly registered in provincial cancer centres.

Pediatric clinical trials

- Data for this indicator were collected by the C[17] Research Network, an organization composed of representatives from each of the individual pediatric cancer programs across Canada.[223]

- For this indicator, data for 2011 and 2012 were available for eight provinces that have pediatric cancer centres treating children in Canada under age 14 years, as well as many 15- to 18-year-olds; the numerator is the total number of cancer patients (18 or younger), whether incident or previously diagnosed, newly enrolled in therapeutic clinical trials or clinical research studies at provincial pediatric cancer centres in 2011 and 2012. The denominator is the total number of pediatric cancer-centre cases, whether incident or previously diagnosed, newly registered in provincial cancer centres in 2011 and 2012. The denominator was chosen as a proxy measure for those patients receiving active treatment only and as such, excludes children on the cancer centre roster who are not receiving active treatment and who by definition would be ineligible to participate in therapeutic clinical trials.

- This analysis does not examine adolescents and young adults (age 15 to 18 years) separately because they tend to be treated in both pediatric and adult cancer centres, depending on their medical needs, referral patterns and overall availability of services. In Ontario, approximately 32% of cancer patients aged 15 to 17 were treated in pediatric cancer centres, with the remaining majority treated in adult centres.[224] The proportion of adolescents with cancer treated in pediatric centres is known to differ from province to province, and the likelihood of adolescents being enrolled in a clinical trial is known to be higher for those treated in pediatric centres than for those treated in adult centres, likely as a result of poorer access to pediatric-specific trials in adult centres. According to the Canadian Childhood Cancer Surveillance and Control Program, as many as 80% of Canadian adolescents diagnosed with cancer between 1995 and 2000 did not participate in clinical trials.[225]

FIGURE 6.1

Ratio of adult patients enrolled in clinical trials to number of incident cases, by province, all cancers – 2012 enrolment year
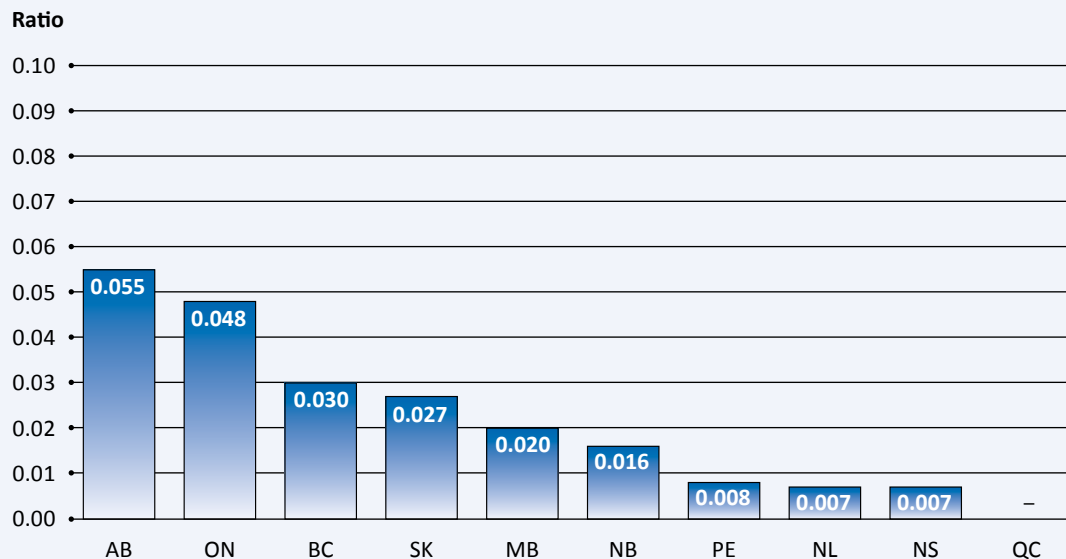
"–" Data not available for QC.

Incident cases are estimated for all ages from the Canadian Cancer Statistics.

Data source: Provincial cancer agencies, Canadian Cancer Statistics

FIGURE 6.2

Ratio of adult patients enrolled in clinical trials to number of incident cases, by disease site, four most common cancers and all cancers – 2012 enrolment year

Ratio
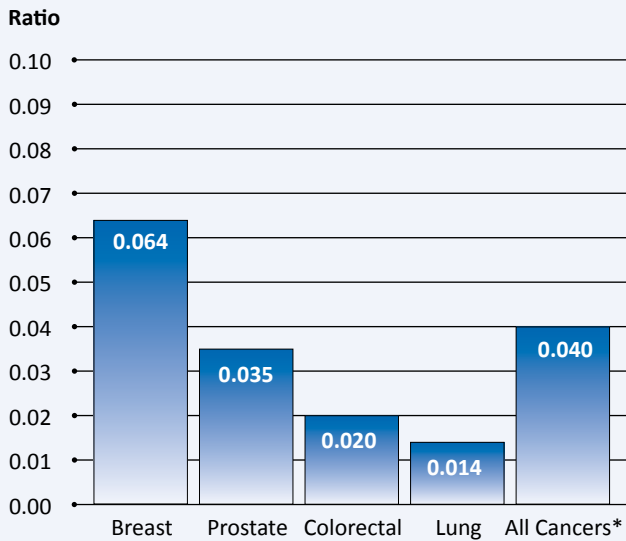
* See Technical Appendix for details on numerator and denominator, available at systemperformance.ca.

Incident cases are estimated for all ages from the Canadian Cancer Statistics.

Four most common cancers include AB, BC, MB, NB, NL, NS, PE and SK.

All cancers include AB, BC, MB, NB, NL, NS, ON, PE and SK.

Data source: Provincial cancer agencies, Canadian Cancer Statistics

FIGURE 6.3

Ratio of pediatric patients enrolled in clinical trials to number of new patient registrations at children's treatment centres, by province – patients seen in 2011 and 2012

Ratio
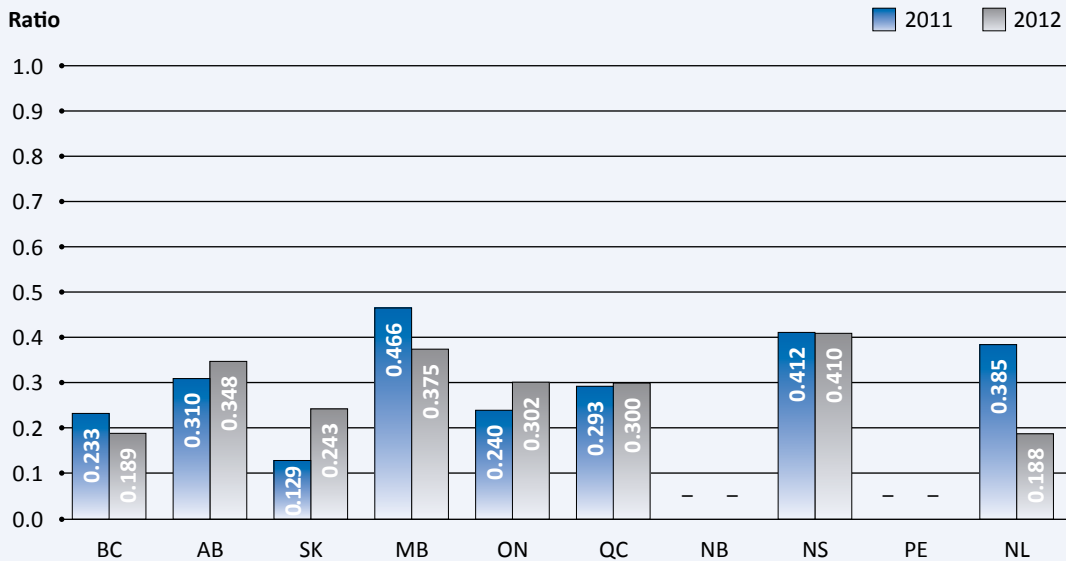
"–" Data not available for NB (2011 and 2012) and PE (2011 and 2012).

Data source: C[17] Council of Canadian Pediatric Oncology Programs (collected September 2013)

What do the results mean?

- To date, targets and benchmarks for clinical trial enrolment have not been set in Canada; however, the Canadian Partnership Against Cancer's System Performance Initiative is in the process of establishing targets and benchmarks for many indicators, including clinical trial participation.

- In the United States, the National Cancer Institute (NCI) reports that fewer than 5% of adult cancer patients participate in clinical trials.[226] In contrast, the United Kingdom has the highest rate of cancer clinical trial participation worldwide, with approximately 14% of adults diagnosed with cancer participating in cancer trials. The National Cancer Research Network was established in the United Kingdom in 2000 to enhance recruitment to trials and to other patient-centred research, which resulted in a boost in clinical trial participation.[227] As well, new cancer drugs are not as easily prescribed in the United Kingdom as they are in the United States, where oncologists are able to prescribe cancer drugs sooner once they reach the market, which may explain why trial participation is much higher in the United Kingdom. It is important to note that in certain circumstances, access to new cancer drugs may be acquired only through enrolment in a clinical trial.

- Data from the NCI Cooperative Group in the United States show that 50% of children from birth to 14 years treated for cancer in 1998 and 1999 were enrolled in a clinical trial.[228] Furthermore, more than 90% of children diagnosed with cancer in the United States are being treated in organizations that are members of the Children's Oncology Group (COG). The COG, which is NCI supported, was created in 2000 with the merger of four national pediatric cancer research organizations to investigate barriers to participation in clinical trials.[229]

- In the United Kingdom, 70% of all children diagnosed with cancer are currently enrolled in clinical trials, which are co-ordinated either by the United Kingdom Children's Cancer Study Group (for solid tumours) or the Medical Research Council (for leukemia).[230]

What are some examples of efforts in this area?

- The *Report on the State of Cancer Clinical Trials in Canada* developed by the Canadian Cancer Research Alliance (CCRA) Clinical Trials Working Group recommended the creation of a pan-Canadian infrastructure program that links to and builds on the strengths of existing clinical trial groups to support cancer clinical trials.[231] In response to this recommendation, the Partnership has taken the lead in creating a vision for a Canadian Cancer Clinical Trials Initiative to address current weaknesses, with the goal of increasing patient accrual within an expanding portfolio of cancer clinical trials through a common co-ordinating centre, known as the Canadian Cancer Trials Network. [232]

- In 2013, the CCRA and the Partnership released a report that found that annual investments in childhood and adolescent cancer research increased from $9.7 million in 2005 to $16.5 million in 2010, a 71% increase.[233]

- The C[17] Research Network holds a two-stage, peer-reviewed grant competition twice a year to fund research into cancer, serious hematologic childhood diseases and bone marrow transplantation, including all phases of clinical trials.[234]

- In March 2012, the second Adolescent and Young Adult Cancer International Stakeholders Workshop was held in Toronto. The Adolescent and Young Adult Task Force has a goal to improve outcomes and health-related quality of life for adolescents and young adults with cancer and adolescent and young adult survivors of childhood cancer.[235] One of the actionable items from the workshop was the establishment of Regional Action Partnerships (RAPs) to represent all regions of Canada. The RAPs are working to formulate a sustainable framework for implementing recommendations for improved outcomes for adolescents and young adults with cancer.[233]

Cancer Research Investment

What are we measuring?

This indicator examines the breakdown of disease site–specific cancer research funding estimates for breast, colorectal, lung and prostate cancers, using information on research spending reported to the Canadian Cancer Research Alliance in 2010. The indicator also compares the allocations with the relative burden of these cancers in terms of incidence and mortality.

- Adequate funding of research activity for various types of cancer is essential to a successful research environment.

- Of overall cancer research investments, 52% ($536.1 million) went to site-specific areas in 2010.[236] In 2010, $149.9 million was invested in supporting cancer research for breast, colorectal, lung and prostate cancers, from a total of $277.6 million for all specific disease sites.[236]

What are the results?

- Breast cancer research received a large share of site-specific research investments in Canada in 2010 relative to the burden of disease, as defined by mortality. Investments toward colorectal and lung cancers, both high-mortality cancers, were disproportionately low relative to the burden of these cancers, as defined by mortality.

- Research investment by disease site varied in 2010 from 26.9% for breast cancer to 7.3% for colorectal cancer (Figure 6.4). Similar site-specific investment patterns were observed in 2009.[32] The distribution of incident cases by cancer site is more similar, ranging from 13.0% for colorectal, breast and prostate cancer to 14.0% for lung cancer in 2008. The distribution of cancer deaths by site

also varies, from 5.3% for prostate cancer to 26.9% for lung cancer in 2009. Breast cancer accounts for 13.0% of new cancer cases and 7.0% of cancer deaths and receives 26.9% ($74.6 million of $277.6 million) of site-specific research dollars.

- Lung cancer, the cancer with the highest mortality rate, had the largest gap between research investment level and burden of disease. Similarly, for colorectal and prostate cancers, the research investment was not commensurate with the burden of disease as measured by incidence and mortality.

- Funding of breast cancer research ($74.6 million) was almost equal to the funding for the other three major cancers (colorectal, lung and prostate) combined ($75.2 million). Other cancer sites (beyond the top four) received $127.7 million in funding.

Data and measurement considerations

- Data come from the Canadian Cancer Research Survey (CCRS), with funding information captured from 40 organizations and programs across Canada in 2010. The number of organizations and programs that contribute data to the survey on research activity at a pan-Canadian level increased from 33 in 2009 to 40 in 2010.

- The CCRS captures research investments by major cancer research funders, federal agencies and programs, provincial government organizations and voluntary organizations; the survey does not, however, capture investments made by hospital foundations, organizations outside the country that fund Canada-based research or industry-sponsored research and development. Estimates in the survey represent between 40% and 50% of the total national investment in cancer research.

- Data exclude investment in research that is relevant to all cancer sites or is not site-specific.

FIGURE 6.4

Distribution of cancer research investment (2010), new cancer cases (2008) and cancer deaths (2009), by disease site, Canada

Percent (%)   ☐ Investment   ☐ New cases   ☐ Deaths

Disease site	Investment	New cases	Deaths
Breast	26.9	13.0	7.0
Prostate	11.9	13.0	5.3
Lung	7.9	14.0	26.9
Colorectal	7.3	13.0	11.3
Other	46.0	47.0	49.5
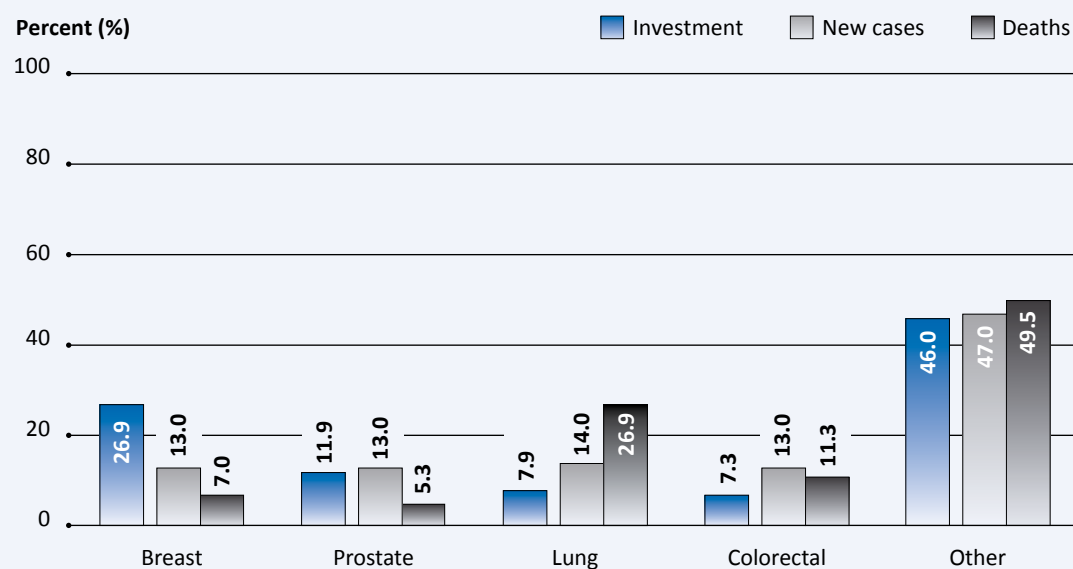
Data source for cancer research investment: Canadian Cancer Research Alliance database

Data source for new cancer cases: Statistics Canada, Canadian Cancer Registry

Data source for cancer deaths: Statistics Canada, Vital Statistics Death Database

What do the results mean?

- The non-commensurate relationship between the allocation of disease site–specific research funding and the relative burden (as defined by incidence and mortality) of those disease sites represents an opportunity for efforts to achieve better balance in cancer research investment. It is important to note that burden of disease is just one way to assess research investment; many other indicators are used to assess health burden. For the purpose of this report, however, incidence and mortality are used.

- Measuring research funding relative to disease burden has been argued as a key consideration in research planning nationally. A few examples include the *Recalcitrant Cancer Research Act*, which requires the National Cancer Institute (NCI) to develop research plans aimed at addressing the most lethal cancers; it has turned immediate attention to lung and pancreatic cancers. Another example is the Ontario Institute for Cancer Research, which has launched new initiatives based on burden of disease and has invested in Pancure, a researched project focused on pancreatic cancer.

- Canada is not alone in this respect. Breast cancer in other countries is also better-supported from a research perspective than other cancer sites. For example, the NCI, one of many sources of such funding in the United States, allocated $625 million to breast cancer research in 2011, over twice the amount allocated to lung cancer research ($296.8 million),[237] despite the higher mortality rate for lung cancer.

- The National Cancer Research Institute in the United Kingdom reports a similar pattern, with more funding being allocated to breast cancer than any other type of cancer (20% of site-specific cancer research funds were allocated to breast cancer in 2010).[238]

What are some examples of efforts in this area?

- The Canadian Cancer Research Alliance (CCRA) will continue to inform the health system about research investment gaps and to identify opportunities for reducing research duplication through optimizing partnerships. The CCRA, through the Canadian Partnership Against Cancer's investment, will work to maximize the impact of research across the cancer control continuum through a co-ordinated approach to improve the efficiency of the Canadian cancer research funding system.

- The CCRA's Pan-Canadian Cancer Research Strategy framework guides cancer research investments in Canada and outlines achievements that could be made over the next few years, including initiatives in improving Canada's cancer research funding system, identifying opportunities for new research investments and addressing concerns about imbalanced investments across types of research funding.[239]

7. System Efficiency

7. System Efficiency

This section presents three indicators that measure the utilization of select cancer control services through the lens of system efficiency. While not by any means a comprehensive assessment of the efficient use of cancer control services, the data presented here highlight where opportunities may be to better align, at the population level, service delivery with evidence of appropriateness and benefit.

Beyond the substantial economic impact of cancer on society, the delivery of cancer control services entails significant capital and operating costs across the continuum of care. Surprisingly, there is currently little reliable information on the comprehensive cost of cancer control across the country. There is also a paucity of objective data on the relative efficiency of cancer control services delivered by provinces. Given the accelerating increases in the costs of many aspects of cancer care, particularly drugs and technology for diagnosis and treatment, many health system planners and policy-makers have raised questions about sustainability. Any opportunities for improving the efficiency of more routine services could enhance the system's ability to invest in more complex and emerging modalities.

With improving efficiency as a rationale, in 2012, the Canadian Partnership Against Cancer's System Performance Steering Committee, comprising representatives from the 10 provincial cancer agencies and programs, identified the need to add system efficiency and sustainability to the domains addressed in system performance measurement and reporting. In response, the Canadian Partnership Against Cancer's System Performance Initiative launched a process to identify opportunities for introducing meaningful system efficiency indicators in future reports. A System Efficiency Measurement Working Group, including experts and leaders in health economics, costing methods and policy and planning, was struck to help guide this effort. The efficiency indicators presented in this chapter represent the initial results of this work. The indicators include three that address efficiency in the screening,

treatment and end-of-life care components of the cancer journey:

- **Breast cancer screening outside recommended guidelines:** National breast screening guidelines disseminated by the Canadian Task Force on Preventive Health Care recommend that women aged 50 to 69 at average risk for breast cancer be routinely screened with mammography every two to three years.[99] The Task Force also makes a weak recommendation based on low-quality evidence for routine screening of women aged 70 to 74. This indicator reports on the percentage of average-risk women aged 75 and over who report receiving a screening mammogram. Mammograms and the subsequent investigations associated with abnormal results can be resource intensive, and when performed outside the guidelines within which they are deemed effective, they can cause unnecessary interventions for the screened individual, as has been shown in studies in the United States.[240]

- **Mastectomies performed as day surgery:** Mastectomies are a common curative treatment for women with resectable breast cancer. Although they are relatively invasive, mastectomies can be safely performed as day surgery.[241] Day surgeries can be preferable to inpatient surgeries (for which a patient is admitted to a hospital bed to recover following the operation) because they consume fewer hospital resources without compromising patient outcomes.

- **Intensive care unit use in the last two weeks of life:** Hospital critical care units, including intensive care units (ICUs), are among the most

resource-intensive patient care areas. Excessive use of critical care near the end of life may indicate inappropriate use of resource-intensive acute care in situations where palliative and supportive care in a non-acute setting may be more appropriate for the patient from a quality of life perspective and a better use of system resources.

The plan for future system performance reports is to increase the scope of system efficiency indicators to include an expanded set of reliable measures that can help inform decisions aimed at improving the efficient use of cancer control resources and achieving a better alignment of patient needs and system capacities.

Indicator	Summary of results
Breast cancer screening outside recommended guidelines	Depending on the province, anywhere from 22.4% to 40.0% of women aged 75 and over report having received a screening mammogram in the past two years.
Mastectomies performed as day surgery	In Ontario, 35.4% of mastectomies are done as day surgery, but the rate is below 10% in five other provinces.
Intensive care unit use in the last two weeks of life	Depending on the province, anywhere from 5.6% to 13.7% of people who died of cancer were admitted to an ICU in the last two weeks of life.

Breast Cancer Screening Outside Recommended Guidelines

What are we measuring?

This indicator measures the percentage of women aged 75 and over who reported in 2012 receiving a screening mammogram in the past two years.

- All provincial and territorial breast screening programs target women aged 50 to 69 at average risk of breast cancer and offer biennial mammograms. In addition, some jurisdictions provide program screening to women aged 70 to 74 years but do not necessarily actively promote screening uptake for women in these age groups; some programs require a physician's referral for screening outside the target age groups. Given the cost of mammograms and investigations that follow an abnormal result, interprovincial comparisons of screening rates in women older than 75 may identify opportunities in some provinces for balancing resource allocations.

What are the results?

- The percentage of women aged 75 and older reporting in 2012 that they have received a screening mammogram in the past two years ranged between 22.4% and 40.0% provincially (Figure 7.1), compared with between 57.4% and 74.9% in the target age group of 50 to 69 (see Screening chapter). Interestingly, Quebec had the highest screening rate in the 50 to 69 target age group (74.9%) but one of the lowest screening rates in the 75 and older group (25.0%).

Data and measurement considerations

- This indicator is based on self-reported survey data from the Canadian Community Health Survey and includes women aged 75 to 101 years. Previous studies have shown that self-reported screening rates can be comparable to actual utilization rates gleaned from administrative data. However, the survey question does not take into account frequency of testing (i.e., whether the respondent had more than one mammogram in the past two years).

FIGURE 7.1

Screening outside of guidelines: Percentage of women (aged ≥ 75) reporting a screening[†] mammogram in the last two years, by province/territory – 2012 reporting year

Percent (%)
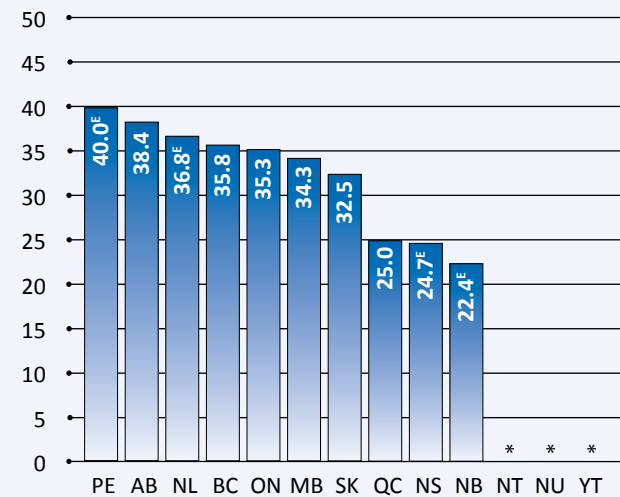
* Suppressed due to statistical unreliability caused by small numbers.

[E] Interpret with caution owing to a large variability in the estimate.

[†] Excludes tests done to investigate symptoms.

Data source: Statistics Canada, Canadian Community Health Survey

What do the results mean?

- Based on an average of 32% of eligible women age 75 and older receiving a screening mammogram at least every two years, and given that there were around 900,000 women aged 75 and over who were candidates[v] for breast cancer screening in Canada in 2012, this would equate to as many as 145,000 mammograms every year.

- This report did not look at breast screening mammograms done on patients under 50 years of age, which would also constitute screening outside the recommended age group of 50 to 69. A system performance report published by the Canadian Partnership Against Cancer in 2012, *Breast Cancer Control in Canada*,[vi] did report on breast screening for patients aged 40 to 49; rates ranged from 15% to 36% in that group.

What are some examples of efforts in this area?

- The Canadian Breast Cancer Screening Initiative is focusing on gaining a better understanding of off-guideline screening across the country. An upcoming report from this group will include a number of in-depth indicators, including screening outside recommended age groups and screening outside recommended frequency. The aim of this report is to raise awareness of this issue among provinces and potentially to encourage efforts to optimize the use of screening resources.

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v Candidates for screening are women with no previous history of breast cancer, which based on the Canadian Community Health Survey sample represents 64% of women aged 75+.

vi Available at systemperformance.ca

Mastectomies Performed as Day Surgery

What are we measuring?

This indicator measures the percentage of mastectomies for breast cancer tumour resection that are done as day surgery.

- The transition of many surgeries from inpatient to outpatient settings has been an ongoing trend in clinical practice for decades. This trend has recently included mastectomies for breast cancer. Studies from the United Kingdom[241] and other jurisdictions have shown that with proper follow-up and home care services, the outcomes of day surgery procedures in breast cancer can be at least as good as inpatient outcomes. Because hospital stay costs are significantly higher than outpatient and home care costs, the shift to day surgery can lead to system savings. Measuring the rate of day surgery mastectomies across provinces can help identify benchmarks that could be applied across the country.

What are the results?

- The percentage of mastectomies done as day surgery by province (based on data from 2007/08 to 2011/12) ranges from 0% in Prince Edward Island to 35.4% in Ontario. Manitoba, Quebec and New Brunswick have rates over 25%, while four other provinces have rates under 10% (British Columbia, Newfoundland and Labrador, Saskatchewan and Alberta) (Figure 7.2).

Data and measurement considerations

- This analysis is based on hospital discharge abstract data, which have not been linked to cancer registry data. Surgeries for new breast cancer cases were identified by excluding patients with a record of previous cancer treatment in the historical data. More details are provided in the Technical Appendix, available at systemperforamance.ca.

FIGURE 7.2

Percentage of breast cancer mastectomies done as day surgery, by province/territory – from 2007/08 to 2011/12 fiscal years combined

Percent (%)

ON 35.4
NB 30.0
QC 26.4
MB 25.1
NS 16.2
BC 7.3
NL 7.2
SK 3.0
AB 1.1
PE 0.0
Terr. *
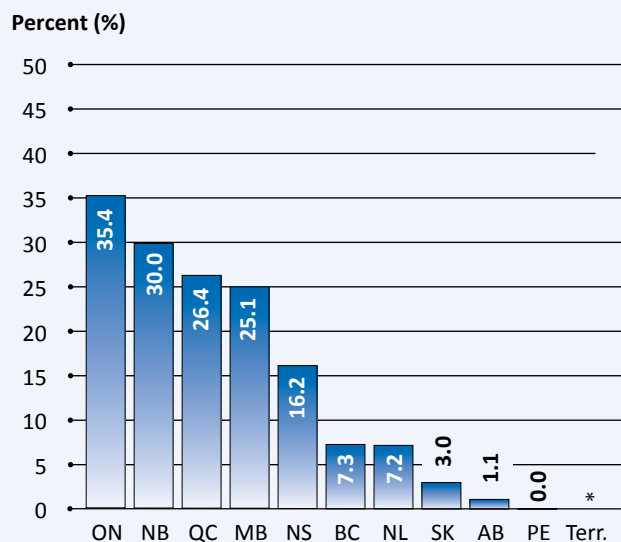
* Suppressed due to statistical unreliability caused by small numbers.

Terr. = Territories, which include NT, NU and YT.

Data source: Hospital Morbidity Database, National Ambulatory Care Reporting System; Canadian Institute for Health Information; Alberta Ambulatory Care Reporting System, Alberta Health and Wellness

What do the results mean?

- If comparable outcomes can be maintained, the advantages of shifting from inpatient to day surgery breast cancer resection include a reduction in system costs and a freeing up of inpatient capacity, which would facilitate improved throughput for essential inpatient care, including other cancer surgeries. The fact that one province (Ontario) performed 35% of mastectomies as day surgeries between 2007/08 and 2011/12 suggests that other provinces can move closer to that benchmark, assuming necessary system support for this shift can be put in place. Based on the five-year data (2007/08 to 2011/12) used for this indicator, there are about 6,300 mastectomies done per year in Canada. If 35% were done as day surgery in provinces other than Ontario (compared with the current 13% average for those provinces), this could result in almost 900 inpatient cases a year being converted to day surgery.

What are some examples of efforts in this area?

- This indicator is part of a suite of metrics recommended by the Canadian Partnership Against Cancer's System Efficiency Measurement Working Group for ongoing reporting and monitoring. The indicator may also be a candidate for the development of benchmarks or targets, which would signal the desired level of performance across the country. The objective is to make breast cancer surgeons and other provincial decision-makers aware of how their province compares with others and of the opportunity to move more cases to the day surgery setting.

Intensive Care Unit Use in the Last Two Weeks of Life

What are we measuring?

This indicator measures the percentage of cancer patients admitted to an intensive care unit in the last 14 days of life.

- High-quality, person-centred end-of-life care is an essential component of an effective cancer care system. Patients dying of cancer deserve care that helps alleviate physical symptoms and addresses emotional and psycho-social needs in a setting that is supportive, comfortable and minimally disruptive. While cancer patients may require the life-sustaining therapies offered by critical care units, such units do not always

represent the ideal setting for end-of-life care, which includes palliative care and symptom control.[242]

- Examining interprovincial variations in the use of critical care in the last two weeks of life may point to opportunities for providing alternatives to intensive care unit (ICU) use without compromising quality of care. The percentage of cancer patients dying in ICU is also presented as an explanatory indicator because it points to the proportion of patients who were discharged from ICU before death (in which the ICU is an episode of care) versus those who died in ICU.

What are the results?

- A relatively small proportion of patients dying of cancer receive ICU care in the last two weeks of life. That percentage ranges from a low of 5.6% in Nova Scotia to a high of 13.7% in Ontario (Figure 7.3). There does not appear to be a correlation between results and size of province – both small and large provinces featured at both ends of the range. The percentage of patients admitted to an ICU who died in the ICU is highest in Ontario (83.2%) and lowest in Prince Edward Island (40.4%).[vii]

Data and measurement considerations

- The indicator results presented here are based on an analysis of inpatient health record data maintained by the Canadian Institute for Health Information. Only cancer patients who died in an acute care hospital are included in this analysis, so the results are based on only a portion of cancer deaths. Cancer patients were identified by ICD-10 diagnosis codes as follows:

  - A main diagnosis of malignant neoplasm or neoplasms of uncertain or unknown behaviour, or

  - A most responsible diagnosis of palliative care, with a secondary diagnosis of malignant neoplasm

- Data on patients treated in Quebec facilities were excluded from the study.

FIGURE 7.3

Percentage of cancer patients admitted to, and dying in, an intensive care unit in the last two weeks of life, by province – in 2011/12 and 2012/13 fiscal years combined

Percent (%)

Legend: Admitted to an intensive care unit; Died in an intensive care unit

Province	Admitted	Died
ON	13.7	11.4
NL	10.4	4.9
AB	9.5	7.2
PE	9.4	3.8
SK	9.2	7.0
BC	8.1	5.5
MB	7.5	5.4
NB	6.8	4.7
NS	5.6	3.8
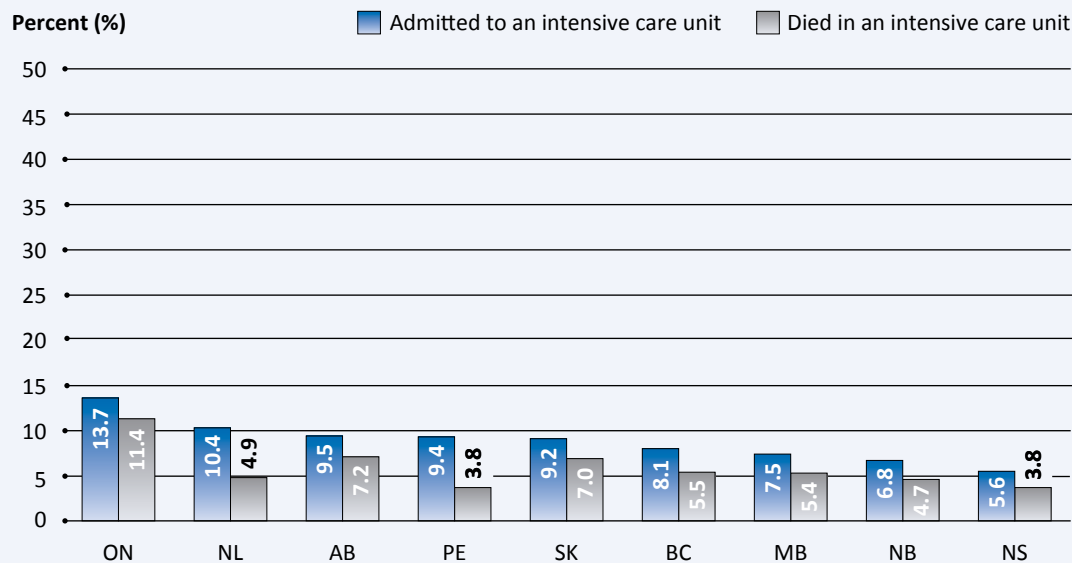
Data include all provinces except QC.

Data include only cancer patients who died in a hospital with an intensive care unit facility.

Data source: Discharge Abstract Database, Canadian Institute for Health Information

vii ON's 83.2% is calculated as 11.4% died in ICU divided by 13.7% admitted to ICU; PE's 40.4% is calculated as 3.8% died in ICU divided by 9.4% admitted to ICU.

What do the results mean?

- A relatively small percentage of people who die of cancer in Canada are admitted to an ICU in the last two weeks of life compared with international jurisdictions. A comparison of Ontario and the Surveillance Epidemiology and End Results data from 1999 to 2003 identified the rate of ICU use in the last 30 days of life in the United States as double that of Ontario[197] and Ontario has the highest rate in Canada based on the results presented here. Nonetheless, interprovincial variations presented here, both in the indicator of percent admitted to an ICU and its relationship to percent of patients dying in an ICU, suggest a need for further analysis to determine whether there are real opportunities to reduce unnecessary ICU use.

What are some examples of efforts in this area?

- The Canadian Partnership Against Cancer's Person-Centred Perspective portfolio is supporting the implementation of a number of palliative care initiatives across the country. The scope of these initiatives includes innovations in the delivery of end-of-life care, which encompasses appropriate settings for care delivery. Beyond the efficiency question is the issue of quality care informed by and centred on the needs of dying cancer patients and their families. The studies and associated implementations that arise from these initiatives will most certainly involve lessons on appropriate use of system resources to care for dying cancer patients. Future updates of the indicators presented in this section will inform the evaluation of the impact of these efforts.

Emerging evidence and studies

- A study in the United States published in 2014 examined what the authors referred to as futile use of intensive care at the end of life in a cancer hospital. This study found that 16% of the 238 admissions to an ICU recorded in the last 30 days of cancer patients' lives were deemed futile. The study authors defined futile admissions as "any advanced support delivered in the ICU to patients that should not have been transferred in the first place or that could, at most, have received an ICU trial but in whom treatment limitation did not occur despite clear evidence of failure of such a trial." The study, which included chart reviews to determine reasons for futile ICU admissions, concluded that "most cases were traceable to the conduct of the attending physicians who failed to consider prognosis and allowed life support measures to be added in an automatic fashion as organic failures mounted." The study also concluded that "physicians were unable to propose to families withholding or withdrawing measures; patients remained in the ICU, receiving treatments that were futile and expensive, at times intensifying suffering" and that palliative care was denied. The study recommended strategies to increase awareness among clinicians of futile use of ICUs and an expansion of indications of palliative care consultations.[243]

8. Long-Term Outcomes

8. Long-Term Outcomes

Much of the effort in cancer control is aimed at reducing the number of people diagnosed with cancer (measured by incidence rates), lowering the number of deaths from cancer (measured by mortality rates) and extending the length of time people live after being diagnosed with cancer (measured by survival rates). In this section of the report, incidence, mortality and survival rates are presented for the most common cancers in Canada: colorectal, lung, breast and prostate cancer. In addition, data on pancreatic cancer are presented because pancreatic cancer has surpassed prostate cancer as the fourth leading cause of cancer-related death in Canada.[96]

Previous system performance reports from the Canadian Partnership Against Cancer included age-standardized incidence and mortality rates standardized to the 1991 Canadian census population. Starting with the *2014 Cancer System Performance Report*, the reference year for standardization has been updated to the 2011 census population. The special insert in this section provides background on age standardization and an analysis of the impact of shifting the reference year on the magnitude of incidence and mortality rates across the country. It is important to note that rates standardized to different reference populations should not be compared given that the different reference populations will result in different age-standardized rates even though the underlying rates may be identical.[244] Plans are in place for Statistics Canada and other organizations to shift to the 2011 census population in the coming year.

In this section, three fundamental measures are used:

1. The age-standardized incidence rate (ASIR) represents the number of newly diagnosed cancer cases per 100,000 people that would occur in a particular area or jurisdiction if it had the same age distribution as a standard reference population (2011).[245]

2. The age-standardized mortality rate (ASMR) represents the number of deaths from cancer per 100,000 people that would occur in a particular area or jurisdiction if it had the same age distribution as a standard reference population (2011).[245]

3. The relative survival ratio (RSR) represents the ratio of observed survival for a group of individuals, typically those diagnosed with a specified disease, to the expected survival for members of the general population that have the same main factors affecting survival (such as age, sex and place of residence) as the individuals with the disease.[245]

- As of the *2014 Cancer System Performance Report*, the Canadian Partnership Against Cancer will be reporting rates standardized to the 2011 reference population.

- Age-standardized rates based on the 2011 census population are not comparable with age-standardized rates based on populations other than 2011.

- Age-standardized rates are not true rates, but are used to remove the effects of aging of the population when considering trends over time, or to compare rates in populations with differing age structures.

Indicator	Summary of results
Breast cancer	Age-standardized incidence is stable while mortality rates continue to decrease. The lowest age-standardized mortality rates for breast cancer are in British Columbia; the highest are in Manitoba. Five-year relative survival for breast cancer has improved from 82% in 1992–1994 to 88% in 2006–2008.
Lung cancer	Age-standardized incidence and mortality rates for lung cancer continue to decrease for men and increase for women, although the rate of increase for women may be slowing. The lowest age-standardized mortality rates for lung cancer are in British Columbia; the highest are in Quebec. Five-year relative survival for lung cancer has improved from 14% in 1992–1994 to 18% in 2006–2008.
Colorectal cancer	Age-standardized mortality rates for colorectal cancer continue to decrease for men and women, although a decreasing trend in incidence rates is seen only in women. The lowest age-standardized mortality rates for colorectal cancer are in Alberta; the highest are in Newfoundland and Labrador. Five-year relative survival for colorectal cancer has improved from 56% in 1992–1994 to 65% in 2006–2008.
Prostate cancer	Age-standardized mortality rates continue to decrease for prostate cancer while incidence rate trends are volatile, likely owing to prostate-specific antigen testing patterns. The lowest age-standardized mortality rates for prostate cancer are in Quebec; the highest are in Saskatchewan.
Pancreatic cancer	Age-standardized incidence rates and mortality rates continue to decrease for men and remain relatively stable for women. The lowest age-standardized incidence rates and mortality rates are in Newfoundland and Labrador. Five-year relative survival for pancreatic cancer has improved from 5% in 1992–1994 to 8% in 2006–2008.

Special Feature: A word about cancer statistics and age standardization

The number of new cancer cases can increase in a population when any one of three factors changes:

1. Cancer cases will probably increase as the population increases in size, simply because there are more people at risk.

2. The frequency of cancer, like that of many other chronic diseases, increases with age. Figure 8.i shows the annual risk of cancer by five-year age groups in Canada. It is clear that risk increases sharply in middle age and continues to increase into old age.

3. The third factor is the actual risk of cancer – in other words, the probability that anyone in the population will, in fact, have cancer detected in any given year. This probability is driven by a number of factors both modifiable (tobacco use, obesity, etc.) and non-modifiable (genetics, environmental exposure, etc.), as well as the likelihood of detection of cancer.

FIGURE 8.i

Incidence rates by five-year age groups, all cancers, Canada – 2008
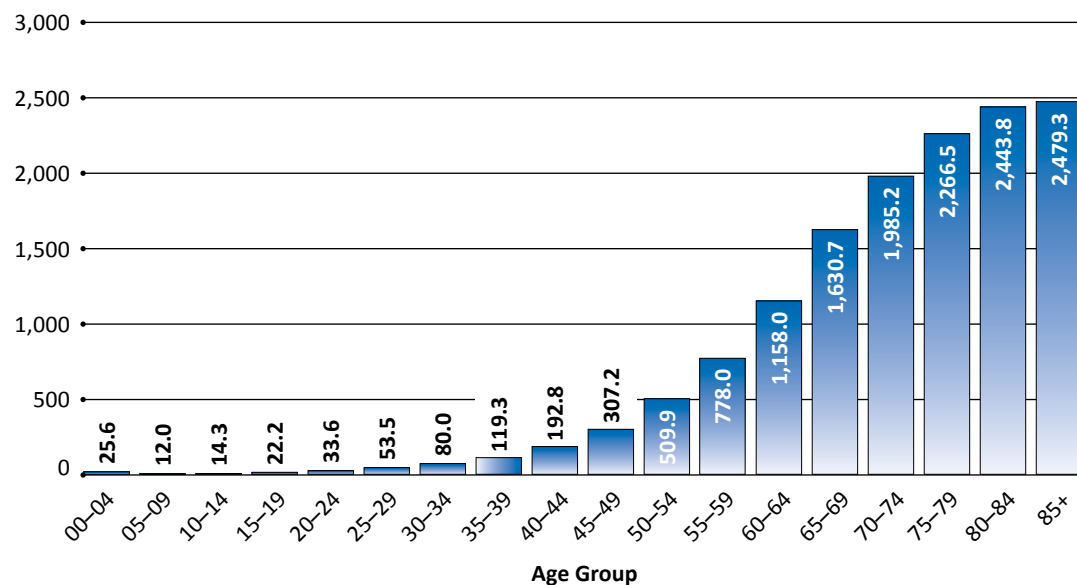
Rate per 100,000 population

Data source: Statistics Canada, Canadian Cancer Registry

Three statistics can be used to describe cancer incidence and each reflects different ways of approaching the factors listed above:

- **Number of new cases** in any given year. This is a critical number needed by health care planners because it drives the direct need for cancer services in the population and the associated resource allocations required. This number does not explain why the number of cases may be increasing, but it is the most useful number for estimating service and capacity needs.

- **Crude cancer rate**. It is useful for planners to know whether – within their regions or across different jurisdictions – there is a disproportionate number of new cancer cases. This can be revealed by calculating the crude cancer rate, which is obtained simply by dividing the number of cases in a region by the number of people in that region. If a region has a higher rate, it could either be because the population is relatively older, because the actual cancer risk is relatively higher (perhaps because of different smoking rates, for example) or because of both factors together. While the crude cancer rate does not make this distinction, it does allow planners to note that cancer rates may be higher in some regions, requiring more resources.

- **Age-standardized incidence rate (ASIR)**. Because age is such a strong predictor of cancer risk, the ASIR is a calculation done to remove the influence of differences in age structure on the calculated rates and thus allows us to examine the differences between cancer rates due to other risk factors. It is very common to compare ASIRs across provincial populations, or over time, because it is the best indicator of how the actual risk for cancer may vary across regions or over time.

Table 8.i shows the differences between 1992 and 2008 in three measures of cancer incidence. The number of cases has risen most sharply, with an increase of 43% in Canada between 1992 and 2008. Clearly, it would be expected that the need for cancer services would therefore also have increased sharply over this time.

Table 8.i also shows that the crude cancer rate has gone up, with an increase of 22% in Canada overall. This is lower than the percentage increase in crude numbers because, by using rates, we have eliminated the effect of the increase in the population size. However, the underlying reason for the increase in the crude rate remains a question. We can see, though, that the ASIR actually decreased slightly (by 0.4%), confirming that the increase seen in the crude cancer rate is due to the aging of the population. This suggests that the actual cancer risk for individuals in the population has remained fairly stable since 1992.

TABLE 8.i

Three measures of cancer burden – in 1992 and 2008

Number of new cases			Crude cancer rate			Age-standardized incidence rate*		
1992	2008	% change	1992	2008	% change	1992	2008	% change
115,700	165,505	43.0	407.8	497.8	22.1	402.4	400.8	-0.4

* Standardized using 1991 Canadian population.

Data source: Statistics Canada, Canadian Cancer Registry

This example demonstrates the usefulness of ASIRs in assessing the difference in individual cancer risk over time (or between populations). It also demonstrates, however, that ASIRs are poor estimates of crude rates and are even less useful in predicting the actual cancer burden.

Updating Canadian age-standardized cancer rates

Age-standardized rates are especially useful for examining a population over time or when comparing different populations. When one calculates ASIRs, the first step is to choose a reference population that is used as the standard age distribution for all of the populations being examined. If one compares many different countries, it is common to use the world population as the reference population. Within countries, it is common to use the national population; in Canada, for many years we have used the 1991 Canadian population as the reference population. It is critical not to compare rates that are standardized to different reference

populations because doing so will produce different results even though the underlying rates may be identical, as shown in Figure 8.iii.

To age standardize the cancer rates, five-year age groups in each province are calculated (age-specific rates) and a weighted average of these rates is obtained by multiplying each rate by the proportion of the Canadian population that was in this age group in 1991 (the reference population). The resulting ASIRs represent what the rates would be if each province had the same population structure as, for example, the Canadian population in 1991. The 1991 Canadian population was used to generate the ASIRs in Table 8.i.

Keeping the same reference population (e.g., Canada 1991) over several years of rate calculations has advantages in that trends can be examined year after year without needing to continually adjust interpretation. As time passes, however, the reference population becomes progressively less like the actual current population in the country and the ASIRs move farther away from the crude rates.

FIGURE 8.ii

Age structure of Canadian population – in 1991 and 2011

1991   **Age Group**   2011

Age Group	1991	2011
85+	1.0	1.9
80 to 84	1.4	2.0
75 to 79	2.2	2.7
70 to 74	3.0	3.4
65 to 69	3.9	4.5
60 to 64	4.2	6.0
55 to 59	4.4	6.9
50 to 54	4.8	7.8
45 to 49	6.0	7.9
40 to 44	7.6	6.9
35 to 39	8.4	6.6
30 to 34	9.2	6.8
25 to 29	8.9	6.9
20 to 24	7.4	6.9
15 to 19	6.9	6.5
10 to 14	6.8	5.6
05 to 09	6.9	5.3
00 to 04	7.0	5.5

Proportion (%)
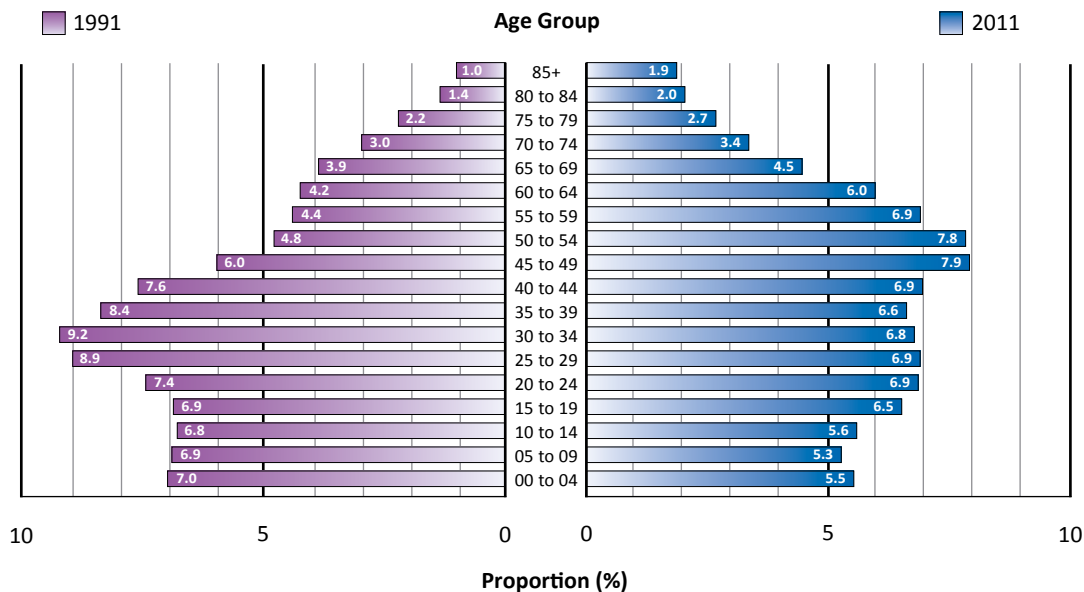
Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 8.iii

Crude and age-standardized incidence rates using 1991 and 2011 reference populations, all cancers, Canada – 2008

Rate per 100,000 population

Crude cancer rate	ASIR (1991 population)	ASIR (2011 population)
497.8	400.8	520.2

ASIR = age-standardized incidence rate.

Data source: Statistics Canada, Canadian Cancer Registry

In Canada, the population has aged significantly since 1991, as shown in the population pyramids in Figure 8.ii.

It is customary, then, to update the reference population from time to time, and in Canada, it has generally been done every 20 years. Given the aging population, incidence rates standardized to a more recent population, for example 2011, will be higher than the ASIRs calculated using the 1991 population – simply because they are no longer being applied against a population that is much younger than the current population. Figure 8.iii shows the crude incidence rates for all cancers combined in Canada in 2008. It then uses *exactly the same actual rates* and age standardizes them using the 1991 population (the current standard) and then using the 2011 population as the standard population.

The rates standardized to the 2011 population are much closer to the crude (actual) rates than those using the 1991 population. This is simply because the age structure in the 2011 reference population is much closer to the current age distribution in Canada. It is critical to note that the differences between the 1991 and 2011 ASIRs reflect *only* the different choice of reference population – exactly the same crude rates (incidence data from 2008) were used to make this calculation.

As of the *2014 Cancer System Performance Report*, the Canadian Partnership Against Cancer (the Partnership) will be reporting rates standardized to the 2011 reference population. As demonstrated by Figure 8.iii, **it is critical *not* to compare these ASIRs to those in earlier publications by the Partnership or others that have used different reference populations.**

Impact on provincial rates

The age structures of the different provinces have not progressed evenly over the past 20 years, and this has had an impact not only on crude cancer incidence rates but also on the relativity of age-standardized rates.

In general, there has been a more rapid "aging" of the population structure in Atlantic Canada than in the rest of the country. If we examine the effect of this on crude rates and ASIRs for cancer, we see the results shown in Table 8.ii.

FIGURE 8.iv

Change in percentage of population over 60 years of age – from 1991 to 2011

Change in percentage
- 1.8–4.4
- 4.5–6.7
- 6.8–10.2

Province	SK	MB	NU	AB	ON	NT	BC	CA	PE	QC	NS	NB	YT	NL
Change in percentage	1.8	2.4	2.5	3.4	4.5	4.8	4.9	5.0	6.4	6.8	7.1	7.6	8.6	10.2
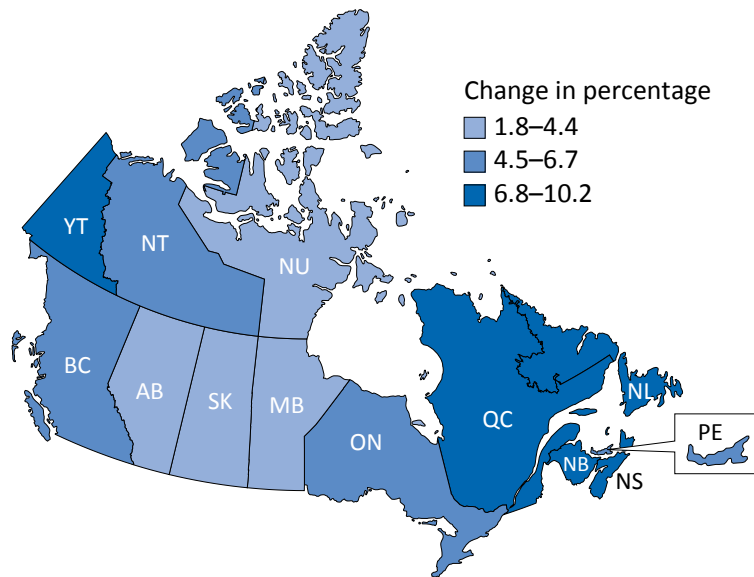
Changes in the percentages of population over 60 years of age from 1991 to 2011 were grouped approximately by tercile excluding Canada as a whole.
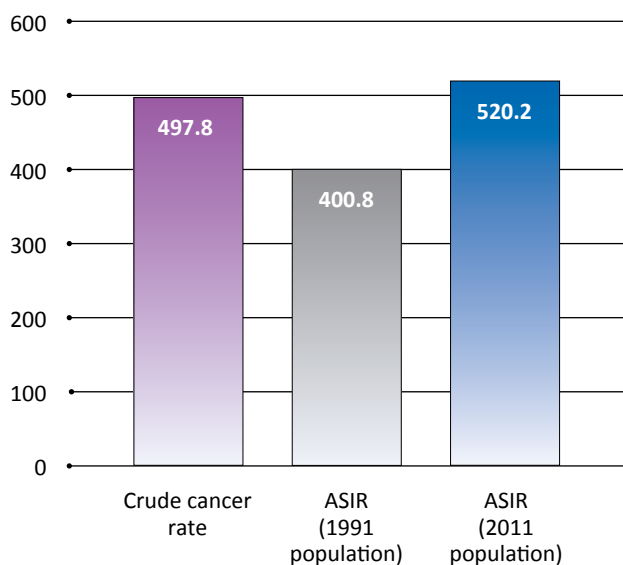
Data source: Statistics Canada, Canadian Cancer Registry

TABLE 8.ii
Crude and age-standardized incidence rates using 1991 and 2011 reference populations, all cancers, by province – 2008

Province	Crude cancer rate	Age-standardized incidence rate		Age-standardized incidence rate increase due to change in reference population (%)
		1991 reference population	2011 reference population	
British Columbia	489.0	374.3	487.7	30.30
Ontario	477.1	392.5	506.0	28.91
Newfoundland & Labrador	529.8	398.9	511.1	28.11
Alberta	404.0	394.6	511.8	29.70
Saskatchewan	510.2	401.5	522.0	30.02
Manitoba	494.3	401.9	522.1	29.93
Quebec	559.8	423.6	554.8	30.96
Nova Scotia	590.9	432.2	561.1	29.82
Prince Edward Island	587.3	434.0	562.2	29.55
New Brunswick	604.5	444.6	577.3	29.84

Data source: Statistics Canada, Canadian Cancer Registry

Despite the differences in rates of aging among provinces, the ranking by ASIR of the provinces remains quite similar regardless of whether the reference population is Canada 1991 or 2011. The percent increase in ASIR due to changing the reference population ranges from 28% to 31% with only Alberta and Newfoundland and Labrador switching ranks.

The 2008 ASIRs using the newer reference population are, in all cases, closer to the crude rates and thus better reflect the actual cancer burden.

Work currently underway at Statistics Canada

A more in-depth investigation of age standardization is being prepared by Statistics Canada and will be featured as a vignette on its website in late spring 2014 (statcan.gc.ca). The report will inform users of the objectives of age standardization, explain how to age standardize data and explore the use of different reference populations depending on the comparative analysis being undertaken. The Canadian 2011 census population is only one of the reference populations being investigated.

Breast Cancer

What are we measuring?

This section presents the age-standardized incidence rate, the age-standardized mortality rate and the five-year relative survival for breast cancer. These indicators are examined over time and by province.

- Breast cancer is the most common cancer diagnosed among women in Canada, accounting for more than one-quarter of new projected incident cases for women in 2013 and for 14% of all cancer deaths among women.[96]

What are the results?

- The age-standardized incidence rate (ASIR) for breast cancer in Canada remained relatively stable from 1992 to 2008 at around 130 cases per 100,000 females (Figure 8.1).

- The age-standardized mortality rate (ASMR) for breast cancer has declined significantly from 1992 to 2009 (Figure 8.1), from approximately 41 deaths per 100,000 females in 1992 to 28 in 2009 (annual percent change = −2.26%).

- The ASIR by province from 2008 to 2010 ranged from 114.1 cases per 100,000 females in Newfoundland and Labrador to 134.6 in Prince Edward Island, a difference of 18% (Figure 8.2).

- The ASMR by province from 2007 to 2009 ranged from 25.6 deaths per 100,000 females in British Columbia to 30.9 in Manitoba, a difference of 21% (Figure 8.3).

- The five-year age-standardized relative survival ratio (RSR) did not vary substantially by province from 2006 to 2008, ranging from 85% in Manitoba to 89% in New Brunswick and Ontario (Figure 8.4).

- There has been an increase of 6 percentage points in Canada's age-standardized RSR from 1992–1994 to 2006–2008 (excluding Quebec) (Figure 8.5).

Data and measurement considerations

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 8.1

Age-standardized (2011 population) incidence and mortality rates for breast cancer in women, Canada – from 1992 to 2009
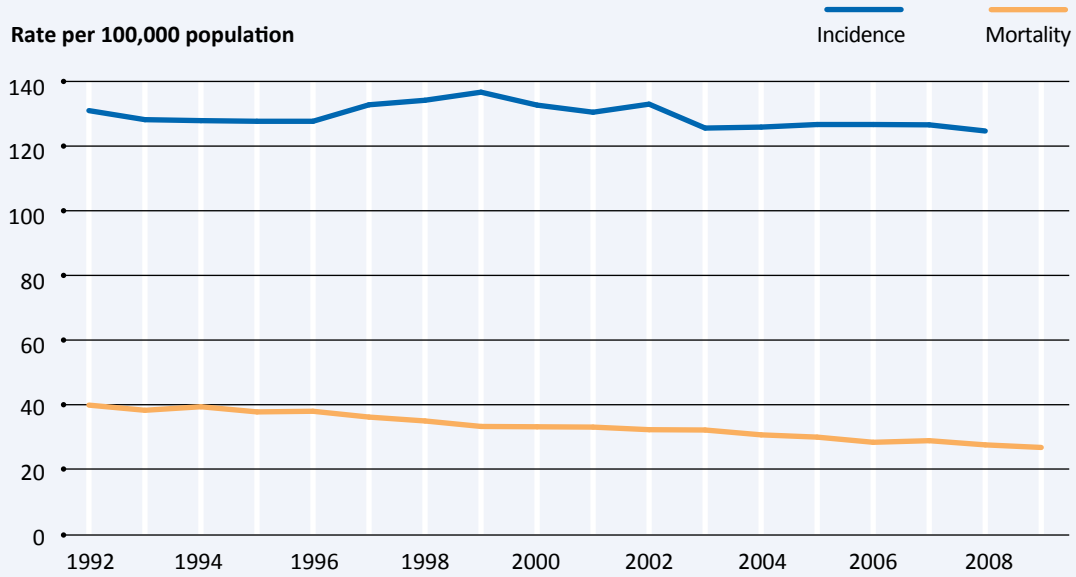
Rate per 100,000 population

Incidence   Mortality

Data source: Statistics Canada, Canadian Cancer Registry, Vital Statistics Death Database

FIGURE 8.2

Age-standardized (2011 population) incidence rates for breast cancer in women, by province – from 2008 to 2010

Rate per 100,000 population

NL	NB	AB	BC	SK	ON	MB	NS	QC	PE
114.1	123.3	125.1	125.3	126.2	127.5	130.7	131.5	131.8	134.6
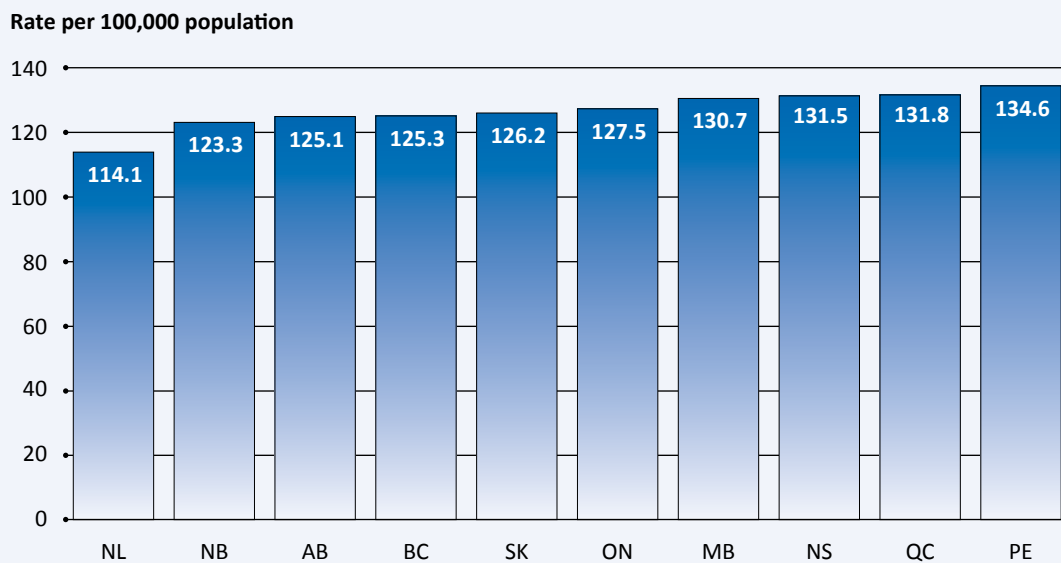
QC data are for 2008.

Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 8.3

Age-standardized (2011 population) mortality rates for breast cancer in women, by province – from 2007 to 2009

Rate per 100,000 population

Province	Rate
BC	25.6
NB	26.9
AB	26.9
SK	27.4
NS	28.1
NL	28.4
ON	28.6
PE	30.2
QC	30.7
MB	30.9
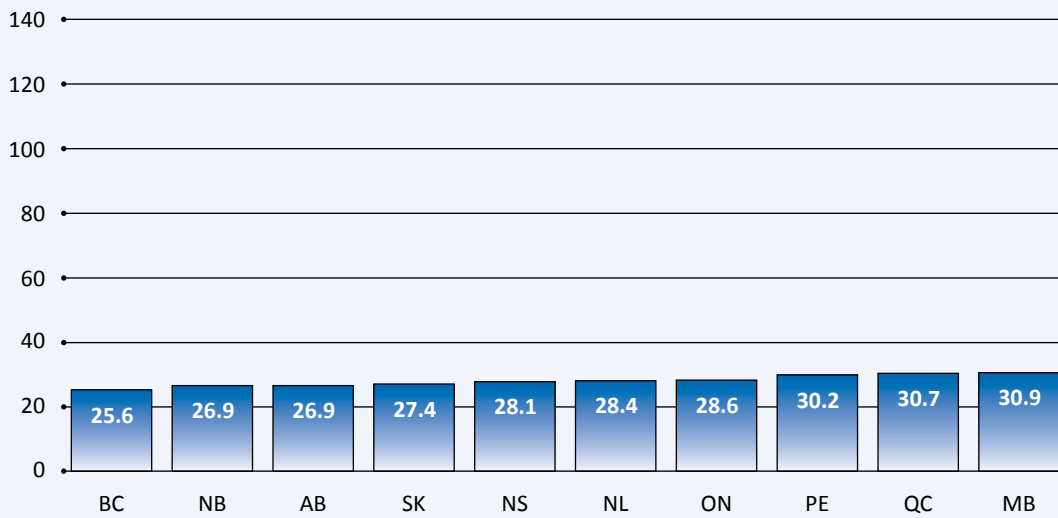
Data source: Statistics Canada, Vital Statistics Death Database

FIGURE 8.4

Age-standardized[†] five-year relative survival ratios for breast cancer, both sexes combined, by province – from 2006 to 2008
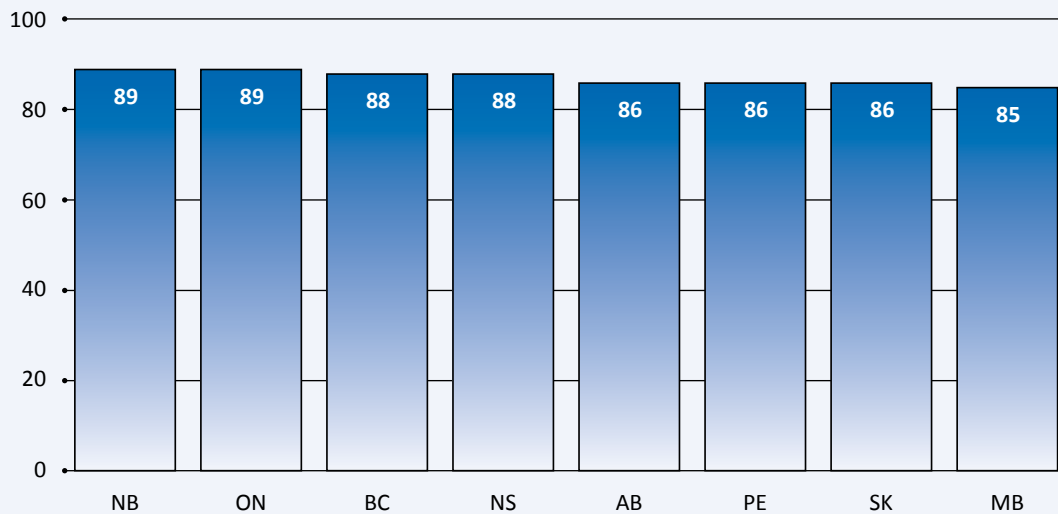
Relative survival (%)

Province	Relative survival (%)
NB	89
ON	89
BC	88
NS	88
AB	86
PE	86
SK	86
MB	85

† Age standardized to population diagnosed with breast cancer in Canada between 1992 and 2001.

Data based on 15 to 99 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

NL survival ratios not shown due to incomplete death clearance data, which may result in inflated survival ratios.

Data source: Statistics Canada, Canadian Cancer Statistics

FIGURE 8.5

Age-standardized[†] five-year relative survival ratios for breast cancer, both sexes combined, Canada – 1992 to 1994 vs. 2006 to 2008

Relative survival (%)

† Age standardized to population diagnosed with breast cancer in Canada between 1992 and 2001.

Data based on 15 to 99 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

Data source: Statistics Canada, Canadian Cancer Statistics

What do the results mean?
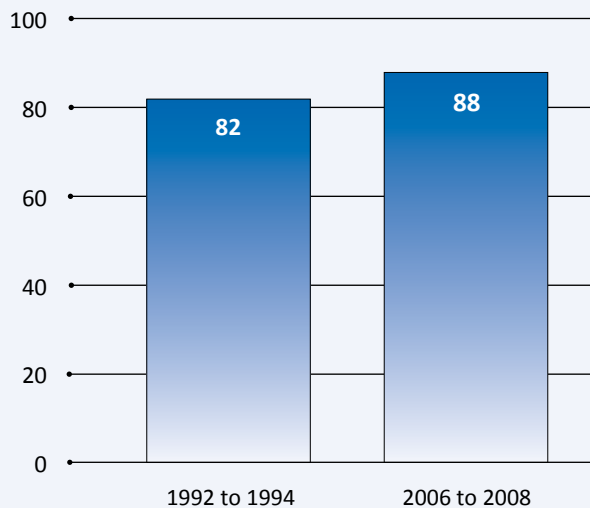
- While incidence rates remained largely stable over the 16-year timeframe examined here (the stable trend in ASIR has also been observed in Europe since the mid-2000s[246]), the substantial decline in mortality likely reflects improvements in early detection through mammography screening as well as more effective treatment. The 6 percentage points increase in five-year relative survival between 1992–1994 and 2006–2008 is also likely a testament to improvements in breast cancer control, including early diagnosis and more effective treatment.

- Similar to the declining ASMR trend in Canada, the breast cancer mortality rate in the United States has declined since 1991.[247] In Europe, the ASMR was around 39% lower in 2008–2010 than in 1984–1986, when rates peaked.[246]

- The improved survival seen in Canada has also been observed in the United States and some European countries. In the United States, five-year relative survival for breast cancer increased from 74.2% in 1979 to 90.2% in 1999 and has remained stable since then.[247] In the United Kingdom, five-year relative survival increased from 52% in 1971–1975 to 85.1% for 2005–2009.[246]

- An international study that compared 12 industrialized nations found that the United States had the highest five-year relative survival rate for breast cancer from 2002 to 2007 at 90.5%, followed by Canada (87.1%) and Sweden (86.1%).[248]

Emerging evidence and studies

- A recent report from the Canadian Partnership Against Cancer shows that the ASIR for breast cancer is not consistent across women with varying levels of income and different places of residence. Specifically, the ASIR for breast cancer is higher among women residing in high-income neighbourhoods and in urban areas than in those in low-income and rural and remote areas, respectively. However, the same is not true for mortality. An examination of estimated stage-specific incidence rates shows that higher income and more urban geography are associated with increased identification of early-stage breast cancer, perhaps as a result of more screening among high-income women. The incidence rate for advanced-stage breast cancer was only slightly lower for high-income women than for those in the lowest income quintile.

Lung Cancer

What are we measuring?

This indicator measures the age-standardized incidence rate, the age-standardized mortality rate and the five-year relative survival for lung cancer. These indicators are examined over time and by province.

- Among Canadian adults, lung cancer is the leading cause of death due to cancer for both men and women and is the second most commonly diagnosed cancer, with an estimated 25,400 new cases and 20,200 deaths in 2013.[96]

- The number of lung cancer deaths in Canada exceeds deaths due to prostate, breast and colorectal cancers combined.[96]

What are the results?

- In Canada, the age-standardized incidence rate (ASIR) and age-standardized mortality rate (ASMR) for lung cancer have consistently decreased among males but continued to increase among females between 1992 and 2008 (Figure 8.6).

- The ASIR for lung cancer decreased significantly for males from approximately 120 cases per 100,000 males in 1992 to approximately 88 in 2008 (annual percent change [APC] = −1.83%). The ASIR for females increased significantly from approximately 52 cases per 100,000 females in 1992 to approximately 64 in 2008 (APC = 1.3%) (Figure 8.6).

- The ASMR for lung cancer in Canada decreased significantly for males from approximately 104 deaths per 100,000 males in 1992 to approximately 74 in 2009 (APC = −2.09%). Meanwhile, for females, the ASMR increased significantly, from approximately 39 deaths per 100,000 females in 1992 to 48 in 2009 (APC = 1.05%). There was a steeper increase from 1992 to 1999 than from 1999 to 2009 (Figure 8.6).

- Across provinces, the ASIR for males was higher than for females but in varying proportions. The biggest variation between male and female ASIRs was observed in Prince Edward Island, followed by Quebec. British Columbia has the least variation between male and female ASIRs. The variation reflects historical differences among provinces in the smoking rate and related trends for men and women (Figure 8.7).

- The ASMR ranged from 51.6 deaths per 100,000 population in British Columbia to 74.7 in Quebec from 2007 to 2009, a 45% difference (Figure 8.8).

- The five-year age-standardized relative survival ratio (RSR) for lung cancer for 2006–2008 ranged from 15% in Nova Scotia to 21% in Manitoba (Figure 8.9). The data show an increase of 4 percentage points in age-standardized RSR from 1992–1994 to 2006–2008 (Figure 8.10).

Data and measurement considerations

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 8.6

Age-standardized (2011 population) incidence and mortality rates for lung cancer, by sex, Canada – from 1992 to 2009
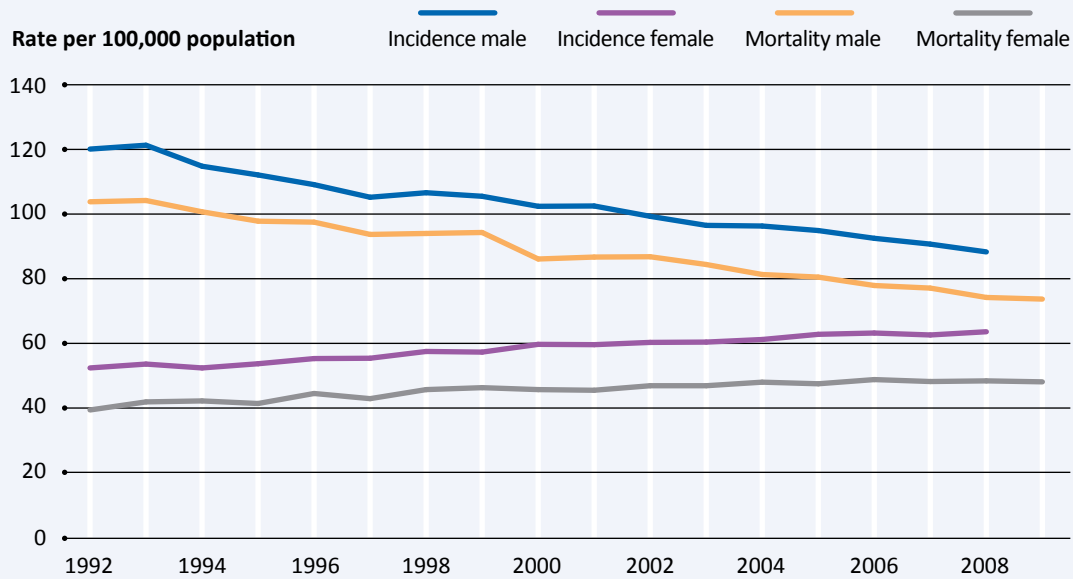
Rate per 100,000 population

Incidence male Incidence female Mortality male Mortality female

Data source: Statistics Canada, Canadian Cancer Registry, Vital Statistics Death Database

FIGURE 8.7

Age-standardized (2011 population) incidence rates for lung cancer, by sex, by province – from 2008 to 2010

Rate per 100,000 population

Male Female

	BC	ON	AB	NL	SK	MB	NS	PE	NB	QC
Male	68.8	73.6	74.9	89.9	75.6	83.2	98.6	115.3	108.1	122.8
Female	56.8	55.2	59.1	46.8	62.2	69.1	73.2	61.2	69.1	78.3
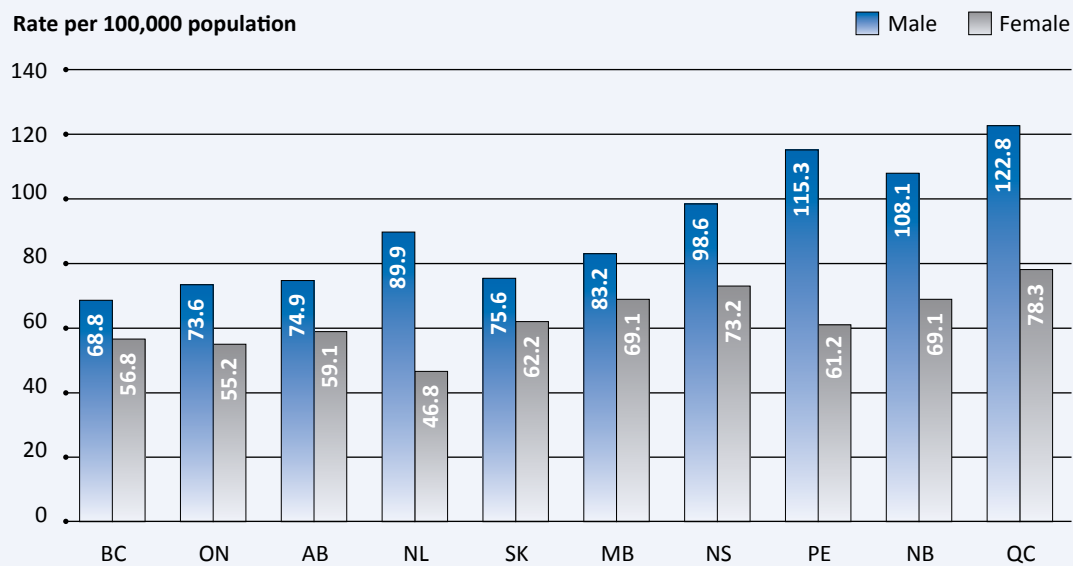
QC data are for 2008.

Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 8.8

Age-standardized (2011 population) mortality rates for lung cancer, by province – from 2007 to 2009

Rate per 100,000 population

Province	Rate
BC	51.6
AB	51.6
ON	52.8
SK	53.5
MB	55.9
PE	62.0
NL	66.4
NS	66.8
NB	74.3
QC	74.7
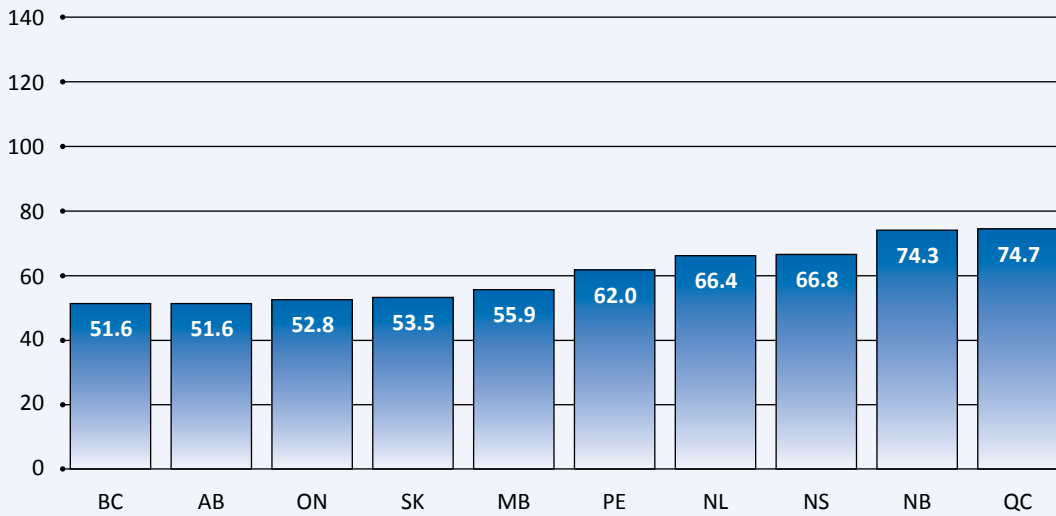
Data source: Statistics Canada, Vital Statistics Death Database

FIGURE 8.9

Age-standardized[†] five-year relative survival ratios for lung cancer, by province – from 2006 to 2008
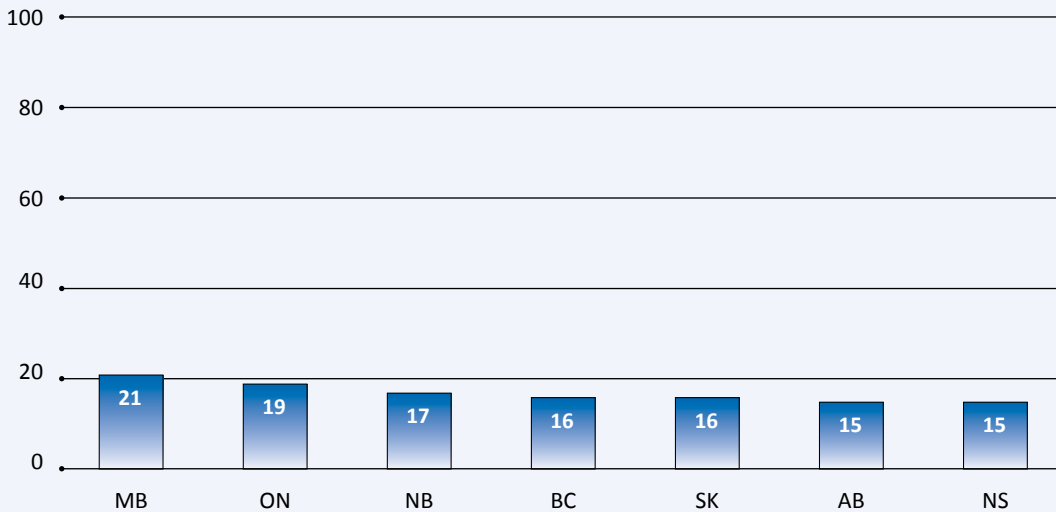
Relative survival (%)

Province	Survival
MB	21
ON	19
NB	17
BC	16
SK	16
AB	15
NS	15

† Age standardized to population diagnosed with lung cancer in Canada between 1992 and 2001.

Data based on 15 to 99 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

NL survival ratios not shown due to incomplete death clearance data, which may result in inflated survival ratios.

PE data not shown due to small number of cases.

Data source: Statistics Canada, Canadian Cancer Statistics

FIGURE 8.10

Age-standardized† five-year relative survival ratios for lung cancer, Canada – 1992 to 1994 vs. 2006 to 2008

Relative survival (%)

† Age standardized to population diagnosed with lung cancer in Canada between 1992 and 2001.

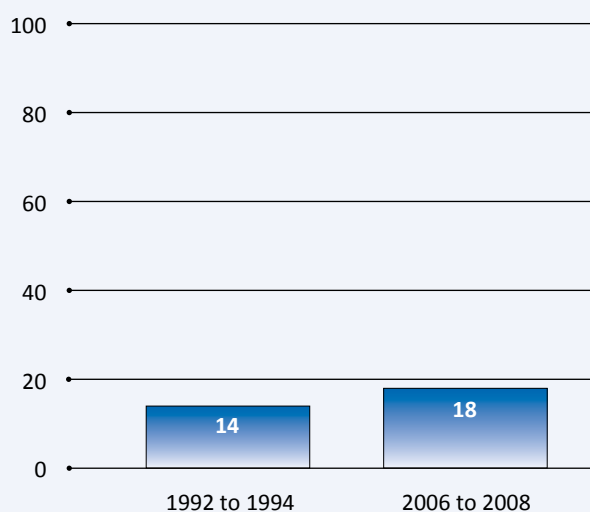Data based on 15 to 99 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

Data source: Statistics Canada, Canadian Cancer Statistics

What do the results mean?

- Current trends in lung cancer incidence and mortality reflect historical cigarette smoking prevalence, which peaked earlier in males than in females, so the decrease in lung cancer rates seen in men for some decades is yet to occur in women. These Canadian patterns match trend data available internationally, suggesting that lung cancer mortality rates have peaked and are now declining among men in many countries, including the United States, Canada, England, Denmark, Australia, Finland and the Netherlands.[249,250] Rates among women continue to rise, except in the United States, where the death rate among women rose from 1975 to 2003 and then fell from 2003 to 2008.[247]

- Differences in provincial age-standardized rates for lung cancer incidence and mortality also reflect interprovincial variations in tobacco use. Quebec and the Atlantic provinces had higher smoking prevalence rates than central and western Canada, which largely explains the higher lung cancer burden in those provinces.

- The five-year RSR for lung cancer in Canada (excluding Quebec) was 18% in 2006–2008. Data from the United States demonstrate a small but significant rise in survival since 1975, with five-year survival at 11.5% in 1975 and 15.9% in 2003.[247] An analysis comparing cancer registry data from several countries showed that five-year relative survival for lung cancer was higher in Australia and Canada and lower in Denmark and the United Kingdom.[251]

Emerging evidence and studies

• The National Lung Screening Trial has shown that screening current or former heavy smokers with low-dose helical computed tomography (LDCT) decreases mortality from lung cancer by about 20%.[252] Although the results are encouraging, more investigation is needed in the following areas: over-diagnosis, net benefit versus harm, at-risk population to screen, frequency and duration of LDCT screening, the most appropriate diagnostic work-up of screen-detected abnormalities and implications for public policy. The Canadian Partnership Against Cancer is organizing national forums to examine these and other considerations in lung cancer screening.

Colorectal Cancer

What are we measuring?

This indicator measures the age-standardized incidence rate, the age-standardized mortality rate and the five-year relative survival for colorectal cancer. These indicators are examined over time and by province.

• Colorectal cancer is the third most commonly diagnosed cancer in the country, with an estimated 13,270 cases diagnosed among men and 10,600 cases diagnosed among women in 2013. Colorectal cancer is the second leading cause of cancer death in men and the third most common cause of cancer death among women.[96]

What are the results?

• The age-standardized incidence rate (ASIR) for colorectal cancer in Canada remained relatively stable for males, hovering at approximately 80 cases per 100,000 males. The ASIR for females decreased significantly from 58 cases per 100,000 females in 1992 to 54 in 2008 (annual percent change [APC] = −0.31%) (Figure 8.11).

• The age-standardized mortality rate (ASMR) decreased significantly for both males and females. The ASMR for males decreased from approximately 43 deaths per 100,000 males in 1992 to 33 in 2009 (APC = −1.45%). The ASMR for females declined from 28 deaths per 100,000 females in 1992 to about 21 in 2009 (APC = −1.67%) (Figure 8.11).

• From 2008 to 2010, the ASIRs for both females and males were lowest in British Columbia and highest in Newfoundland and Labrador. The ASIR for colorectal cancer among males ranged from 69.9 cases per 100,000 males in British Columbia to 105.0 in Newfoundland and Labrador. Among females it ranged from 48.2 cases per 100,000 females in Alberta to 69.3 in Newfoundland and Labrador (Figure 8.12).

• From 2007 to 2009, the ASMR for colorectal cancer ranged from 23.8 deaths per 100,000 population in Alberta to 42.1 in Newfoundland and Labrador (Figure 8.13), a 77% difference.

• The five-year age-standardized relative survival ratio (RSR) for colorectal cancer did not vary widely across provinces in 2006–2008, ranging from 61% in Saskatchewan to 67% in Ontario (Figure 8.14). The RSR for Canada (excluding Quebec) was 65% in 2006–2008 (Figure 8.15), a 9 percentage point increase from the rate in 1992–1994.

Data and measurement considerations

• Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 8.11

Age-standardized (2011 population) incidence and mortality rates for colorectal cancer, by sex, Canada – from 1992 to 2009
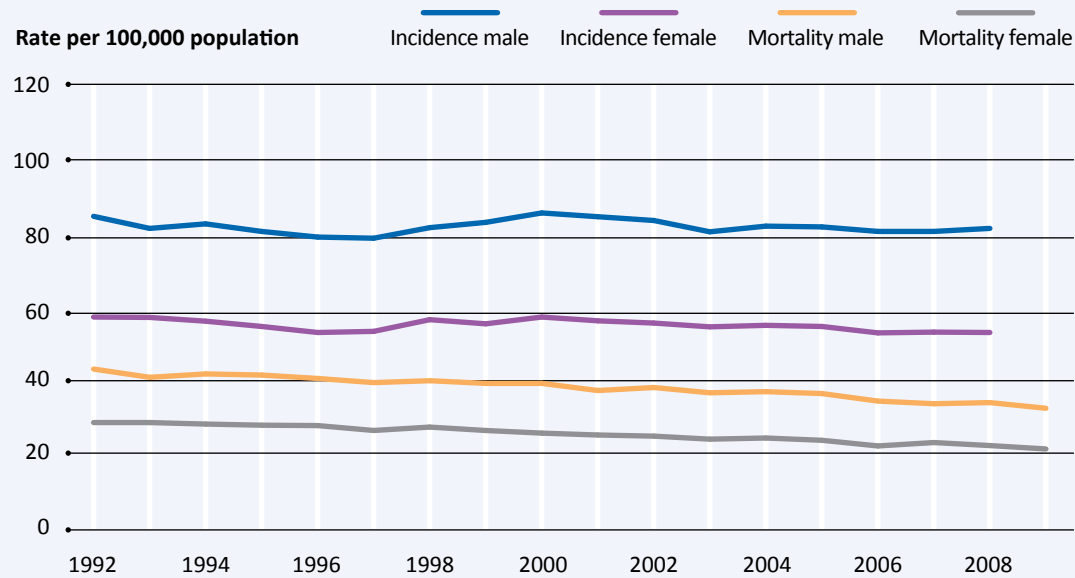
Rate per 100,000 population

Incidence male Incidence female Mortality male Mortality female

Data source: Statistics Canada, Canadian Cancer Registry, Vital Statistics Death Database

FIGURE 8.12

Age-standardized (2011 population) incidence rates for colorectal cancer, by sex, by province – from 2008 to 2010

Rate per 100,000 population

Male Female

Province	Male	Female
BC	69.9	48.3
AB	75.8	48.2
ON	73.8	51.2
SK	80.3	55.7
PE	78.6	58.4
NB	84.7	55.5
QC	89.1	58.8
MB	89.4	59.6
NS	94.4	64.4
NL	105.0	69.3
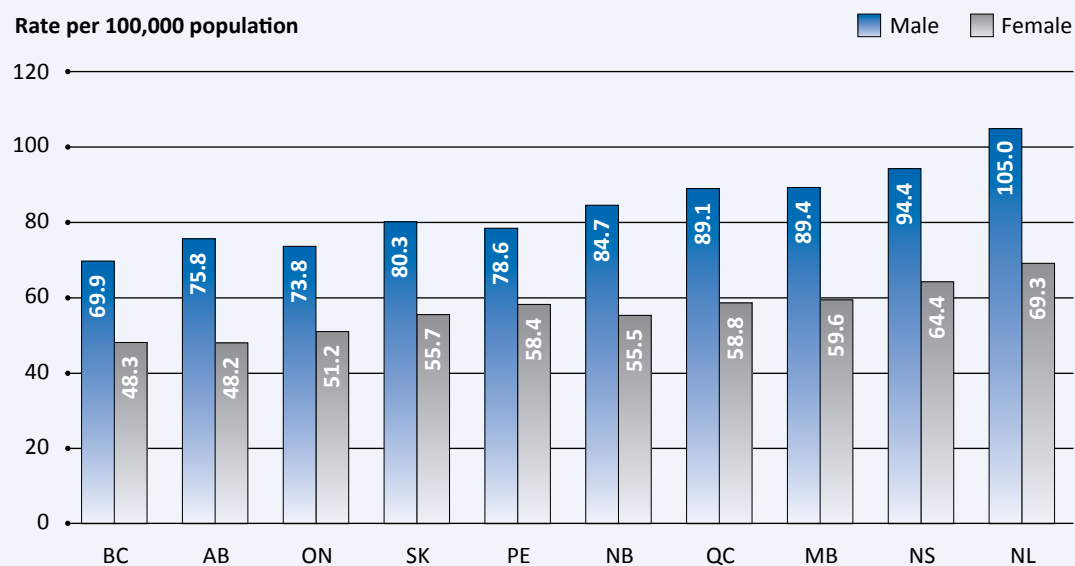
QC data are for 2008.

Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 8.13

Age-standardized (2011 population) mortality rates for colorectal cancer, by province – from 2007 to 2009

Rate per 100,000 population

Province	Rate
AB	23.8
BC	24.5
SK	24.6
PE	25.9
ON	26.0
NB	26.8
MB	28.9
QC	29.6
NS	34.2
NL	42.1
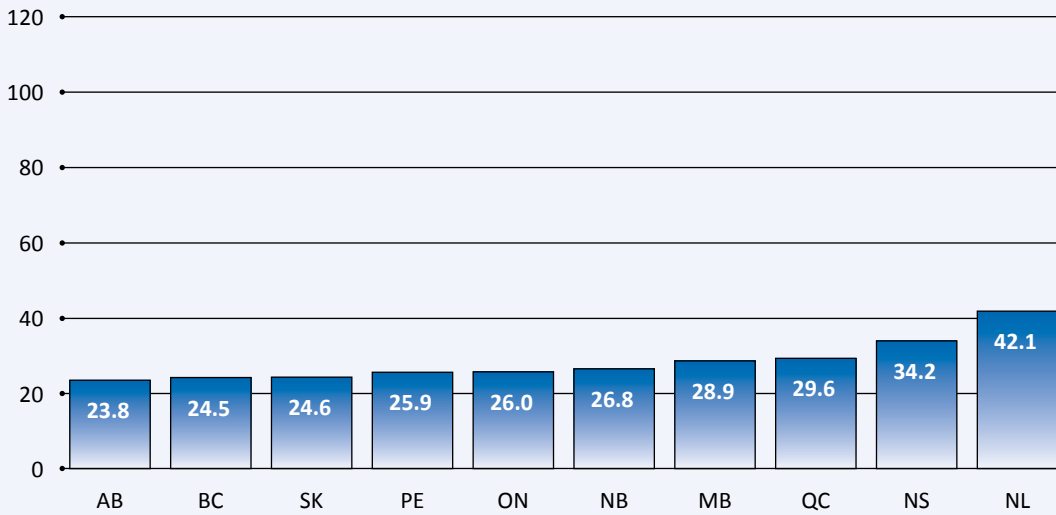
Data source: Statistics Canada, Vital Statistics Death Database

FIGURE 8.14

Age-standardized[†] five-year relative survival ratios for colorectal cancer, by province – from 2006 to 2008

Relative survival (%)

Province	Survival
ON	67
AB	62
BC	62
NB	62
MB	61
NS	61
PE	61
SK	61

† Age standardized to population diagnosed with colorectal cancer in Canada between 1992 and 2001.

Data based on 15 to 99 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

NL survival ratios not shown due to incomplete death clearance data, which may result in inflated survival ratios.

Data source: Statistics Canada, Canadian Cancer Statistics

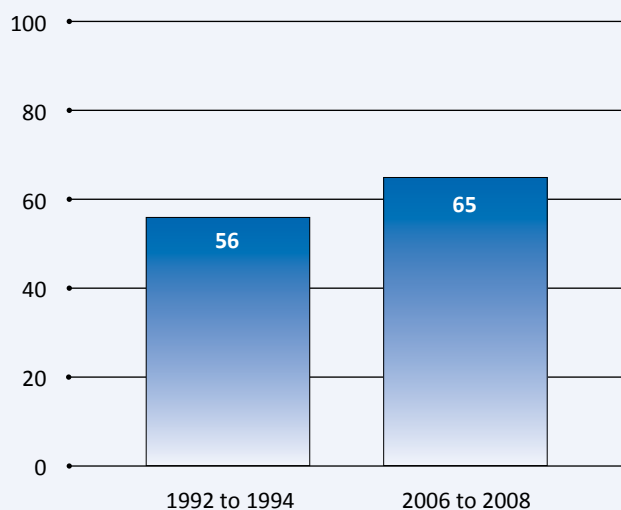## Age-standardized† five-year relative survival ratios for colorectal cancer, Canada – 1992 to 1994 vs. 2006 to 2008

Relative survival (%)

† Age standardized to population diagnosed with colorectal cancer in Canada between 1992 and 2001.

Data based on 15 to 99 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

Data source: Statistics Canada, Canadian Cancer Statistics

What do the results mean?

- Because data presented in this section are for 2008 and provincial colorectal cancer screening programs were just getting started around that time, it is not yet possible to assess the impact of screening programs on reductions in incidence and mortality. The decrease in mortality observed in both Canada and the United States[247] is likely due to improved treatment and increased awareness and early detection.

- The five-year age-standardized RSR increased by 9 percentage points in Canada from 1992–1994 to 2006–2008. In the United States, the five-year RSR had risen from 1995 to 2001 and has since stabilized.[247] An international study that compared 12 industrialized nations, including Canada, found that the United States had the highest five-year RSR from 2002 to 2007 at 65.5%.[248]

- Ontario's five-year RSRs are 5% to 6% higher than in all other provinces; more analysis is needed to determine whether this reflects more effective early detection in the province, more effective treatment or both.

Emerging evidence and studies

- In the United States, screening for colorectal cancer has led to a decrease in the incidence of tumours diagnosed at regional and distant stages among screening-eligible adults aged 50 and older.[253] In Canada, it is too soon to see a measurable impact of colorectal cancer screening on stage at diagnosis. As colorectal cancer screening programs achieve higher uptake, we expect a reduction in the incidence rates for colorectal cancers diagnosed in late stage, as seen in the United States.

Prostate Cancer

What are we measuring?

This indicator measures the age-standardized incidence rate and the age-standardized mortality rate for prostate cancer. These indicators are examined over time and by province.

- Prostate cancer is the most commonly diagnosed cancer among Canadian men, expected to account for more than one quarter (24.5%) of all new male cancer cases in 2013.[96]

What are the results?

- The age-standardized incidence rate (ASIR) for prostate cancer in Canada has remained stable at around 160 cases per 100,000 males from 1992 to 2008, while the age-standardized mortality rate (ASMR) has decreased significantly from approximately 45 to 30 deaths per 100,000 males from 1992 to 2009 (annual percent change = −2.63%) (Figure 8.16).

- From 2008 to 2010, the difference in ASIR between the lowest and highest provincial rate was 54.3% (Figure 8.17). The ASIR ranged from 125.7 cases per 100,000 males in Quebec to 194.0 in New Brunswick.

- From 2007 to 2009, the ASMR ranged from 26.0 deaths per 100,000 males in Quebec to 41.7 in Saskatchewan (Figure 8.18), a 60.4% difference.

Data and measurement considerations

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 8.16

Age-standardized (2011 population) incidence and mortality rates for prostate cancer, Canada – from 1992 to 2009
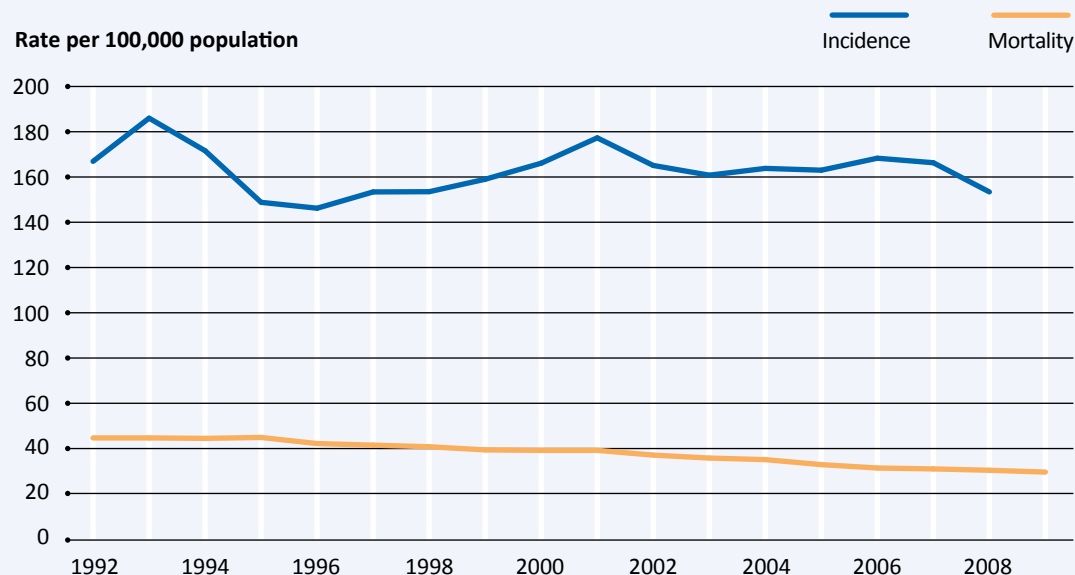
Data source: Statistics Canada, Canadian Cancer Registry, Vital Statistics Death Database

FIGURE 8.17

Age-standardized (2011 population) incidence rates for prostate cancer, by province – from 2008 to 2010

Rate per 100,000 population

Province	Rate
QC	125.7
MB	134.2
BC	148.0
SK	153.0
NS	155.0
ON	158.7
AB	160.9
NL	177.3
PE	191.2
NB	194.0
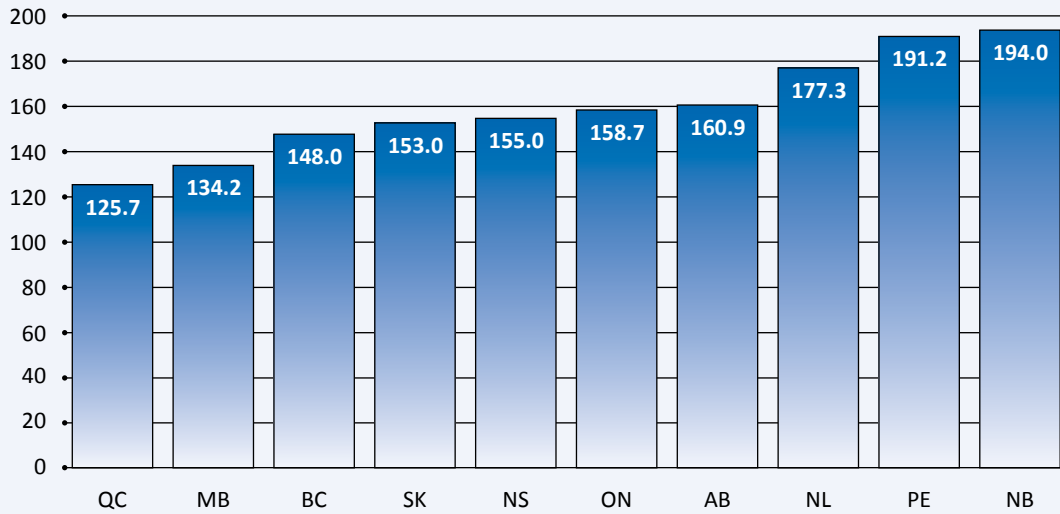
QC data are for 2008.

Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 8.18

Age-standardized (2011 population) mortality rates for prostate cancer, by province – from 2007 to 2009

Rate per 100,000 population

Province	Rate
QC	26.0
BC	29.5
ON	29.7
NS	33.1
NB	33.9
AB	33.9
NL	35.3
PE	37.5
MB	37.9
SK	41.7
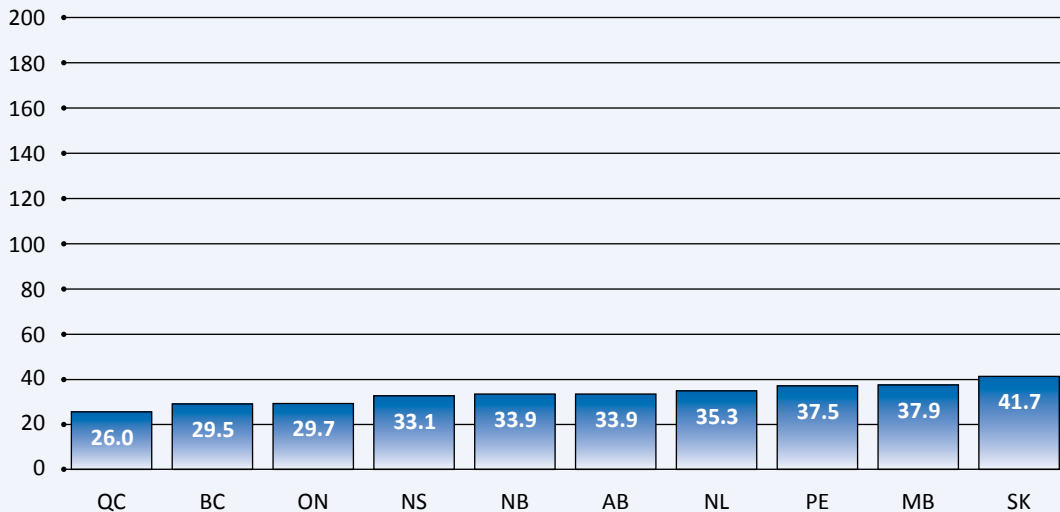
Data source: Statistics Canada, Vital Statistics Death Database

What do the results mean?

- Prostate cancer incidence rates are sensitive to prostate-specific antigen (PSA) testing because testing may result in the detection of latent asymptomatic disease. Because previous analysis, as presented in system performance reports, does not show a relationship between increased early-stage detection and a decrease in mortality,[94] the drop in ASMR between 1992 and 2008 is more likely to reflect improvements in treatment effectiveness. Mortality rates have been decreasing in most western countries, including, besides Canada, the United States, Finland, France, Norway, Portugal, Sweden and Australia.[254]

- Incidence rates in the United States, Canada and Australia are generally decreasing after increasing dramatically between the late 1980s and early 1990s because of the rapid dissemination of PSA testing, while rates in the United Kingdom and elsewhere in Europe continue to increase slightly because of increased awareness and gradual adoption of PSA testing.[254] Prostate cancer incidence rates are highest in Australia and New Zealand and lowest in south-central Asia, with around a 25-fold variation in ASIRs among the regions of the world.[246]

Emerging evidence and studies

- Data from a recent report by the Canadian Partnership Against Cancer show that men from higher-income neighbourhoods have a higher incidence rate for prostate cancer than men from lower-income neighbourhoods and are often diagnosed at earlier stages. These findings are consistent with higher rates of PSA testing among high-income men. Despite higher rates of testing, however, high-income men had slightly higher rates of advanced-stage (Stages III and IV) prostate cancer than low-income men. These findings, which require further research to be confirmed, suggest that PSA testing does not reduce the risk of developing advanced-stage prostate cancer.

Pancreatic Cancer

What are we measuring?

This indicator measures the age-standardized incidence rate, the age-standardized mortality rate and the five-year relative survival for pancreatic cancer. These indicators are examined over time and by province.

- Pancreatic cancer is the tenth most common cancer in Canada, with an estimated 4,700 new cases in 2013. Pancreatic cancer is also the fourth leading cause of cancer death in Canada (behind lung, colorectal and breast cancer), with an estimated 4,300 deaths in 2013.[72]

What are the results?

- Between 1992 to 2008, the age-standardized incidence rate (ASIR) for pancreatic cancer decreased significantly among males, from 51.1 to 13.6 incident cases per 100,000 males (annual percent change [APC] = −0.47%). Similarly, the age-standardized mortality rate (ASMR) for males also decreased from approximately 15 deaths in 1992 to 14 deaths per 100,000 males in 2009 (APC = −0.57%) (Figure 8.19). Over the same periods, the ASIR and ASMR remained relatively stable for females.

- There was wide interprovincial variation in the ASIR for pancreatic cancer, ranging from 8.3 cases per 100,000 population in Newfoundland and Labrador to 17.1 in Prince Edward Island (Figure 8.20). The percentage difference in the ASMR between the lowest and highest provincial rate was 25.5% from 2005 to 2009. The ASMR ranged from 11.0 deaths per 100,000 population in Newfoundland and Labrador to 13.8 in New Brunswick (Figure 8.21).

- From 2005 to 2007, the five-year age-standardized relative survival ratio (RSR) ranged from 5% in Nova Scotia to 11% in Ontario (Figure 8.22). The five-year RSR for Canada (excluding Quebec) rose from 5% in 1992–1994 to 8% in 2006–2008 (Figure 8.23).

Data and measurement considerations

- Caution should be used when comparing the RSR across provinces for pancreatic cancer. Under-ascertainment of deaths because of linkage failure of registry data with death certificates or because of unregistered annual emigration could lead to severe over-estimation of survival because patients lost to follow-up are assumed to be alive at the cut-off date.[255] This limitation has a much greater effect on estimates for people in younger and middle-aged groups.

- Age-standardized RSRs were not available for all provinces because sparse data in some age groups would result in unstable age-standardized rates.

- Detailed calculation methodology is provided in the Technical Appendix, available at systemperformance.ca.

FIGURE 8.19

Age-standardized (2011 population) incidence and mortality rates for pancreatic cancer, by sex, Canada – from 1992 to 2009
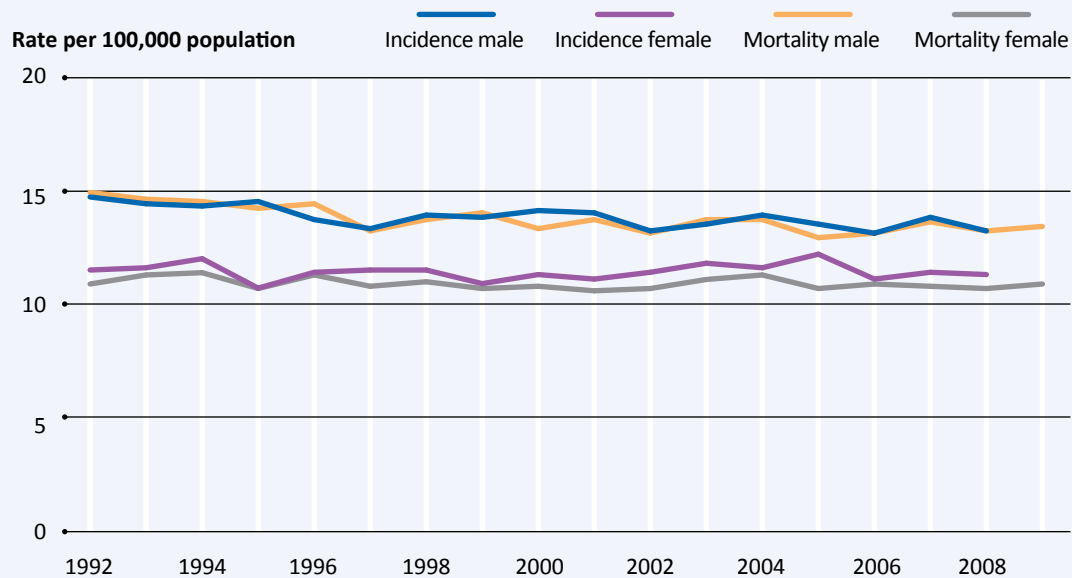
Data source: Statistics Canada, Canadian Cancer Registry, Vital Statistics Death Database

FIGURE 8.20

Age-standardized (2011 population) incidence rates for pancreatic cancer, by province – from 2008 to 2010

Rate per 100,000 population
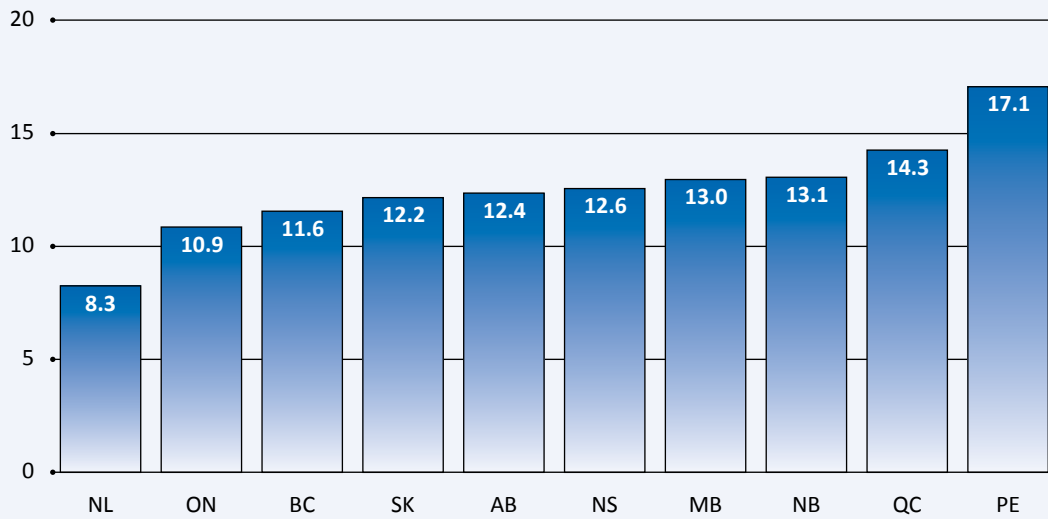
QC data are for 2008.

Data source: Statistics
Canada, Canadian Cancer
Registry

FIGURE 8.21

Age-standardized (2011 population) mortality rates for pancreatic cancer, by province – from 2005 to 2009

Rate per 100,000 population
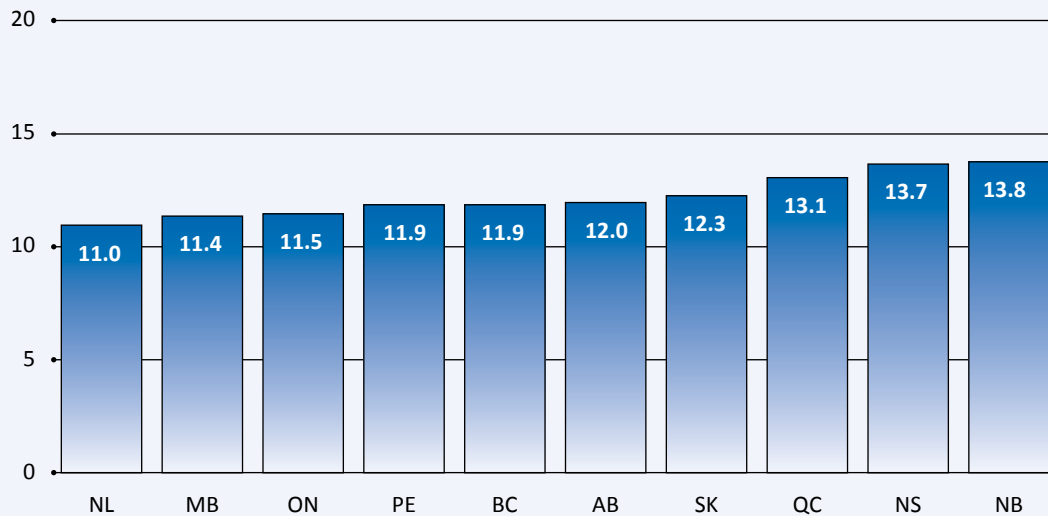
Data source: Statistics
Canada, Vital Statistics
Death Database

FIGURE 8.22

Age-standardized[†] five-year relative survival ratios for pancreatic cancer, by province – from 2005 to 2007

Relative survival (%)
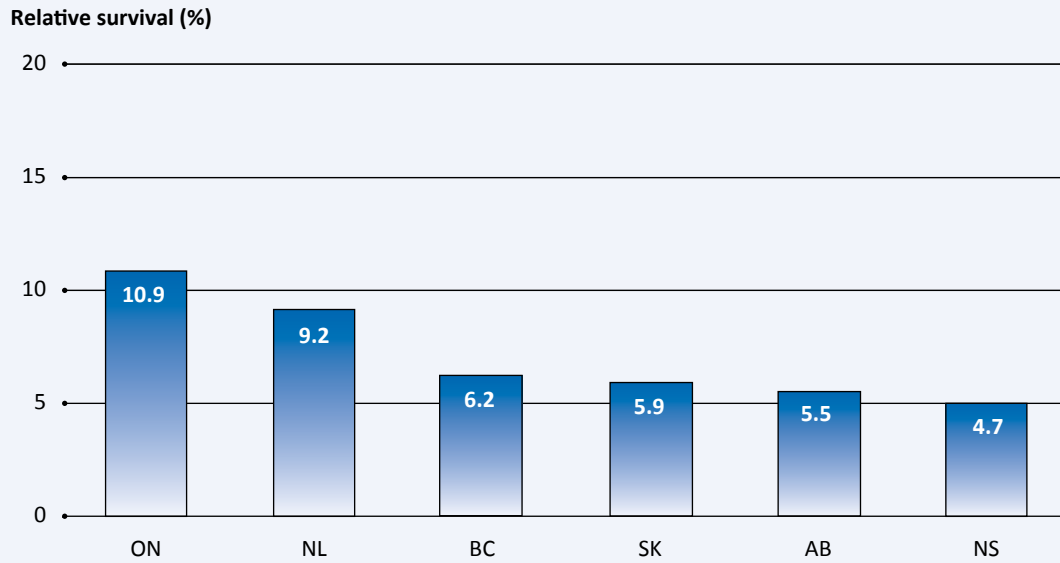
[†] Age standardized to population diagnosed with pancreatic cancer in Canada between 2001 and 2005.

Data based on 15 to 74 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

MB, NB and PE have sparse data in some age groups; therefore, results not shown due to unstable estimate.

Data source: Statistics Canada, Canadian Cancer Registry

FIGURE 8.23

Age-standardized[†] five-year relative survival ratios for pancreatic cancer, Canada – 1992 to 1994 vs. 2006 to 2008
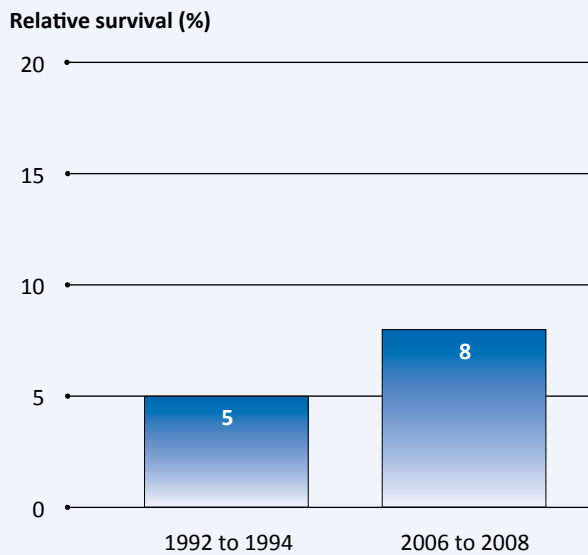
Relative survival (%)

[†] Age standardized to population diagnosed with pancreatic cancer in Canada between 1992 and 2001.

Data based on 15 to 99 years of age at diagnosis.

QC data excluded due to different methodology for determining date of diagnosis.

Data source: Statistics Canada, Canadian Cancer Statistics

What do the results mean?

- Pancreatic cancer remains one of the most challenging cancers from a cancer control perspective. Smoking is a known risk factor for pancreatic cancer, as are obesity and diabetes, among other factors.[256] The more recent peak of smoking prevalence among women than among men likely explains why a decrease in mortality has been observed in men but not in women. The increases in obesity rates in Canada over the same timeframe (as reported in the Prevention section of this report) could be offsetting the benefits of decreased tobacco use.

- Over the past decade in the United Kingdom, the ASIR for women has increased by 7% (from 7.9 cases per 100,000 females in 1999–2001 to 8.5 in 2008–2010), while rates for males have remained relatively stable. The stable trend in ASIR for males partly reflects the decline in smoking prevalence – smoking accounts for around 29% of pancreatic cancer cases in the United Kingdom.[246]

- Unlike mortality trends in Canada, the ASMR in the United States fell slightly between 1975 and 2002 and then increased between 2002 and 2008.[247]

- Making sense of interprovincial variations in incidence and mortality rates is difficult in pancreatic cancer. While differences among provinces in risk profiles (e.g., tobacco use) may explain much of the variation in incidence and mortality, differences in relative survival are harder to explain without more information on diagnosis and treatment patterns.

Moving Forward

Considerable advances in cancer control in Canada have been achieved through the sustained efforts and collaborations of provincial and national partners. People diagnosed with cancer today have a better chance of surviving than they did even a decade ago. In spite of these efforts, cancer continues to be the leading cause of death in Canada, responsible for nearly 30% of all deaths, followed by cardiovascular diseases and chronic lower respiratory diseases.[72]

Grounded in and informed by the experiences of those working closely with and most affected by cancer, the Canadian Partnership Against Cancer (the Partnership) will continue to play its unique role in collaborating with provincial and national partners toward the optimization of cancer control planning, and in driving improvements in quality of practice in Canada. This work includes the production and dissemination of cancer system performance reports to inform opportunities for pan-Canadian system improvements and to promote the exchange and uptake of best practices across the country.

To increase the reach and utility of cancer system performance reporting, in 2014 the Partnership launched a System Performance website to allow users to navigate through the content of this report in a user-friendly and interactive manner and to download graphs and data directly from web pages, among other features. Later in 2014, the website will allow users to view cancer system performance information by disease site and by province or territory. The website is available at systemperformance.ca.

Also ahead are future **spotlight** reports, which will continue to provide insight into specific aspects of cancer control through more detailed indicators and other exploratory information. This year's spotlight report examined disparities in cancer control by income, geographic location and immigrant status. The upcoming spotlight report will include a range of performance indicators and will address current issues relevant to understanding the prostate cancer control continuum. Past spotlight reports have focused on colorectal, lung and breast cancer in Canada.

The 2013 system performance spotlight report examined cancer risk factors and screening participation in Canada's largest cities and other urban and rural communities. A spotlight report on cancer system resource use, planned for 2015, will expand on the suite of efficiency indicators and resource use patterns included in this report and will further examine system costs and sustainability. This examination will help inform future development of system efficiency targets and benchmarks to promote capacity and resource optimization efforts across the country. Also forthcoming in the spotlight series is a report focusing on stage data indicators.

Another aspect of the Partnership's System Performance Initiative's work is conducting **in-depth studies** to shed light on areas of cancer control that are unmeasured or under-measured. In 2013, an in-depth study began on the use of positron emission tomography scanners in the diagnosis and treatment of non–small cell lung cancer. Results available later in 2014 will help identify opportunities for more consistent and evidence-based use of this resource-intensive technology across the country. In 2014, the System Performance Initiative will launch a two-year in-depth study examining cancer patients' transitions from treatment to follow-up care and survivorship. The study will provide descriptive information as well as new quantitative and qualitative data in the form of indicators from existing data sets and primary data collected through surveys, retrospective reviews or both.

The development of performance targets and benchmarks for indicators being reported on will continue to feature in the work ahead. Targets and benchmarks have proven pivotal in identifying the direction and magnitude of potential system performance improvements based on indicator results. As in previous years, identification of these will be done through a consensus-based process incorporating available evidence. Likewise, knowledge translation and exchange efforts will continue in order to enhance the reach and impact of system performance information across a broad range of target audiences in the Canadian cancer control system. These efforts include wider

publication of system performance findings in scientific and medical journals as well as conference presentations.

Finally, a change will be made to the scope of the annual cancer system performance reports. As of the 2015 edition, the annual reports will feature a shorter list of well-established indicators that represent each cancer control domain and address key aspects of Canada's cancer control system performance. These "dashboard" indicators will be updated annually and will feature targets or benchmarks in the future. All other indicators previously reported on will be available at the Partnership's System Performance website and

will be updated periodically. In addition to the dashboard indicators, the *2015 Cancer System Performance Report* (and all subsequent annual reports) will feature special topics and analyses that help shed light on important and emerging issues in the cancer control system.

Future reports on the performance of the Canadian cancer control system, together with the online presence for system performance information and other publications and knowledge translation and exchange tools, will continue to provide health system decision-makers with the system performance knowledge they need to inform quality improvements across the country.

Enhancements to future reports, publications and other knowledge translation and exchange efforts produced by the Canadian Partnership Against Cancer's System Performance Initiative are informed by annual independent evaluations. An evaluation of this report and other products released during the 2013/2014 cycle will be conducted later in 2014. *If you would like to participate in the upcoming evaluation process or wish to provide any feedback or suggestions, please email us at sp-info@partnershipagainstcancer.ca.*

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